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Recommendations on the

TRANSPORT OF DANGEROUS GOODS

Model Regulations

Volume I

Twenty-second revised edition

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INTRODUCTION

The Recommendations on the Transport of Dangerous Goods are addressed to governments and to the international organizations concerned with safety in the transport of dangerous goods.

The first version, prepared by the United Nations Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods, was published in 1956 (ST/ECA/43-E/CN.2/170).

In response to developments in technology and the changing needs of users, they have been regularly amended and updated at succeeding sessions of the Committee of Experts pursuant to Resolution 645 G (XXIII) of 26 April 1957 of the Economic and Social Council and subsequent resolutions.

At its nineteenth session (2-10 December 1996), the Committee adopted a first version of the "Model Regulations on the Transport of Dangerous Goods", which were annexed to the tenth revised edition of the Recommendations on the Transport of Dangerous Goods. This was done to facilitate the direct integration of the Model Regulations into all modal, national and international regulations and thereby enhance harmonization, facilitate regular updating of all legal instruments concerned, and result in overall considerable resource savings for the Governments of the Member States, the United Nations, the specialized agencies and other international organizations.

By resolution 1999/65 of 26 October 1999, the Economic and Social Council extended the mandate of the Committee to the global harmonization of the various systems of classification and labelling of chemicals which are applicable under various regulatory regimes, e.g.: transport; workplace safety; consumer protection; environment protection, etc.

The Committee was reconfigured and renamed "Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals", supported with one sub-committee specialized in transport of dangerous goods and another one addressing the global harmonization of classification and labelling of chemicals.

At its tenth session (11 December 2020), the Committee adopted a set of amendments to the Model Regulations on the Transport of Dangerous Goods, concerning, *inter alia*, electric storage systems (including modification of the lithium battery mark and provisions for transport of assembled batteries not equipped with overcharge protection); requirements for the design, construction, inspection and testing of portable tanks with shells made of fibre reinforced plastics (FRP) materials; listing of dangerous goods; and harmonization with the IAEA Regulations for the Safe Transport of Radioactive Material.

This twenty-second revised edition of the Recommendations takes account of all the amendments which were circulated as document ST/SG/AC.10/48/Add.1.

At its tenth session, the Committee also adopted a set of amendments to the "*Manual of Tests and Criteria*" (ST/SG/AC.10/48/Add.2) and the "*Globally Harmonized System of Classification and Labelling of Chemicals*" (GHS) (ST/SG/AC.10/48/Add.3). The amendments adopted by the Committee will be reflected in amendment 1 to the seventh revised edition of the Manual (ST/SG/AC.10/11/Rev.7/Amend.1) and the ninth revised edition of the GHS (ST/SG/AC.10/30/Rev.9).

This publication has been prepared by the secretariat of the United Nations Economic Commission for Europe (UNECE) which provides secretariat services to the Economic and Social Council's Committee of Experts.

Additional information, including corrigenda to this publication, if any, may be found on the UNECE Sustainable Transport Division website:

https://unece.org/transport/dangerous-goods

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VOLUME II

RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS

NATURE, PURPOSE AND SIGNIFICANCE OF THE RECOMMENDATIONS

1. These Recommendations have been developed by the United Nations Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods[1] in the light of technical progress, the advent of new substances and materials, the exigencies of modern transport systems and, above all, the requirement to ensure the safety of people, property and the environment. They are addressed to governments and international organizations concerned with the regulation of the transport of dangerous goods. They do not apply to the bulk transport of dangerous goods in sea-going or inland navigation bulk carriers or tank-vessels, which is subject to special international or national regulations.

2. The recommendations concerning the transport of dangerous goods are presented in the form of "Model Regulations on the Transport of Dangerous Goods", which are presented as an annex to this document. The Model Regulations aim at presenting a basic scheme of provisions that will allow uniform development of national and international regulations governing the various modes of transport; yet they remain flexible enough to accommodate any special requirements that might have to be met. It is expected that governments, intergovernmental organizations and other international organizations, when revising or developing regulations for which they are responsible, will conform to the principles laid down in these Model Regulations, thus contributing to worldwide harmonization in this field. Furthermore, the new structure, format and content should be followed to the greatest extent possible in order to create a more user-friendly approach, to facilitate the work of enforcement bodies and to reduce the administrative burden. Although only a recommendation, the Model Regulations have been drafted in the mandatory sense (i.e., the word "shall" is employed throughout the text rather than "should") in order to facilitate direct use of the Model Regulations as a basis for national and international transport regulations.

3. The scope of the Model Regulations should ensure their value for all who are directly or indirectly concerned with the transport of dangerous goods. Amongst other aspects, the Model Regulations cover principles of classification and definition of classes, listing of the principal dangerous goods, general packing requirements, testing procedures, marking, labelling or placarding, and transport documents. There are, in addition, special requirements related to particular classes of goods. With this system of classification, listing, packing, marking, labelling, placarding and documentation in general use, carriers, consignors and inspecting authorities will benefit from simplified transport, handling and control and from a reduction in time-consuming formalities. In general, their task will be facilitated and obstacles to the international transport of such goods reduced accordingly. At the same time, the advantages will become increasingly evident as trade in goods categorized as "dangerous" steadily grows.

PRINCIPLES UNDERLYING THE REGULATION OF THE TRANSPORT OF DANGEROUS GOODS

4. Transport of dangerous goods is regulated in order to prevent, as far as possible, accidents to persons or property and damage to the environment, the means of transport employed or to other goods. At the same time, regulations should be framed so as not to impede the movement of such goods, other than those too dangerous to be accepted for transport. With this exception, the aim of regulations is to make transport feasible by eliminating risks or reducing them to a minimum. It is a matter therefore of safety no less than one of facilitating transport.

5. The Model Regulations annexed to this document are addressed to all modes of transport. Modal transport regulations may occasionally apply other requirements for operational reasons.

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[1] *In 2001, the Committee was reconfigured and renamed "Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals" (see resolution 1999/65 of 26 October 1999 of the Economic and Social Council).*

CLASSIFICATION AND DEFINITIONS OF CLASSES OF DANGEROUS GOODS

6. The classification of goods by type of hazard involved has been drawn up to meet technical conditions while at the same time minimizing interference with existing regulations. It should be noted that the numerical order of the classes is not that of the degree of danger.

7. The objective of the recommended definitions is to indicate which goods are dangerous and in which class, according to their specific characteristics, they should be included. These definitions have been devised so as to provide a common pattern which it should prove possible to follow in the various national and international regulations. Used with the list of dangerous goods, the definitions should provide guidance to those who have to use such regulations; and they present a notable degree of standardization while retaining a flexibility that allows diverse situations to be taken into account. Classifications for substances in the Model Regulations are made on the basis of consideration of data submitted to the Committee by governments, intergovernmental organizations and other international organizations in the form recommended in Figure 1. However the actual data submitted are not formally endorsed by the Committee.

8. The Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.7 and Amend.1) presents the United Nations schemes for the classification of certain types of dangerous goods and gives descriptions of the test methods and procedures, considered to be the most useful, for providing competent authorities with the necessary information to arrive at a proper classification of substances and articles for transport. It should be noted that the Manual is not a concise formulation of testing procedures that will unerringly lead to a proper classification of products and it assumes, therefore, competence on the part of the testing authority and leaves responsibility for classification with them. The competent authority has discretion to dispense with certain tests, to vary the details of tests and to require additional tests, when this is justified, to obtain a reliable and realistic assessment of the hazard of a product.

9. Wastes should be transported under the requirements of the appropriate class considering their hazards and the criteria presented in the Model Regulations. Wastes not otherwise subject to these Regulations but covered under the Basel Convention[2] may be transported under Class 9.

10. Many of the substances listed in Classes 1 to 9 are deemed as being dangerous to the environment. Additional labelling is not always specified except for transport by sea. Criteria for substances and mixtures dangerous to the aquatic environment are given in Chapter 2.9 of the Model Regulations.

11. Many consignments of goods are treated with fumigants that pose a hazard during transport, in particular to workers who may be exposed unknowingly when they open cargo transport units. The Model Regulations address fumigated cargo transport units as consignments that are subject to special documentation and warning sign requirements in the consignment procedures of Part 5.

CONSIGNMENT PROCEDURES

12. Whenever dangerous goods are offered for transport certain measures should be taken to ensure that the hazards of the dangerous goods offered are adequately communicated to all who may come in contact with the goods in the course of transport. This has traditionally been accomplished through special marking and labelling of packages to indicate the hazards of a consignment and through the inclusion of relevant information in the transport documents and by placarding of cargo transport units. Requirements in this regard are provided in the Model Regulations annexed to this document.

13. The labels recommended in 5.2.2.2 of the Model Regulations should be affixed on goods or packages. The labelling system is based on the classification of dangerous goods and was established with the following aims in mind:

[2] *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989).*

(a) To make dangerous goods easily recognizable from a distance by the general appearance (symbol, colour and shape) of the labels they bear;

(b) To provide, by means of colours on the labels, a useful first guide for handling, stowage and segregation.

14. In certain cases, where the danger of an item of dangerous goods is considered low, or the goods are packed in a limited quantity, exemptions from labelling may be provided. In such cases, marking of packages with the class or division and the packing group number may be required.

15. One of the primary requirements of the transport document for dangerous goods is to convey the fundamental information relative to the hazard of the goods being offered for transport. To achieve this end, it is considered necessary to include certain basic information in the transport document for the dangerous goods consignment unless otherwise exempted in the Model Regulations. It is recognized that individual national authorities or international organizations may consider it necessary to require additional information. However, the basic items of information considered necessary for each dangerous substance, material or article offered for transport by any mode are identified in the Model Regulations.

EMERGENCY RESPONSE

16. The relevant national and/or international organizations should establish emergency provisions to be taken in the event of accidents or incidents during the transport of dangerous goods in order to protect persons, property and the environment. For radioactive material appropriate guidelines for such provisions are contained in “Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material”, Safety Standard Series No. TS-G-1.2 (ST-3), IAEA, Vienna (2002).

COMPLIANCE ASSURANCE

17. The competent authority should ensure compliance with these Regulations. Means to discharge this responsibility include the establishment and execution of a programme for monitoring the design, manufacture, testing, inspection and maintenance of packaging, the classification of dangerous goods and the preparation, documentation, handling and stowage of packages by consignors and carriers, to provide evidence that the provisions of the Model Regulations are being met in practice.

TRANSPORT OF RADIOACTIVE MATERIAL

18. The competent authority should ensure that the consignment, acceptance for transport and transport of radioactive material is subject to a Radiation Protection Programme as described in the Model Regulations. The competent authority should arrange for periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with the “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards”, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014).

REPORTING OF ACCIDENTS AND INCIDENTS

19. The relevant national and international organizations should establish provisions for the reporting of accidents and incidents involving dangerous goods in transport. Basic provisions in this connection are recommended in 7.1.9 of the Model Regulations. Reports or summaries of reports that the States or international organizations deem relevant to the work of the Sub-Committee of Experts on the Transport of Dangerous Goods (e.g., reports involving packaging and tank failures, major release) should be submitted to the Sub-Committee for its consideration and action, as appropriate.

Figure 1

DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES

Submitted by ..... Date .....

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - if necessary state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

Section 1. SUBSTANCE IDENTITY

1.1 Chemical name .....

1.2 Chemical formula .....

1.3 Other names/synonyms .....

1.4.1 UN number ..... 1.4.2 CAS number .....

1.5 Proposed classification for the Recommendations

1.5.1 proper shipping name (3.1.2[1]).....

1.5.2 class/division ..... subsidiary hazard(s) .....

packing group .....

1.5.3 proposed special provisions, if any .....

1.5.4 proposed packing instruction(s).....

Section 2. PHYSICAL PROPERTIES

2.1 Melting point or range.....°C

2.2 Boiling point or range .....°C

2.3 Relative density at :

2.3.1 15 °C .....

2.3.2 20 °C .....

2.3.3 50 °C .....

2.4 Vapour pressure at :

2.4.1 50 °C ..... kPa

2.4.2 65 °C ..... kPa

2.5 Viscosity at 20 °C[2] ..... m^2/s

2.6 Solubility in water at 20 °C ..... g/100 ml

2.7 Physical state at 20 °C (2.2.1.1[1]) ☐ solid ☐ liquid[2] ☐ gas

---

[1] *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

[2] *See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.*

2.8 Appearance at normal transport temperatures, including colour and odour .....

.....

.....

.....

2.9 Other relevant physical properties .....

.....

.....

.....

Section 3. FLAMMABILITY

3.1 Flammable vapour

3.1.1 Flash point (2.3.3[1]) .....°C oc/cc

3.1.2 Is combustion sustained? (2.3.1.3[1]) yes/no

3.2 Autoignition temperature .....°C

3.3 Flammability range (LEL/UEL) ..... %

3.4 Is the substance a flammable solid? (2.4.2[1]) yes/no

3.4.1 If yes, give details .....

.....

.....

.....

Section 4. CHEMICAL PROPERTIES

4.1 Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? yes/no

If yes, state:

4.1.1 Inhibitor/stabilizer used .....

4.1.2 Alternative method .....

4.1.3 Time effective at 55 °C.....

4.1.4 Conditions rendering it ineffective .....

4.2 Is the substance an explosive according to paragraph 2.1.1.1? (2.1[1]) yes/no

4.2.1 If yes, give details .....

.....

.....

.....

[1] *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

4.3 Is the substance a desensitized explosive? (2.4.2.4[1]) yes/no

4.3.1 If yes, give details .....

.....

.....

.....

4.4 Is the substance a self-reactive substance? (2.4.1[1]) yes/no

If yes, state:

4.4.1 exit box of flow chart... .....

What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? ..... °C

Is the temperature control required? (2.4.2.3.4[1]) yes/no

4.4.2 proposed control temperature for a 50 kg package ..... °C

4.4.3 proposed emergency temperature for a 50 kg package ..... °C

4.5 Is the substance pyrophoric? (2.4.3[1]) yes/no

4.5.1 If yes, give details .....

.....

.....

.....

4.6 Is the substance liable to self-heating? (2.4.3[1]) yes/no

4.6.1 If yes, give details .....

.....

.....

.....

4.7 Is the substance an organic peroxide (2.5.1[1]) yes/no

If yes state:

4.7.1 exit box of flow chart... .....

What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? ..... °C

Is temperature control required? (2.5.3.4.1[1]) yes/no

4.7.2 proposed control temperature for a 50 kg package ..... °C

4.7.3 proposed emergency temperature for a 50 kg package ..... °C

4.8 Does the substance in contact with water emit flammable gases? (2.4.4[1]) yes/no

4.8.1 If yes, give details .....

.....

.....

.....

[1] *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

4.9 Does the substance have oxidizing properties (2.5.1[1]) yes/no

4.9.1 If yes, give details .....

.....

.....

.....

4.10 Corrosivity (2.8[1]) to:

4.10.1 mild steel ..... mm/year at ..... °C

4.10.2 aluminium ..... mm/year at ..... °C

4.10.3 other packaging materials (specify)

.... mm/year at ..... °C

.... mm/year at ..... °C

4.11 Other relevant chemical properties .....

.....

.....

.....

Section 5. HARMFUL BIOLOGICAL EFFECTS

5.1 LD_{50}, oral (2.6.2.1.1[1]) .....mg/kg Animal species .....

5.2 LD_{50}, dermal (2.6.2.1.2[1]) .....mg/kg Animal species .....

5.3 LC_{50}, inhalation (2.6.2.1.3[1]) .....mg/litre Exposure time..... hours

or .....ml/m^3 Animal species .....

5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3[1]) .....ml/m^3

5.5 Skin exposure (2.8[1]) results Exposure time ..... hours/minutes

Animal species.....

5.6 Other data .....

.....

.....

.....

5.7 Human experience .....

.....

.....

.....

[1] *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

Section 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action

6.1.1 Fire (include suitable and unsuitable extinguishing agents) .....

.....

.....

.....

6.1.2 Spillage .....

.....

.....

.....

6.2 Is it proposed to transport the substance in:

6.2.1 Bulk Containers (6.8[1]) yes/no

6.2.2 Intermediate Bulk Containers (6.5[1])? yes/no

6.2.3 Portable tanks (6.7[1])? yes/no

If yes, give details in Sections 7, 8 and/or 9.

Section 7. BULK CONTAINERS (only complete if yes in 6.2.1)

7.1 Proposed type(s) .....

Section 8. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.2)

8.1 Proposed type(s).....

Section 9. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.3)

9.1 Description of proposed tank (including IMO tank type if known).....

9.2 Minimum test pressure .....

9.3 Minimum shell thickness .....

9.4 Details of bottom openings, if any .....

9.5 Pressure relief arrangements .....

9.6 Degree of filling .....

9.7 Unsuitable construction materials .....

[1] *This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.*

Annex

Model Regulations on the

TRANSPORT OF DANGEROUS GOODS

Notes on the structure of the

Model Regulations

These Model Regulations consist of seven parts, each of which is divided into chapters. Chapters are numbered sequentially within each part, with the first digit identifying the part in which the chapter is located. For example, the second chapter in Part 7 would be designated “Chapter 7.2”. Chapters are further divided into sections, which, in turn, are normally divided into a number of paragraphs. Sections and paragraphs are numbered sequentially with the first number always being the number of the chapter in which the section or paragraph is contained (e.g., 7.2.1 would be the first section in Chapter 7.2, and “7.2.1.1” would be the first paragraph in that section).

As an exception, and in order to keep a correspondence between the class number and the chapter number in Part 2, the first chapter (“Introduction”) of Part 2 has been numbered Chapter 2.0.

When references appear in the text to other provisions of these regulations, the reference will normally consist of the full section or paragraph reference, as described above. In certain cases, however, broader reference may be made to an entire part or chapter by noting only the relevant part (e.g., “Part 5”), or the relevant chapter (e.g., “Chapter 5.4”).

Recommendations on Tests and Criteria, which are incorporated by reference into certain provisions of these regulations, are published as a separate manual (“*Manual of Tests and Criteria*”) (ST/SG/AC.10/11/Rev.7 and Amend.1).

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VOLUME II

PART 1

GENERAL PROVISIONS, DEFINITIONS, TRAINING AND SECURITY

CHAPTER 1.1

GENERAL PROVISIONS

Introductory notes

NOTE 1: *Recommendations on Tests and Criteria, which are incorporated by reference into certain provisions of these Regulations, are published as a separate Manual ("Manual of Tests and Criteria") (ST/SG/AC.10/11/Rev.7 and Amend.1), the contents of which are:*

Part I: Classification procedures, test methods and criteria relating to explosives

Part II: Classification procedures, test methods and criteria relating to self-reactive substances, organic peroxides and polymerizing substances

Part III: Classification procedures, test methods and criteria relating to various hazard classes

Part IV: Test methods concerning transport equipment

Part V: Classification procedures, test methods and criteria relating to sectors other than transport

Appendices: Information common to a number of different types of tests and national contacts for test details.

NOTE 2: *Part III of the Manual of Tests and Criteria contains some classification procedures, test methods and criteria which are also given in these Regulations.*

1.1.1 Scope and application

1.1.1.1 These Regulations prescribe detailed requirements applicable to the transport of dangerous goods. Except as otherwise provided in these Regulations, no person may offer or accept dangerous goods for transport unless those goods are properly classified, packaged, marked, labelled, placarded, described and certified on a transport document, and otherwise in a condition for transport as required by these Regulations.

1.1.1.2 These Regulations do not apply to the transport of:

(a) Dangerous goods that are required for the propulsion of the means of transport or the operation of its specialised equipment during transport (e.g. refrigeration units) or that are required in accordance with the operating regulations (e.g. fire extinguishers); and

(b) Dangerous goods, packaged for retail sale, that are carried by individuals for their own use.

NOTE 1: *Specific modal provisions for the transport of dangerous goods as well as derogations from these general requirements can be found in the modal regulations.*

NOTE 2: *Certain special provisions of Chapter 3.3 also indicate substances and articles which are not subject to these Regulations.*

NOTE 3: *1.1.1.2 (a) above is only applicable to the means of transport performing the transport operation.*

NOTE 4: *For dangerous goods in equipment in use or intended for use during transport, see 5.5.4.*

1.1.1.3 In certain parts of these Regulations, a particular action is prescribed, but the responsibility for carrying out the action is not specifically assigned to any particular person. Such responsibility may vary according to the laws and customs of different countries and the international conventions into which these countries have entered. For the purposes of these Regulations, it is not necessary to make this assignment, but only to identify the action itself. It remains the prerogative of each government to assign this responsibility.

1.1.1.4 In the transport of dangerous goods, the safety of persons and protection of property and the environment are assured when these Regulations are complied with. Confidence in this regard is achieved through quality assurance and compliance assurance programmes.

1.1.1.5 ***Exceptions for dangerous goods packed in limited quantities***

Certain dangerous goods packed in limited quantities are exempted from certain requirements of these regulations subject to the conditions laid down in Chapter 3.4.

1.1.1.6 ***Transport of dangerous goods by post***

In accordance with the Universal Postal Union Convention, dangerous goods as defined in these Regulations, with the exception of those listed below, are not permitted in mail transported internationally. Appropriate national authorities should ensure that provisions are complied with in relation to the international transport of dangerous goods. The following dangerous goods may be acceptable in international mail subject to the provisions of the appropriate national authorities:

(a) Infectious substances, assigned to Category B (UN 3373) only, and solid carbon dioxide (dry ice) when used as a refrigerant for UN 3373; and

(b) Radioactive material in an excepted package conforming to the requirements of 1.5.1.5, the activity of which does not exceed one tenth of that listed in Table 2.7.2.4.1.2 and that does not meet the definitions and criteria of classes, other than Class 7, or divisions, as defined in Part 2.

For international movement by post additional requirements as prescribed by the Acts of the Universal Postal Union apply.

NOTE: *The Acts of the Universal Postal Union do not apply to the domestic transport of dangerous goods by mail. Domestic transport of dangerous goods in the mail is subject to the provisions of the appropriate national authorities.*

1.1.1.7 ***Application of standards***

Where the application of a standard is required and there is any conflict between the standard and these Regulations, the Regulations take precedence. The requirements of the standard that do not conflict with these Regulations shall be applied as specified, including the requirements of any other standard, or part of a standard, referenced within that standard as normative.

1.1.1.8 ***Transport of dangerous goods used as a coolant or conditioner***

Dangerous goods, that are only asphyxiant (which dilute or replace the oxygen normally in the atmosphere), when used in cargo transport units for cooling or conditioning purposes are only subject to the provisions of section 5.5.3.

1.1.1.9 ***Lamps containing dangerous goods***

The following lamps are not subject to these Regulations provided that they do not contain radioactive material and do not contain mercury in quantities above those specified in special provision 366 of Chapter 3.3:

(a) Lamps that are collected directly from individuals and households when transported to a collection or recycling facility;

(b) Lamps each containing not more than 1 g of dangerous goods and packaged so that there is not more than 30 g of dangerous goods per package, provided that:

(i) the lamps are certified to a manufacturer's quality management system;

NOTE: *The application of ISO 9001:2008 may be considered acceptable for this purpose.*

and

(ii) each lamp is either individually packed in inner packagings, separated by dividers, or surrounded with cushioning material to protect the lamps and packed into strong outer packagings meeting the general provisions of 4.1.1.1 and capable of passing a 1.2 m drop test.

(c) Used, damaged or defective lamps each containing not more than 1 g of dangerous goods with not more than 30 g of dangerous goods per package when transported from a collection or recycling facility. The lamps shall be packed in strong outer packagings sufficient for preventing release of the contents under normal conditions of transport meeting the general provisions of 4.1.1.1 and that are capable of passing a drop test of not less than 1.2 m.

(d) Lamps containing only gases of Division 2.2 (according to 2.2.2.1) provided they are packaged so that the projectile effects of any rupture of the bulb will be contained within the package.

NOTE: *Lamps containing radioactive material are addressed in 2.7.2.2.2(b).*

1.1.2 Dangerous goods forbidden from transport

1.1.2.1 Unless provided otherwise by these Regulations, the following are forbidden from transport:

Any substance or article which, as presented for transport, is liable to explode, dangerously react, produce a flame or dangerous evolution of heat or dangerous emission of toxic, corrosive or flammable gases or vapours under normal conditions of transport.

CHAPTER 1.2

DEFINITIONS AND UNITS OF MEASUREMENT

1.2.1 Definitions

NOTE: *This Chapter provides definitions of general applicability that are used throughout these Regulations. Additional definitions of a highly specific nature (e.g., terms relating to construction of intermediate bulk containers or portable tanks) are presented in the relevant chapters.*

For the purposes of these Regulations:

Aerosol or aerosol dispenser means an article consisting of a non-refillable receptacle meeting the requirements of 6.2.4, made of metal, glass or plastics and containing a gas, compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state;

Aircraft

Cargo aircraft means any aircraft, other than a passenger aircraft, which is carrying goods or property;

Passenger aircraft means an aircraft that carries any person other than a crew member, a carrier's employee in an official capacity, an authorized representative of an appropriate national authority, or a person accompanying a consignment or other cargo;

Alternative arrangement means an approval granted by the competent authority for a portable tank or MEGC that has been designed, constructed or tested to technical requirements or testing methods other than those specified in these regulations (see, for instance, 6.7.5.11.1);

Animal material means animal carcasses, animal body parts, foodstuffs or feedstuffs derived from animals;

Approval

Multilateral approval, for the transport of radioactive material, means approval by the relevant competent authority of the country of origin of the design or shipment, as applicable, and also, where the consignment is to be transported through or into any other country, approval by the competent authority of that country;

Unilateral approval, for the transport of radioactive material, means an approval of a design which is required to be given by the competent authority of the country of origin of the design only;

ASTM means the American Society for Testing and Materials (ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959, United States of America);

Bag means a flexible packaging made of paper, plastics film, textiles, woven material or other suitable materials;

Box means a packaging with complete rectangular or polygonal faces, made of metal, wood, plywood, reconstituted wood, fibreboard, plastics or other suitable material. Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the packaging during transport;

Bulk container means a containment system (including any liner or coating) intended for the transport of solid substances which are in direct contact with the containment system. Packagings, intermediate bulk containers (IBCs), large packagings and portable tanks are not included.

A bulk container is:

- of a permanent character and accordingly strong enough to be suitable for repeated use;
- specially designed to facilitate the transport of goods by one or more means of transport without intermediate reloading;
- fitted with devices permitting its ready handling;
- of a capacity of not less than 1.0 m^3.

Examples of bulk containers are freight containers, offshore bulk containers, skips, bulk bins, swap bodies, trough-shaped containers, roller containers, load compartments of vehicles, flexible bulk containers;

Bundle of cylinders means a pressure receptacle comprising an assembly of cylinders or cylinder shells that are fastened together and which are interconnected by a manifold and transported as a unit. The total water capacity shall not exceed 3 000 litres except that bundles intended for the transport of gases of Division 2.3 shall be limited to 1 000 litres water capacity;

Cargo transport unit means a road transport tank or freight vehicle, a railway transport tank or freight wagon, a multimodal freight container or portable tank, or a MEGC;

Carrier means any person, organization or government undertaking the transport of dangerous goods by any means of transport. The term includes both carriers for hire or reward (known as common or contract carriers in some countries) and carriers on own account (known as private carriers in some countries);

CGA means the Compressed Gas Association (CGA, 14501 George Carter Way, Suite 103, Chantilly, VA 20151, United States of America);

Closed cargo transport unit means a cargo transport unit which totally encloses the contents by permanent structures with complete and rigid surfaces. Cargo transport units with fabric sides or tops are not considered closed cargo transport units;

Closed cryogenic receptacle means a thermally insulated pressure receptacle for refrigerated liquefied gases of a water capacity of not more than 1 000 litres;

Closure means a device which closes an opening in a receptacle;

NOTE: *For pressure receptacles, closures are, for example, valves, pressure relief devices, pressure gauges or level indicators.*

Combination packaging means a combination of packagings for transport purposes, consisting of one or more inner packagings secured in an outer packaging in accordance with 4.1.1.5;

Competent authority means any body or authority designated or otherwise recognized as such for any purpose in connection with these Regulations;

Compliance assurance means a systematic programme of measures applied by a competent authority which is aimed at ensuring that the provisions of these Regulations are met in practice;

Composite packaging means a packaging consisting of an outer packaging and an inner receptacle so constructed that the inner receptacle and the outer packaging form an integral packaging. Once assembled it remains thereafter an integrated single unit; it is filled, stored, transported and emptied as such;

Confinement system, for the transport of radioactive material, means the assembly of fissile material and packaging components specified by the designer and agreed to by the competent authority as intended to preserve criticality safety;

Consignee means any person, organization or government which is entitled to take delivery of a consignment;

Consignment means any package or packages, or load of dangerous goods, presented by a consignor for transport;

Consignor means any person, organization or government which prepares a consignment for transport;

Containment system, for the transport of radioactive material, means the assembly of components of the packaging specified by the designer as intended to retain the radioactive material during transport;

Conveyance means

(a) For transport by road or rail: any vehicle;

(b) For transport by water: any vessel, or any hold, compartment, or defined deck area of a vessel; and

(c) For transport by air: any aircraft;

Crate means an outer packaging with incomplete surfaces;

Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material, for the transport of radioactive material, means a number which is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material;

Critical temperature means the temperature above which the substance cannot exist in the liquid state;

Cylinder means a pressure receptacle of a water capacity not exceeding 150 litres;

Defined deck area means the area of the weather deck of a vessel, or of a vehicle deck of a roll-on/roll-off ship or a ferry, which is allocated for the stowage of dangerous goods;

Design, for the transport of radioactive material, means the description of fissile material excepted under 2.7.2.3.5 (f), special form radioactive material, low dispersible radioactive material, package or packaging which enables such an item to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation;

Design life, for composite cylinders and tubes, means the maximum life (in number of years) to which the cylinder or tube is designed and approved in accordance with the applicable standard;

Dose rate means the ambient dose equivalent or the directional dose equivalent, as appropriate, per unit time, measured at the point of interest.

Drum means a flat-ended or convex-ended cylindrical packaging made of metal, fibreboard, plastics, plywood or other suitable materials. This definition also includes packagings of other shapes e.g. round taper-necked packagings, or pail-shaped packagings. Wooden barrels or jerricans are not covered by this definition;

Elevated temperature substance means a substance which is transported or offered for transport:

- in the liquid state at a temperature at or above 100 °C;
- in the liquid state with a flashpoint above 60 °C and which is intentionally heated to a temperature above its flashpoint; or
- in a solid state and at a temperature at or above 240 °C;

EN (standard) means a European standard published by the European Committee for Standardization (CEN) (CEN – 36 rue de Stassart, B-1050 Brussels, Belgium);

Exclusive use, for the transport of radioactive material, means the sole use, by a single consignor, of a conveyance or of a large freight container, in respect of which all initial, intermediate and final loading and unloading and shipment are carried out in accordance with the directions of the consignor or consignee, where so required by these Regulations;

Filling ratio means the ratio of the mass of gas to the mass of water at 15 °C that would fill completely a pressure receptacle fitted ready for use;

Freight container means an article of transport equipment that is of a permanent character and accordingly strong enough to be suitable for repeated use; specially designed to facilitate the transport of goods, by one or other modes of transport, without intermediate reloading: designed to be secured and/or readily handled, having fittings for these purposes, and approved in accordance with the International Convention for Safe Containers (CSC), 1972, as amended. The term "freight container" includes neither vehicle nor packaging. However a freight container that is carried on a chassis is included. For freight containers for the transport of radioactive material, a freight container may be used as a packaging.

In addition: Small freight container means a freight container that has an internal volume of not more than 3 m^3. Large freight container means a freight container that has an internal volume of more than 3 m^3.

Fuel cell means an electrochemical device that converts the chemical energy of a fuel to electrical energy, heat and reaction products;

Fuel cell engine means a device used to power equipment and which consists of a fuel cell and its fuel supply, whether integrated with or separate from the fuel cell, and includes all appurtenances necessary to fulfil its function;

GHS means the ninth revised edition of the Globally Harmonized System of classification and labelling of chemicals, published by the United Nations as document ST/SG/AC.10/30/Rev.9;

IAEA means the International Atomic Energy Agency (IAEA, P.O. Box 100 – A -1400 Vienna, Austria);

ICAO means the International Civil Aviation Organization (ICAO, 999 University Street, Montreal, Quebec H3C 5H7, Canada);

IMO means the International Maritime Organization (IMO, 4 Albert Embankment, London SE1 7SR, United Kingdom);

Inspection body means an independent inspection and testing body approved by the competent authority;

Intermediate Bulk Container (IBC)

IBC means any rigid or flexible portable packaging, other than those specified in Chapter 6.1, that:

(a) has a capacity of:

(i) not more than 3.0 m^3 (3 000 litres) for solids and liquids of packing groups II and III;

(ii) not more than 1.5 m^3 for solids of packing group I when packed in flexible, rigid plastics, composite, fibreboard and wooden IBCs;

(iii) not more than 3.0 m^3 for solids of packing group I when packed in metal IBCs;

(iv) not more than 3.0 m^3 for radioactive material of Class 7;

(b) is designed for mechanical handling;

(c) is resistant to the stresses produced in handling and transport, as determined by tests;

Remanufactured IBC means a metal, rigid plastics or composite IBC that:

(a) is produced as a UN type from a non-UN type; or

(b) is converted from one UN design type to another UN design type.

Remanufactured IBCs are subject to the same requirements of these Regulations that apply to new IBCs of the same type (see also design type definition in 6.5.6.1.1);

Repaired IBC means a metal, rigid plastics or composite IBC that, as a result of impact or for any other cause (e.g. corrosion, embrittlement or other evidence of reduced strength as compared to the design type) is restored so as to conform to the design type and to be able to withstand the design type tests. For the purposes of these Regulations, the replacement of the rigid inner receptacle of a composite IBC with a receptacle conforming to the original design type from the same manufacturer is considered repair. However, routine maintenance of rigid IBCs (see definition below) is not considered repair. The bodies of rigid plastics IBCs and the inner receptacles of composite IBCs are not repairable. Flexible IBCs are not repairable unless approved by the competent authority;

Routine maintenance of flexible IBCs means the routine performance on plastics or textile flexible IBCs of operations, such as:

(a) Cleaning; or

(b) Replacement of non-integral components, such as non-integral liners and closure ties, with components conforming to the original manufacturer's specification;

provided that these operations do not adversely affect the containment function of the flexible IBC or alter the design type;

NOTE: *For rigid IBCs, see* "*Routine maintenance of rigid IBCs*".

Routine maintenance of rigid IBCs means the routine performance on metal, rigid plastics or composite IBCs of operations such as:

(a) Cleaning;

(b) Removal and reinstallation or replacement of body closures (including associated gaskets), or of service equipment, conforming to the original manufacturer's specifications, provided that the leaktightness of the IBC is verified; or

(c) Restoration of structural equipment not directly performing a dangerous goods containment or discharge pressure retention function so as to conform to the design type (e.g. the straightening of legs or lifting attachments) provided that the containment function of the IBC is not affected;

NOTE: *For flexible IBCs, see "Routine maintenance of flexible IBCs".*

IAEA Regulations for the Safe Transport of Radioactive Material means one of the editions of those Regulations, as follows:

(a) For the 1985, 1985 (as amended 1990) editions: IAEA Safety Series No. 6

(b) For the 1996 edition: IAEA Safety Series No. ST-1

(c) For the 1996 (revised) edition: IAEA Safety Series No. TS-R-1 (ST-1, Revised)

(d) For the 1996 (as amended 2003), 2005, 2009 editions: IAEA Safety Standards Series No. TS-R-1

(e) For the 2012 edition: IAEA Safety Standards Series No. SSR-6

(f) For the 2018 edition: IAEA Safety Standards Series No. SSR-6 (Rev.1);

Inner packaging means a packaging for which an outer packaging is required for transport;

Inner receptacle means a receptacle which requires an outer packaging in order to perform its containment function;

Inner vessel, for a closed cryogenic receptacle, means the pressure vessel intended to contain the refrigerated liquefied gas;

Intermediate packaging means a packaging placed between inner packagings, or articles, and an outer packaging;

ISO (standard) means an international standard published by the International Organization for Standardization (ISO - 1, ch. de la Voie-Creuse, CH-1211 Geneva 20, Switzerland);

Jerrican means a metal or plastics packaging of rectangular or polygonal cross-section;

Large packaging means a packaging consisting of an outer packaging which contains articles or inner packagings and which

(a) is designed for mechanical handling; and

(b) exceeds 400 kg net mass or 450 litres capacity but has a volume of not more than 3 m^3;

Large salvage packaging means a special packaging which

(a) is designed for mechanical handling; and

(b) exceeds 400 kg net mass or 450 litres capacity but has a volume of not more than 3 m^3;

into which damaged, defective, leaking or non-conforming dangerous goods packages, or dangerous goods that have spilled or leaked are placed for purposes of transport for recovery or disposal;

Liner means a separate tube or bag inserted into a packaging, (including IBCs and large packagings) but not forming an integral part of it, including the closures of its openings;

Liquid means a dangerous good which at 50 °C have a vapour pressure of not more than 300 kPa (3 bar), which is not completely gaseous at 20 °C and at a pressure of 101.3 kPa, and which has a melting point or initial melting point of 20 °C or less at a pressure of 101.3 kPa. A viscous substance for which a specific melting point cannot be determined shall be subjected to the ASTM D 4359-90 test; or to the test for determining fluidity (penetrometer test) prescribed in section 2.3.4 of Annex A of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)[1];

Management system, for the transport of radioactive material, means a set of interrelated or interacting elements (system) for establishing policies and objectives and enabling the objectives to be achieved in an efficient and effective manner;

Manual of Tests and Criteria means the seventh revised edition of the United Nations publication bearing this title (ST/SG/AC.10/11/Rev.7 and Amend.1);

Maximum capacity as used in 6.1.4 means the maximum inner volume of receptacles or packagings expressed in litres;

[1] *United Nations publication: ECE/TRANS/300 (Sales No. E.21.VIII.1).*

Maximum net mass means the maximum net mass of contents in a single packaging or maximum combined mass of inner packagings and the contents thereof and is expressed in kg;

Maximum normal operating pressure, for the transport of radioactive material, means the maximum pressure above atmospheric pressure at mean sea-level that would develop in the containment system in a period of one year under the conditions of temperature and solar radiation corresponding to environmental conditions in the absence of venting, external cooling by an ancillary system, or operational controls during transport;

Metal hydride storage system means a single complete hydrogen storage system, including a pressure receptacle pressure, metal hydride, pressure relief device, shut-off valve, service equipment and internal components used for the transport of hydrogen only;

Multiple-element gas container (MEGC) means a multimodal assembly of cylinders, tubes or bundles of cylinders which are interconnected by a manifold and which are assembled within a framework. The MEGC includes service equipment and structural equipment necessary for the transport of gases;

Net explosive mass (NEM) means the total mass of the explosive substances, without the packagings, casings, etc. *(Net explosive quantity (NEQ), net explosive contents (NEC), or net explosive weight (NEW) are often used to convey the same meaning.);*

Neutron radiation detector is a device that detects neutron radiation. In such a device, a gas may be contained in a hermetically sealed electron tube transducer that converts neutron radiation into a measureable electric signal;

Offshore bulk container means a bulk container specially designed for repeated use for transport of dangerous goods to, from and between offshore facilities. An offshore bulk container is designed and constructed in accordance with the Guidelines for the approval of offshore containers handled in open seas specified by the International Maritime Organization (IMO) in document MSC/Circ.860;

Open cryogenic receptacle means a transportable thermally insulated receptacle for refrigerated liquefied gases maintained at atmospheric pressure by continuous venting of the refrigerated liquefied gas;

Outer packaging means the outer protection of a composite or combination packaging together with any absorbent materials, cushioning and any other components necessary to contain and protect inner receptacles or inner packagings;

Overpack means an enclosure used by a single consignor to contain one or more packages and to form one unit for convenience of handling and stowage during transport. Examples of overpacks are a number of packages either:

(a) Placed or stacked on to a load board such as a pallet and secured by strapping, shrink wrapping, stretch wrapping, or other suitable means; or

(b) Placed in a protective outer packaging such as a box or crate;

Package means the complete product of the packing operation, consisting of the packaging and its contents prepared for transport;

Packaging means one or more receptacles and any other components or materials necessary for the receptacles to perform their containment and other safety functions;

Portable tank means:

(a) For the purposes of the transport of substances of Class 1 and Classes 3 to 9, a multimodal portable tank. It includes a shell fitted with service equipment and structural equipment necessary for the transport of dangerous substances;

(b) For the purposes of transport of non-refrigerated, liquefied gases of Class 2, a multimodal tank having a capacity of more than 450 litres. It includes a shell fitted with service equipment and structural equipment necessary for the transport of gases;

(c) For the purposes of transport of refrigerated liquefied gases, a thermally insulated tank having a capacity of more than 450 litres fitted with service equipment and structural equipment necessary for the transport of refrigerated liquefied gases;

The portable tank shall be capable of being loaded and discharged without the need of removal of its structural equipment. It shall possess stabilizing members external to the shell, and shall be capable of being lifted when full. It shall be designed primarily to be loaded on to a vehicle or vessel and is equipped with skids, mountings or accessories to facilitate mechanical handling. Road tank-vehicles, rail tank-wagons, non-metallic tanks, gas cylinders, large receptacles, and intermediate bulk containers (IBCs) are not considered to fall within this definition;

Pressure drum means a welded pressure receptacle of a water capacity exceeding 150 litres and of not more than 1 000 litres, (e.g. cylindrical receptacles equipped with rolling hoops, spheres on skids);

Pressure receptacle means a transportable receptacle intended for holding substances under pressure including its closure(s) and other service equipment and is a collective term that includes cylinders, tubes, pressure drums, closed cryogenic receptacles, metal hydride storage system, bundles of cylinders and salvage pressure receptacles;

Pressure receptacle shell means a cylinder, a tube a pressure drum or a salvage pressure receptacle without its closures or other service equipment, but including any permanently attached device(s) (e.g. neck ring, foot ring, etc.);

NOTE: *The terms "cylinder shell", "pressure drum shell" and "tube shell" are also used.*

Quality assurance means a systematic programme of controls and inspections applied by any organization or body which is aimed at providing adequate confidence that the standard of safety prescribed in these Regulations is achieved in practice;

Radiation detection system is an apparatus that contains radiation detectors as components;

Radioactive contents, for the transport of radioactive material, mean the radioactive material together with any contaminated or activated solids, liquids, and gases within the packaging;

Receptacle means a containment vessel for receiving and holding substances or articles, including any means of closing;

Reconditioned packagings include:

(a) Metal drums that:

(i) are cleaned to original materials of construction, with all former contents, internal and external corrosion, and external coatings and labels removed;

(ii) are restored to original shape and contour, with chimes (if any) straightened and sealed, and all non-integral gaskets replaced; and

(iii) are inspected after cleaning but before painting, with rejection of packagings with visible pitting, significant reduction in material thickness, metal fatigue, damage threads or closures, or other significant defects; or

(b) Plastics drums and jerricans that:

(i) are cleaned to original materials of construction, with all former contents, external coatings and labels removed;

(ii) have all non-integral gaskets replaced; and

(iii) are inspected after cleaning with rejection of packagings with visible damage such as tears, creases or cracks, or damaged threads, or closures, or other significant defects;

Recycled plastics material means material recovered from used industrial packagings that has been cleaned and prepared for processing into new packagings. The specific properties of the recycled material used for production of new packagings shall be assured and documented regularly as part of a quality assurance programme recognized by the competent authority. The quality assurance programme shall include a record of proper pre-sorting and verification that each batch of recycled plastics material has the proper melt flow rate, density, and tensile yield strength, consistent with that of the design type manufactured from such recycled material. This necessarily includes knowledge about the packaging material from which the recycled plastics have been derived, as well as awareness of the prior contents of those packagings if those prior contents might reduce the capability of new packagings produced using that material. In addition, the packaging manufacturer's quality assurance programme under 6.1.1.4 shall include performance of the mechanical design type test in 6.1.5 on packagings manufactured from each batch of recycled plastics material. In this testing, stacking performance may be verified by appropriate dynamic compression testing rather than static load testing;

NOTE: *ISO 16103:2005 "Packaging – Transport packages for dangerous goods – Recycled plastics material", provides additional guidance on procedures to be followed in approving the use of recycled plastics material. These guidelines have been developed based on the experience of the manufacturing of drums and jerricans from recycled plastics material and as such may need to be adapted for other types of packagings, IBCs and large packagings made of recycled plastics material.*

Remanufactured IBC (see "*Intermediate Bulk Container (IBC)*").

Remanufactured large packaging means a metal or rigid plastics large packaging that:

(a) Is produced as a UN type from a non-UN type; or

(b) Is converted from one UN design type to another UN design type.

Remanufactured large packagings are subject to the same requirements of these Regulations that apply to new large packagings of the same type (see also design type definition in 6.6.5.1.2);

Remanufactured packagings include:

(a) Metal drums that:

(i) are produced as a UN type from a non-UN type;

(ii) are converted from one UN type to another UN type; or

(iii) undergo the replacement of integral structural components (such as non-removable heads); or

(b) Plastics drums that:

(i) are converted from one UN type to another UN type (e.g. 1H1 to 1H2); or

(ii) undergo the replacement of integral structural components;

Remanufactured drum is subject to the same requirements of these Regulations that apply to a new drum of the same type;

Repaired IBC (see "*Intermediate Bulk Container (IBC)*");

Reused large packaging means a large packaging to be refilled which has been examined and found free of defects affecting the ability to withstand the performance tests: the term includes those which are refilled with the same or similar compatible contents and are transported within distribution chains controlled by the consignor of the product;

Reused packaging means a packaging to be refilled which has been examined and found free of defects affecting the ability to withstand the performance tests: the term includes those which are refilled with the same or similar compatible contents and are transported within distribution chains controlled by the consignor of the product;

Routine maintenance of flexible IBC (see "Intermediate Bulk Container (IBC)");

Routine maintenance of rigid IBC (see "Intermediate Bulk Container (IBC)");

Salvage packaging means a special packaging into which damaged, defective, leaking or non-conforming dangerous goods packages, or dangerous goods that have spilled or leaked, are placed for purposes of transport for recovery or disposal;

Salvage pressure receptacle means a pressure receptacle with a water capacity not exceeding 3 000 litres into which are placed damaged, defective, leaking or non-conforming pressure receptacle(s) for the purpose of transport e.g. for recovery or disposal;

Self-accelerating decomposition temperature (SADT) means the lowest temperature at which self-accelerating decomposition may occur in a substance in the packaging, IBC or portable tank as offered for transport. The SADT shall be determined in accordance with the test procedures given in Part II, Section 28 of the Manual of Tests and Criteria.

Self-accelerating polymerization temperature (SAPT) means the lowest temperature at which self-accelerating polymerization may occur with a substance in the packaging, IBC or portable tank as offered for transport. The SAPT shall be determined in accordance with the test procedures established for the self-accelerating decomposition temperature for self-reactive substances in accordance with Part II, Section 28 of the Manual of Tests and Criteria;

Service equipment of a pressure receptacle means closure(s), manifold(s), piping, porous, absorbent or adsorbent material and any structural devices, e.g. for handling;

Service life, for composite cylinders and tubes, means the number of years the cylinder or tube is permitted to be in service;

Settled pressure means the pressure of the contents of a pressure receptacle in thermal and diffusive equilibrium;

Shipment means the specific movement of a consignment from origin to destination;

Siftproof packaging means a packaging impermeable to dry contents including fine solid material produced during transport;

Solid means a dangerous good, other than a gas, that does not meet the definition of liquid in this section;

Tank means a portable tank, including a tank container, a road tank-vehicle, a rail tank-wagon or a receptacle to contain solids, liquids, or gases, having a capacity of not less than 450 litres when used for the transport of gases as defined in 2.2.1.1;

Test pressure means the required pressure applied during a pressure test for qualification or requalification;

Through or into means through or into the countries in which a consignment is transported but specifically excludes countries "over" which a consignment is carried by air, provided that there are no scheduled stops in those countries;

Transport index (TI) assigned to a package, overpack or freight container, or to unpackaged LSA-I or SCO-I or SCO-III, for the transport of radioactive material, means a number which is used to provide control over radiation exposure;

Tube means a pressure receptacle of seamless or composite construction having a water capacity exceeding 150 litres but not more than 3 000 litres;

UNECE means the United Nations Economic Commission for Europe (UNECE, Palais des Nations, 8-14 avenue de la Paix, CH-1211 Geneva 10, Switzerland);

Vehicle means a road vehicle (including an articulated vehicle, i.e. a tractor and semi-trailer combination), railroad car or railway wagon. Each trailer shall be considered as a separate vehicle;

Vessel means any seagoing vessel or inland waterway craft used for carrying cargo;

Wooden barrel means a packaging made of natural wood, of round cross-section, having convex walls, consisting of staves and heads and fitted with hoops;

Working pressure

(a) For a compressed gas, means the settled pressure at a reference temperature of 15 °C in a full pressure receptacle;

(b) For UN 1001 acetylene, dissolved, means the calculated settled pressure at a uniform reference temperature of 15 °C in an acetylene cylinder containing the specified solvent content and the maximum acetylene content;

(c) For UN 3374 acetylene, solvent free, means the working pressure which was calculated for the equivalent cylinder for UN 1001 acetylene, dissolved.

Clarifying examples for certain defined terms

The following explanations and examples are meant to assist in clarifying the use of the some of the packaging terms defined in this section.

The definitions in this section are consistent with the use of the defined terms throughout the Regulations. However, some of the defined terms are commonly used in other ways. This is particularly evident in respect of the term “inner receptacle” which has often been used to describe the “inners” of a combination packaging.

The “inners” of “combination packagings” are always termed “inner packagings” not “inner receptacles”. A glass bottle is an example of such an “inner packaging”.

The “inners” of “composite packagings” are normally termed “inner receptacles”. For example, the “inner” of a 6HA1 composite packaging (plastics material) is such an “inner receptacle” since it is normally not designed to perform a containment function without its “outer packaging” and is not therefore an “inner packaging”.

1.2.2 Units of measurement

1.2.2.1 The following units of measurement [a] are applicable in these Regulations:

Measurement of	SI Unit [b]	Acceptable alternative unit		Relationship between units		
Length	m (metre)	--		--		
Area	m² (square metre)	--		--		
Volume	m³ (cubic metre)	1 [c]	(litre)	1 l	=	10^{-3} m³
Time	s (second)	min	(minute)	1 min	=	60 s
		h	(hour)	1 h	=	3 600 s
		d	(day)	1 d	=	86 400 s
Mass	kg (kilogramme)	g	(gramme)	1 g	=	10^{-3} kg
		t	(ton)	1 t	=	10^{3} kg
Mass density	kg/m³	kg/l		1 kg/l	=	10^{3} kg/m³
Temperature	K (kelvin)	°C	(degree Celsius)	0 °C	=	273.15 K
Difference of temperature	K (kelvin)	°C	(degree Celsius)	1 °C	=	1 K
Force	N (newton)	--		1 N	=	1 kg · m/s²
Pressure	Pa (pascal)	bar	(bar)	1 bar	=	10^{5} Pa
				1 Pa	=	1 N/m²
Stress	N/m²	N/mm²		1 N/mm²	=	1 MPa
Work	J (joule)	KWh	(kilowatt hour)	1 kWh	=	3.6 MJ
Energy				1 J	=	1 N · m = 1 W · s
Quantity of heat		eV	(electronvolt)	1 eV	=	0.1602 · 10^{-18}J
Power	W (watt)	--		1 W	=	1 J/s = 1 N · m/s
Electrical resistance	Ω (ohm)	--		1 Ω	=	1 kg · m² / s³ / A²
Kinematic viscosity	m²/s	mm²/s		1 mm²/s	=	10^{-6} m²/s
Dinamic viscosity	Pa · s	mPa · s		1 mPa · s	=	10^{-3} Pa · s
Activity	Bq (becquerel)					
Dose equivalent	Sv (sievert)					

Notes to 1.2.2.1:

[a] *The following round figures are applicable for the conversion of the units hitherto used into SI Units.*

Force

1 kg = 9.807 N
1 N = 0.102 kg

Stress

1 kg/mm² = 9.807 N/mm²
1 N/mm² = 0.102 kg/mm²

Pressure

1 Pa	=	*1 N/m² = 10^{-5} bar*	=	*1.02 × 10^{-5} kg/cm²*	=	*0.75 × 10^{-2} torr*
1 bar	=	*10^{5} Pa*	=	*1.02 kg/cm²*	=	*750 torr*
1 kg/cm²	=	*9.807 × 10^{4} Pa*	=	*0.9807 bar*	=	*736 torr*
1 torr	=	*1.33 × 10^{2} Pa*	=	*1.33 × 10^{-3} bar*	=	*1.36 × 10^{-3}kg/cm²*

Energy, Work, Quantity of heat

1 J=1 Nm	=	*0.278 × 10⁻⁶ kWh*	=	*0.102 kgm*	=	*0.239 × 10⁻³ kcal*
1 kWh	=	*3.6 × 10⁶ J*	=	*367 × 10³ kgm*	=	*860 kcal*
1 kgm	=	*9.807 J*	=	*2.72 × 10⁻⁶ kWh*	=	*2.34 × 10⁻³ kcal*
1 kcal	=	*4.19×10³J*	=	*1.16 × 10⁻³ kWh*	=	*427 kgm*

Power

1 W	=	*0.102 kgm/s*	=	*0.86 kcal/h*
1 kgm/s	=	*9.807 W*	=	*8.43 kcal/h*
1 kcal/h	=	*1.16 W*	=	*0.119 kgm/s*

Kinematic viscosity

1 m²/s	=	*10⁴ St (Stokes)*
1 St	=	*10⁻⁴ m²/s*

Dynamic viscosity

1 Pa · s	=	*1 Ns/m²*	=	*10 P (poise)*	=	*0.102 kgs/m²*
1 P	=	*0.1 Pa · s*	=	*0.1 Ns/m²*	=	*1.02 × 10⁻² kgs/m²*
1 kgs/m²	=	*9.807 Pa · s*	=	*9.807 Ns/m²*	=	*98.07 P*

[b] *The International System of Units (SI) is the result of decisions taken at the General Conference on Weights and Measures (Address: Pavillon de Breteuil, Parc de St-Cloud, F-92310 Sèvres).*

[c] *The abbreviation "L" for litre may also be used in place of the abbreviation "l" when a typewriter cannot distinguish between figure "1" and letter "l".*

The decimal multiples and sub-multiples of a unit may be formed by prefixes or symbols, having the following meanings, placed before the name or symbol of the unit:

Factor				Prefix	Symbol
1 000 000 000 000 000 000	=	10^{18}	quintillion	exa	E
1 000 000 000 000 000	=	10^{15}	quadrillion	peta	P
1 000 000 000 000	=	10^{12}	trillion	tera	T
1 000 000 000	=	10^{9}	billion	giga	G
1 000 000	=	10^{6}	million	mega	M
1 000	=	10^{3}	thousand	kilo	k
100	=	10^{2}	hundred	hecto	h
10	=	10^{1}	ten	deca	da
0.1	=	10^{-1}	tenth	deci	d
0.01	=	10^{-2}	hundredth	centi	c
0.001	=	10^{-3}	thousandth	milli	m
0.000 001	=	10^{-6}	millionth	micro	µ
0.000 000 001	=	10^{-9}	billionth	nano	n
0.000 000 000 001	=	10^{-12}	trillionth	pico	p
0.000 000 000 000 001	=	10^{-15}	quadrillionth	femto	f
0.000 000 000 000 000 001	=	10^{-18}	quintillionth	atto	a

NOTE: *10^{9} = 1 billion is United Nations usage in English. By analogy, so is 10^{-9} = 1 billionth.*

1.2.2.2 *Deleted.*

1.2.2.3 Whenever the mass of a package is mentioned, the gross mass is meant unless otherwise stated. The mass of containers or tanks used for the transport of goods is not included in the gross mass.

1.2.2.4 Unless expressly stated otherwise, the sign "%" represents:

(a) In the case of mixtures of solids or of liquids, and also in the case of solutions and of solids wetted by a liquid: a percentage mass based on the total mass of the mixture, the solution or the wetted solid;

(b) In the case of mixtures of compressed gases: when filled by pressure, the proportion of the volume indicated as a percentage of the total volume of the gaseous mixture, or, when filled by mass, the proportion of the mass indicated as a percentage of the total mass of the mixture.

In the case of mixtures of liquefied gases and gases dissolved under pressure: the proportion of the mass indicated as a percentage of the total mass of the mixture.

1.2.2.5 Pressures of all kinds relating to receptacles (such as test pressure, internal pressure, safety-valve opening pressure) are always indicated in gauge pressure (pressure in excess of atmospheric pressure); however, the vapour pressure of substances is always expressed in absolute pressure.

CHAPTER 1.3

TRAINING

1.3.1 Persons engaged in the transport of dangerous goods shall be trained in the contents of dangerous goods requirements commensurate with their responsibilities. Employees shall be trained in accordance with 1.3.2 before assuming responsibilities and shall only perform functions, for which required training has not yet been provided, under the direct supervision of a trained person. Training requirements specific to security of dangerous goods in Chapter 1.4 shall also be addressed.

1.3.2 Individuals such as those who classify dangerous goods; pack dangerous goods; mark and label dangerous goods; prepare transport documents for dangerous goods; offer or accept dangerous goods for transport; carry or handle dangerous goods in transport; mark or placard or load or unload packages of dangerous goods into or from transport vehicles, bulk packagings or freight containers; or are otherwise directly involved in the transport of dangerous goods as determined by the competent authority; shall be trained in the following:

(a) *General awareness/familiarization training:*

(i) Each person shall be trained in order to be familiar with the general provisions of dangerous goods transport requirements;

(ii) Such training shall include a description of the classes of dangerous goods; labelling, marking, placarding and packaging, segregation and compatibility requirements; a description of the purpose and content of the dangerous goods transport document; and a description of available emergency response documents;

(b) *Function-specific training*: Each person shall be trained in specific dangerous goods transport requirements which are applicable to the function that person performs;

(c) *Safety training*: Commensurate with the risk of exposure in the event of a release and the functions performed, each person shall be trained in:

(i) Methods and procedures for accident avoidance, such as proper use of package-handling equipment and appropriate methods of stowage of dangerous goods;

(ii) Available emergency response information and how to use it;

(iii) General dangers presented by the various classes of dangerous goods and how to prevent exposure to those hazards, including if appropriate the use of personal protective clothing and equipment; and

(iv) Immediate procedures to be followed in the event of an unintentional release of dangerous goods, including any emergency response procedures for which the person is responsible and personal protection procedures to be followed.

1.3.3 Records of training received according to this Chapter shall be kept by the employer and made available to the employee or competent authority, upon request. Records shall be kept by the employer for a period of time established by the competent authority.

1.3.4 The training required by 1.3.2 shall be provided or verified upon employment in a position involving dangerous goods transport and shall be periodically supplemented with retraining as deemed appropriate by the competent authority.

CHAPTER 1.4

SECURITY PROVISIONS

Introductory notes

NOTE 1: *This Chapter provides requirements intended to address the security of dangerous goods in transport in all modes. Mode specific security provisions can be found in Chapter 7.2. National and modal authorities may apply additional security provisions which should be considered when offering or transporting dangerous goods.*

NOTE 2: *For the purposes of this Chapter security means measures or precautions to be taken to minimise theft or misuse of dangerous goods that may endanger persons or property.*

1.4.1 General provisions

1.4.1.1 All persons engaged in the transport of dangerous goods shall consider security requirements for the transport of dangerous goods commensurate with their responsibilities.

1.4.1.2 Consignors shall only offer dangerous goods to carriers that have been appropriately identified.

1.4.1.3 Transit sites, such as airside warehouses, marshalling yards and other temporary storage areas shall be properly secured, well lit and, where possible, not be accessible to the general public.

1.4.1.4 The provisions of this Chapter do not apply to:

(a) UN 2908 and UN 2909 excepted packages;

(b) UN 2910 and UN 2911 excepted packages with an activity level not exceeding the A_2 value; and

(c) UN 2912 LSA-I and UN 2913 SCO-I.

1.4.2 Security training

1.4.2.1 The training specified for individuals in 1.3.2 (a), (b) or (c) shall also include elements of security awareness.

1.4.2.2 Security awareness training shall address the nature of security risks, recognising security risks, methods to address and reduce such risks and actions to be taken in the event of a security breach. It shall include awareness of security plans (if appropriate) commensurate with the responsibilities of individuals and their part in implementing security plans.

1.4.2.3 Such training shall be provided or verified upon employment in a position involving dangerous goods transport and shall be periodically supplemented with retraining.

1.4.2.4 Records of all security training received shall be kept by the employer and made available to the employee or competent authority, upon request. Records shall be kept by the employer for a period of time established by the competent authority.

1.4.3 Provisions for high consequence dangerous goods

1.4.3.1 *Definition of high consequence dangerous goods*

1.4.3.1.1 High consequence dangerous goods are those which have the potential for misuse in a terrorist event and which may, as a result, produce serious consequences such as mass casualties, mass destruction or, particularly for Class 7, mass socio-economic disruption.

1.4.3.1.2 An indicative list of high consequence dangerous goods in classes and divisions other than Class 7 is given in Table 1.4.1 below.

Table 1.4.1: Indicative list of high consequence dangerous goods

Class 1, Division 1.1	explosives
Class 1, Division 1.2	explosives
Class 1, Division 1.3	compatibility group C explosives
Class 1, Division 1.4	UN Nos. 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456, 0500, 0512 and 0513
Class 1, Division 1.5	explosives
Class 1, Division 1.6:	explosives
Division 2.1	flammable gases in bulk
Division 2.3	toxic gases (excluding aerosols)
Class 3	flammable liquids of packing groups I and II in bulk
Class 3 and Division 4.1	desensitized explosives
Division 4.2	goods of packing group I in bulk
Division 4.3	goods of packing group I in bulk
Division 5.1	oxidizing liquids of packing group I in bulk
Division 5.1	perchlorates, ammonium nitrate, ammonium nitrate fertilizers and ammonium nitrate emulsions or suspensions or gels, in bulk
Division 6.1	toxic substances of packing group I
Division 6.2	infectious substances of Category A (UN 2814 and UN 2900) and medical waste of Category A (UN 3549)
Class 8	corrosive substances of packing group I in bulk

NOTE: *For the purposes of this table, "in bulk" means transported in quantities greater than 3 000 kg or 3 000 l in portable tanks or bulk containers.*

1.4.3.1.3 For dangerous goods of Class 7, high consequence radioactive material is that with an activity equal to or greater than a transport security threshold of 3 000 A_2 per single package (see also 2.7.2.2.1) except for the following radionuclides where the transport security threshold is given in Table 1.4.2 below.

Table 1.4.2: Transport security thresholds for specific radionuclides

Element	Radionuclide	Transport security threshold (TBq)
Americium	Am-241	0.6
Gold	Au-198	2
Cadmium	Cd-109	200
Californium	Cf-252	0.2
Curium	Cm-244	0.5
Cobalt	Co-57	7
Cobalt	Co-60	0.3
Caesium	Cs-137	1
Iron	Fe-55	8000
Germanium	Ge-68	7
Gadolinium	Gd-153	10
Iridium	Ir-192	0.8
Nickel	Ni-63	600
Palladium	Pd-103	900
Promethium	Pm-147	400
Polonium	Po-210	0.6
Plutonium	Pu-238	0.6
Plutonium	Pu-239	0.6
Radium	Ra-226	0.4
Ruthenium	Ru-106	3
Selenium	Se-75	2
Strontium	Sr-90	10
Thallium	Tl-204	200
Thulium	Tm-170	200
Ytterbium	Yb-169	3

1.4.3.1.4 For mixtures of radionuclides, determination of whether or not the transport security threshold has been met or exceeded can be calculated by summing the ratios of activity present for each radionuclide divided by the transport security threshold for that radionuclide. If the sum of the fractions is less than 1, then the radioactivity threshold for the mixture has not been met nor exceeded.

This calculation can be made with the formula:

$$\sum_i \frac{A_i}{T_i} < 1$$

Where:

A_i = activity of radionuclide *i* that is present in a package (TBq)

T_i = transport security threshold for radionuclide *i* (TBq).

1.4.3.1.5 When radioactive material possesses subsidiary hazards of other classes or divisions, the criteria of table 1.4.1 shall also be taken into account (see also 1.5.5.1).

1.4.3.2 *Specific security provisions for high consequence dangerous goods*

1.4.3.2.1 In implementing national security provisions competent authorities shall consider establishing a programme for identifying consignors or carriers engaged in the transport of high consequence dangerous goods for the purpose of communicating security related information.

NOTE: *In addition to the security provisions of these Regulations, competent authorities may implement further security provisions for reasons other than safety of dangerous goods during transport. In order to not impede international and multimodal transport by different explosives security markings, it is recommended that such marks be formatted consistent with an internationally harmonized standard (e.g. European Union Commission Directive 2008/43/EC).*

1.4.3.2.2 *Security plans*

1.4.3.2.2.1 Carriers, consignors and others (including infrastructure managers) engaged in the transport of high consequence dangerous goods (see 1.4.3.1) shall adopt, implement and comply with a security plan that addresses at least the elements specified in 1.4.3.2.2.2.

1.4.3.2.2.2 The security plan shall comprise at least the following elements:

(a) Specific allocation of responsibilities for security to competent and qualified persons with appropriate authority to carry out their responsibilities;

(b) Records of dangerous goods or types of dangerous goods transported;

(c) Review of current operations and assessment of vulnerabilities, including inter-modal transfer, temporary transit storage, handling and distribution as appropriate;

(d) Clear statements of measures, including training, policies (including response to higher threat conditions, new employee/employment verification etc.), operating practices (e.g. choice/use of routes where known, access to dangerous goods in temporary storage, proximity to vulnerable infrastructure etc.), equipment and resources that are to be used to reduce security risks;

(e) Effective and up to date procedures for reporting and dealing with security threats, breaches of security or security incidents;

(f) Procedures for the evaluation and testing of security plans and procedures for periodic review and update of the plans;

(g) Measures to ensure the security of transport information contained in the plan; and

(h) Measures to ensure that the distribution of the transport information is limited as far as possible. (Such measures shall not preclude provision of transport documentation required by Chapter 5.4 of these Regulations).

NOTE: *Carriers, consignors and consignees should co-operate with each other and with appropriate authorities to exchange threat information, apply appropriate security measures and respond to security incidents.*

1.4.3.2.3 For radioactive material, the provisions of this Chapter and of section 7.2.4 are deemed to be complied with when the provisions of the Convention on Physical Protection of Nuclear Material (INFCIRC/274/Rev.1, IAEA, Vienna (1980)) and the IAEA circular on "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities" (INFCIRC/225/Rev.5, IAEA, Vienna (2011)) are applied.

CHAPTER 1.5

GENERAL PROVISIONS CONCERNING RADIOACTIVE MATERIAL

1.5.1 Scope and application

1.5.1.1 These Regulations establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to people, property and the environment that are associated with the transport of radioactive material. These Regulations are based on the 2018 edition of the IAEA Regulations for the Safe Transport of Radioactive Material. Explanatory material can be found in "Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (2018 Edition)", Safety Standards Series No. SSG-26 (Rev.1), IAEA, Vienna (2019). The prime responsibility for safety shall rest with the person or organization responsible for facilities and activities that give rise to radiation risk.

1.5.1.2 The objective of these Regulations is to establish requirements that must be satisfied to ensure safety and to protect people, property and the environment from harmful effects of ionizing radiation during the transport of radioactive material. This protection is achieved by requiring:

(a) Containment of the radioactive contents;

(b) Control of external dose rate;

(c) Prevention of criticality; and

(d) Prevention of damage caused by heat.

These requirements are satisfied firstly by applying a graded approach to contents limits for packages and conveyances and to performance standards applied to package designs depending upon the hazard of the radioactive contents. Secondly, they are satisfied by imposing conditions on the design and operation of packages and on the maintenance of packagings, including a consideration of the nature of the radioactive contents. Thirdly, they are satisfied by requiring administrative controls including, where appropriate, approval by competent authorities. Finally, further protection is provided by making arrangements for planning and preparing emergency response to protect people, property and the environment.

1.5.1.3 These Regulations apply to the transport of radioactive material by all modes on land, water or in the air, including transport which is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with and involved in the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, transport including in-transit storage, unloading and receipt at the final destination of loads of radioactive material and packages. A graded approach is applied to the performance standards in these Regulations that are characterized by three general severity levels:

(a) Routine conditions of transport (incident free);

(b) Normal conditions of transport (minor mishaps);

(c) Accident conditions of transport.

1.5.1.4 These Regulations do not apply to any of the following:

(a) Radioactive material that is an integral part of the means of transport;

(b) Radioactive material moved within an establishment which is subject to appropriate safety regulations in force in the establishment and where the movement does not involve public roads or railways;

(c) Radioactive material implanted or incorporated into a person or live animal for diagnosis or treatment;

(d) Radioactive material in or on a person who is to be transported for medical treatment because the person has been subject to accidental or deliberate intake of radioactive material or to contamination;

(e) Radioactive material in consumer products which have received regulatory approval, following their sale to the end user;

(f) Natural material and ores containing naturally occurring radionuclides (which may have been processed), provided the activity concentration of the material does not exceed 10 times the values specified in Table 2.7.2.2.1, or calculated in accordance with 2.7.2.2.2 (a) and 2.7.2.2.3 to 2.7.2.2.6. For natural materials and ores containing naturally occurring radionuclides that are not in secular equilibrium the calculation of the activity concentration shall be performed in accordance with 2.7.2.2.4;

(g) Non-radioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the limit set out in the definition for "contamination" in 2.7.1.2.

1.5.1.5 *Specific provisions for the transport of excepted packages*

1.5.1.5.1 Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles and empty packagings as specified in 2.7.2.4.1 shall be subject only to the following provisions of Parts 5 to 7:

(a) The applicable provisions specified in 5.1.1.2, 5.1.2, 5.1.3.2, 5.1.5.2.2, 5.1.5.2.3, 5.1.5.4, 5.2.1.7, 5.4.1.5.7.1 (f) (i) and (ii), 5.4.1.5.7.1 (i), 7.1.8.3.1, 7.1.8.4.3, 7.1.8.5.1 to 7.1.8.5.4 and 7.1.8.6.1; and

(b) The requirements for excepted packages specified in 6.4.4;

except when the radioactive material possesses other hazardous properties and has to be classified in a class other than Class 7 in accordance with special provision 290 or 369 of Chapter 3.3, where the provisions listed in (a) and (b) above apply only as relevant and in addition to those relating to the main class or division.

1.5.1.5.2 Excepted packages shall be subject to the relevant provisions of all other parts of these Regulations.

1.5.2 Radiation protection programme

1.5.2.1 The transport of radioactive material shall be subject to a radiation protection programme which shall consist of systematic arrangements aimed at providing adequate consideration of radiation protection measures.

1.5.2.2 Doses to persons shall be below the relevant dose limits. Protection and safety shall be optimized in order that the magnitude of individual doses, the number of persons exposed and the likelihood of incurring exposure shall be kept as low as reasonably achievable, economic and social factors being taken into account, within the restriction that the doses to individuals are subject to dose constraints. A structured and systematic approach shall be adopted and shall include consideration of the interfaces between transport and other activities.

1.5.2.3 The nature and extent of the measures to be employed in the programme shall be related to the magnitude and likelihood of radiation exposures. The programme shall incorporate the requirements in 1.5.2.2, 1.5.2.4 to 1.5.2.7 and 7.1.8.1.1. Programme documents shall be available, on request, for inspection by the relevant competent authority.

1.5.2.4 For occupational exposures arising from transport activities, where it is assessed that the effective dose either:

(a) Is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring shall be conducted; or

(b) Is likely to exceed 6 mSv in a year, individual monitoring shall be conducted.

When workplace monitoring or individual monitoring is conducted, appropriate records shall be kept.

NOTE: *For occupational exposures arising from transport activities, where it is assessed that the effective dose is most unlikely to exceed 1mSv in a year, no special work patterns, detailed monitoring, dose assessment programmes or individual record keeping need be required.*

1.5.2.5 In the event of a nuclear or radiological emergency during the transport of radioactive material, provisions as established by relevant national and/or international organizations, shall be observed to protect persons, property and the environment. This includes arrangements for preparedness and response established in accordance with the national and/or international requirements and in a consistent and coordinated manner with the national and/or international emergency arrangements.

1.5.2.6 The arrangements for preparedness and response shall be based on the graded approach and take into consideration the identified hazards and their potential consequences, including the formation of other dangerous substances that may result from the reaction between the contents of a consignment and the environment in the event of a nuclear or radiological emergency. Guidance for the establishment of such arrangements is contained in “Preparedness and Response for a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015); “Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GSG-2, IAEA, Vienna (2011); “Arrangements for Preparedness for a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GS-G-2.1, IAEA, Vienna (2007), and “Arrangements for the Termination of a Nuclear or Radiological Emergency”, IAEA Safety Standards Series No. GSG-11, IAEA, Vienna (2018).

1.5.2.7 Workers shall be appropriately trained in the radiation hazards involved and the precautions to be observed in order to ensure restriction of their exposure and that of other persons who might be affected by their actions.

1.5.3 Management system

1.5.3.1 A management system based on international, national or other standards acceptable to the competent authority shall be established and implemented for all activities within the scope of these Regulations, as identified in 1.5.1.3, to ensure compliance with the relevant provisions of these Regulations. Certification that the design specification has been fully implemented shall be available to the competent authority. The manufacturer, consignor or user shall be prepared:

(a) To provide facilities for inspection during manufacture and use; and

(b) To demonstrate compliance with these Regulations to the competent authority.

Where competent authority approval is required, such approval shall take into account and be contingent upon the adequacy of the management system.

1.5.4 Special arrangement

1.5.4.1 Special arrangement shall mean those provisions, approved by the competent authority, under which consignments which do not satisfy all the requirements of these Regulations applicable to radioactive material may be transported.

1.5.4.2 Consignments for which conformity with any provision applicable to radioactive material is impracticable shall not be transported except under special arrangement. Provided the competent authority is

satisfied that conformity with the radioactive material provisions of these Regulations is impracticable and that the requisite standards of safety established by these Regulations have been demonstrated through means alternative to the other provisions of these Regulations, the competent authority may approve special arrangement transport operations for a single consignment or a planned series of multiple consignments. The overall level of safety in transport shall be at least equivalent to that which would be provided if all the applicable requirements in these Regulations had been met. For international consignments of this type, multilateral approval shall be required.

1.5.5 Radioactive material possessing other dangerous properties

1.5.5.1 In addition to the radioactive and fissile properties, any subsidiary hazard of the contents of a package, such as explosiveness, flammability, pyrophoricity, chemical toxicity and corrosiveness, shall also be taken into account in the documentation, packing, labelling, marking, placarding, stowage, segregation and transport, in order to be in compliance with all relevant provisions for dangerous goods of these regulations.

1.5.6 Non-compliance

1.5.6.1 In the event of non-compliance with any limit in these Regulations applicable to dose rate or contamination:

(a) The consignor, carrier, consignee and any organization involved during transport, who may be affected, as appropriate, shall be informed of the non-compliance:

(i) by the carrier if the non-compliance is identified during transport; or

(ii) by the consignee if the non-compliance is identified at receipt;

(b) The consignor, carrier or consignee, as appropriate, shall:

(i) take immediate steps to mitigate the consequences of the non-compliance;

(ii) investigate the non-compliance and its causes, circumstances and consequences;

(iii) take appropriate action to remedy the causes and circumstances that led to the non-compliance and to prevent a recurrence of the causes and circumstances similar to those that led to the non-compliance; and

(iv) communicate to the relevant competent authority(ies) on the causes of the non-compliance and the corrective or preventive actions taken or to be taken;

(c) The communication of the non-compliance to the consignor and relevant competent authority(ies), respectively, shall be made as soon as practicable and it shall be immediate whenever an emergency exposure situation has developed or is developing.

PART 2

CLASSIFICATION

CHAPTER 2.0

INTRODUCTION

2.0.0 Responsibilities

2.0.0.1 The classification shall be made by the appropriate competent authority when so required or may otherwise be made by the consignor.

2.0.0.2 A consignor who has identified, on the basis of test data, that a substance listed by name in column 2 of the Dangerous Goods List in Chapter 3.2 meets classification criteria for a hazard class or division that is not identified in the list, may, with the approval of the competent authority, consign the substance:

(a) Under the most appropriate generic or not otherwise specified (N.O.S.) entry reflecting all hazards; or

(b) Under the same UN number and name but with additional hazard communication information as appropriate to reflect the additional subsidiary hazard(s) (documentation, label, placard) provided that the primary hazard class remains unchanged and that any other transport conditions (e.g. limited quantity, packaging and tank provisions) that would normally apply to substances possessing such a combination of hazards are the same as those applicable to the substance listed.

NOTE: *When a competent authority grants such approvals, it should inform the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods accordingly and submit a relevant proposal of amendment to the Dangerous Goods List. Should the proposed amendment be rejected, the competent authority should withdraw its approval.*

2.0.1 Classes, divisions, packing groups

2.0.1.1 *Definitions*

Substances (including mixtures and solutions) and articles subject to these Regulations are assigned to one of nine classes according to the hazard or the most predominant of the hazards they present. Some of these classes are subdivided into divisions. These classes and divisions are:

Class 1: Explosives

- Division 1.1: Substances and articles which have a mass explosion hazard
- Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard
- Division 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
- Division 1.4: Substances and articles which present no significant hazard
- Division 1.5: Very insensitive substances which have a mass explosion hazard
- Division 1.6: Extremely insensitive articles which do not have a mass explosion hazard

Class 2: Gases

- Division 2.1: Flammable gases

Division 2.2: Non-flammable, non-toxic gases

Division 2.3: Toxic gases

Class 3: Flammable liquids

Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases

Division 4.1: Flammable solids, self-reactive substances, solid desensitized explosives and polymerizing substances

Division 4.2: Substances liable to spontaneous combustion

Division 4.3: Substances which in contact with water emit flammable gases

Class 5: Oxidizing substances and organic peroxides

Division 5.1: Oxidizing substances

Division 5.2: Organic peroxides

Class 6: Toxic and infectious substances

Division 6.1: Toxic substances

Division 6.2: Infectious substances

Class 7: Radioactive material

Class 8: Corrosive substances

Class 9: Miscellaneous dangerous substances and articles, including environmentally hazardous substances

The numerical order of the classes and divisions is not that of the degree of danger.

2.0.1.2 Many of the substances assigned to Classes 1 to 9 are deemed, without additional labelling, as being environmentally hazardous.

2.0.1.2.1 Wastes shall be transported under the requirements of the appropriate class considering their hazards and the criteria in these Regulations.

Wastes not otherwise subject to these Regulations but covered under the Basel Convention[1] may be transported under Class 9.

2.0.1.3 For packing purposes, substances other than those of Classes 1, 2 and 7, divisions 5.2 and 6.2 and other than self-reactive substances of Division 4.1 are assigned to three packing groups in accordance with the degree of danger they present:

Packing group I: Substances presenting high danger;

Packing group II: Substances presenting medium danger; and

Packing group III: Substances presenting low danger.

[1] *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989).*

The packing group to which a substance is assigned is indicated in the Dangerous Goods List in Chapter 3.2.

Articles are not assigned to packing groups. For packing purposes any requirement for a specific packaging performance level is set out in the applicable packing instruction.

2.0.1.4 Dangerous goods are determined to present one or more of the dangers represented by Classes 1 to 9 and divisions and, if applicable, the degree of danger on the basis of the requirements in Chapters 2.1 to 2.9.

2.0.1.5 Dangerous goods presenting a danger of a single class and division are assigned to that class and division and the degree of danger (packing group), if applicable, determined. When an article or substance is specifically listed by name in the Dangerous Goods List in Chapter 3.2, its class or division, its subsidiary hazard(s) and, when applicable, its packing group are taken from this list.

2.0.1.6 Dangerous goods meeting the defining criteria of more than one hazard class or division and which are not listed by name in the Dangerous Goods List, are assigned to a class and division and subsidiary hazards(s) on the basis of the precedence of hazards in 2.0.3.

2.0.2 UN numbers and proper shipping names

2.0.2.1 Dangerous goods are assigned to UN numbers and proper shipping names according to their hazard classification and their composition.

2.0.2.2 Dangerous goods commonly carried are listed in the Dangerous Goods List in Chapter 3.2. Where an article or substance is specifically listed by name, it shall be identified in transport by the proper shipping name in the Dangerous Goods List. Such substances may contain technical impurities (for example those deriving from the production process) or additives for stability or other purposes that do not affect their classification. However, a substance listed by name containing technical impurities or additives for stability or other purposes affecting its classification shall be considered a mixture or solution (see 2.0.2.5). For dangerous goods not specifically listed by name, “generic” or “not otherwise specified” entries are provided (see 2.0.2.7) to identify the article or substance in transport. The substances listed by name in column (2) of the Dangerous Goods List of Chapter 3.2 shall be transported according to their classification in the list or under the conditions specified in 2.0.0.2.

Each entry in the Dangerous Goods List is characterized by a UN number. This list also contains relevant information for each entry, such as hazard class, subsidiary hazard(s) (if any), packing group (where assigned), packing and tank transport requirements, etc. Entries in the Dangerous Goods List are of the following four types:

(a) Single entries for well-defined substances or articles e.g.

1090 ACETONE
1194 ETHYL NITRITE SOLUTION;

(b) Generic entries for a well-defined group of substances or articles e.g.

1133 ADHESIVES
1266 PERFUMERY PRODUCT
2757 CARBAMATE PESTICIDE, SOLID, TOXIC
3101 ORGANIC PEROXIDE, TYPE B, LIQUID;

(c) Specific n.o.s. entries covering a group of substances or articles of a particular chemical or technical nature e.g.

1477 NITRATES, INORGANIC, N.O.S.
1987 ALCOHOLS, N.O.S.;

(d) General n.o.s. entries covering a group of substances or articles meeting the criteria of one or more classes or divisions e.g.

1325 FLAMMABLE SOLID, ORGANIC, N.O.S.
1993 FLAMMABLE LIQUID, N.O.S.

2.0.2.3 All self-reactive substances of Division 4.1 are assigned to one of twenty generic entries in accordance with the classification principles and flow chart described in 2.4.2.3.3 and Figure 2.4.1.

2.0.2.4 All organic peroxides of Division 5.2 are assigned to one of twenty generic entries in accordance with the classification principles and flow chart described in 2.5.3.3 and Figure 2.5.1.

2.0.2.5 A mixture or solution meeting the classification criteria of these Regulations composed of a single predominant substance identified by name in the Dangerous Goods List and one or more substances not subject to these Regulations and/or traces of one or more substances identified by name in the Dangerous Goods List, shall be assigned the UN number and proper shipping name of the predominant substance named in the Dangerous Goods List unless:

(a) The mixture or solution is identified by name in the Dangerous Goods List;

(b) The name and description of the substance named in the Dangerous Goods List specifically indicate that they apply only to the pure substance;

(c) The hazard class or division, subsidiary hazard(s), packing group, or physical state of the mixture or solution is different from that of the substance named in the Dangerous Goods List; or

(d) The hazard characteristics and properties of the mixture or solution necessitate emergency response measures that are different from those required for the substance identified by name in the Dangerous Goods List.

In those other cases, except the one described in (a), the mixture or solution shall be treated as a dangerous substance not specifically listed by name in the Dangerous Goods List.

2.0.2.6 For a solution or mixture when the hazard class, the physical state or the packing group is changed in comparison with the listed substance, the appropriate N.O.S. entry shall be used including its packaging and labelling provisions.

2.0.2.7 A mixture or solution containing one or more substances identified by name in these Regulations or classified under a N.O.S. entry and one or more substances is not subject to these Regulations if the hazard characteristics of the mixture or solution are such that they do not meet the criteria (including human experience criteria) for any class.

2.0.2.8 Substances or articles which are not specifically listed by name in the Dangerous Goods List shall be classified under a “generic” or “not otherwise specified” (“N.O.S.”) entry. The substance or article shall be classified according to the class definitions and test criteria in this Part, and the article or substance classified under the generic or “N.O.S.” entry in the Dangerous Goods List which most appropriately describes the article or substance[2]. This means that a substance is only to be assigned to an entry of type c), as defined in 2.0.2.2, if it cannot be assigned to an entry of type b), and to an entry of type d) if it cannot be assigned to an entry of type b) or c)[2].

2.0.2.9 A mixture or solution meeting the classification criteria of these Regulations that is not identified by name in the Dangerous Goods List and that is composed of two or more dangerous goods shall be assigned to an entry that has the proper shipping name, description, hazard class or division, subsidiary hazard(s) and packing group that most precisely describe the mixture or solution.

[2] *See also the “List of generic or n.o.s. proper shipping names” in Appendix A.*

2.0.3 Precedence of hazard characteristics

2.0.3.1 The table below shall be used to determine the class of a substance, mixture or solution having more than one hazard, when it is not named in the Dangerous Goods List in Chapter 3.2 or to assign the appropriate entry for articles containing dangerous goods N.O.S. (UN Nos. 3537 to 3548, see 2.0.5). For goods having multiple hazards which are not specifically listed by name in the Dangerous Goods List, the most stringent packing group denoted to the respective hazards of the goods takes precedence over other packing groups, irrespective of the precedence of hazard table in this Chapter. The precedence of hazard characteristics of the following has not been dealt with in the Precedence of hazards Table in 2.0.3.3, as these primary characteristics always take precedence:

(a) Substances and articles of Class 1;

(b) Gases of Class 2;

(c) Liquid desensitized explosives of Class 3;

(d) Self-reactive substances and solid desensitized explosives of Division 4.1;

(e) Pyrophoric substances of Division 4.2;

(f) Substances of Division 5.2;

(g) Substances of Division 6.1 with a packing group I inhalation toxicity[3]:

(h) Substances of Division 6.2;

(i) Material of Class 7.

2.0.3.2 Apart from radioactive material in excepted packages (where the other hazardous properties take precedence) radioactive material having other hazardous properties shall always be classified in Class 7 and the subsidiary hazard shall also be identified. For radioactive material in excepted packages, except for UN 3507, URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, special provision 290 of Chapter 3.3 applies.

[3] *Except for substances or preparations meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC_{50}) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, which shall be allocated to Class 8.*

2.0.3.3 ***Precedence of hazards***

	Class or Division and Packing Group	4.2	4.3	5.1 I	5.1 II	5.1 III	6.1, I Dermal	6.1, I Oral	6.1 II	6.1 III	8, I Liquid	8, I Solid	8, II Liquid	8, II Solid	8, III Liquid	8, III Solid
3	I[a]		4.3				3	3	3	3	3	-	3	-	3	-
3	II[a]		4.3				3	3	3	3	8	-	3	-	3	-
3	III[a]		4.3				6.1	6.1	6.1	3[b]	8	-	8	-	3	-
4.1	II[a]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	4.1	4.1	-	8	-	4.1	-	4.1
4.1	III[a]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	6.1	4.1	-	8	-	8	-	4.1
4.2	II		4.3	5.1	4.2	4.2	6.1	6.1	4.2	4.2	8	8	4.2	4.2	4.2	4.2
4.2	III		4.3	5.1	5.1	4.2	6.1	6.1	6.1	4.2	8	8	8	8	4.2	4.2
4.3	I			5.1	4.3	4.3	6.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
4.3	II			5.1	4.3	4.3	6.1	4.3	4.3	4.3	8	8	4.3	4.3	4.3	4.3
4.3	III			5.1	5.1	4.3	6.1	6.1	6.1	4.3	8	8	8	8	4.3	4.3
5.1	I						5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
5.1	II						6.1	5.1	5.1	5.1	8	8	5.1	5.1	5.1	5.1
5.1	III						6.1	6.1	6.1	5.1	8	8	8	8	5.1	5.1
6.1	I Dermal										8	6.1	6.1	6.1	6.1	6.1
6.1	I Oral										8	6.1	6.1	6.1	6.1	6.1
6.1	II Inhalation										8	6.1	6.1	6.1	6.1	6.1
6.1	II Dermal										8	6.1	8	6.1	6.1	6.1
6.1	II Oral										8	8	8	6.1	6.1	6.1
6.1	III										8	8	8	8	8	8

[a] *Substances of Division 4.1 other than self-reactive substances and solid desensitized explosives and substances of Class 3 other than liquid desensitized explosives.*

[b] *6.1 for pesticides.*

\- *Denotes an impossible combination.*

For hazards not shown in this table, see 2.0.3.

2.0.4 Transport of samples

2.0.4.1 When the hazard class of a substance is uncertain and it is being transported for further testing, a tentative hazard class, proper shipping name and identification number shall be assigned on the basis of the consignor's knowledge of the substance and application of:

(a) the classification criteria of these Regulations; and

(b) the precedence of hazards given in 2.0.3.

The most severe packing group possible for the proper shipping name chosen shall be used.

Where this provision is used the proper shipping name shall be supplemented with the word "SAMPLE" (e.g., FLAMMABLE LIQUID, N.O.S. SAMPLE). In certain instances, where a specific proper shipping name is provided for a sample of a substance considered to meet certain classification criteria (e.g., GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, UN 3167) that proper shipping name shall be used. When an N.O.S. entry is used to transport the sample, the proper shipping name need not be supplemented with the technical name as required by special provision 274.

2.0.4.2 Samples of the substance shall be transported in accordance with the requirements applicable to the tentative assigned proper shipping name provided:

(a) The substance is not considered to be a substance prohibited for transport by 1.1.2;

(b) The substance is not considered to meet the criteria for Class 1 or considered to be an infectious substance or a radioactive material;

(c) The substance is in compliance with 2.4.2.3.2.4 (b) or 2.5.3.2.5.1 if it is a self-reactive substance or an organic peroxide, respectively;

(d) The sample is transported in a combination packaging with a net mass per package not exceeding 2.5 kg; and

(e) The sample is not packed together with other goods.

2.0.4.3 *Samples of energetic materials for testing purposes*

2.0.4.3.1 Samples of organic substances carrying functional groups listed in tables A6.1 and/or A6.3 in Appendix 6 (Screening Procedures) of the Manual of Tests and Criteria may be transported under UN 3224 (self-reactive solid type C) or UN 3223 (self-reactive liquid type C), as applicable, of Division 4.1 provided that:

(a) The samples do not contain any:

(i) Known explosives;

(ii) Substances showing explosive effects in testing;

(iii) Compounds designed with the view of producing a practical explosive or pyrotechnic effect; or

(iv) Components consisting of synthetic precursors of intentional explosives;

(b) For mixtures, complexes or salts of inorganic oxidizing substances of Division 5.1 with organic material(s), the concentration of the inorganic oxidizing substance is:

(i) Less than 15 %, by mass, if assigned to packing group I (high hazard) or II (medium hazard); or

(ii) Less than 30 %, by mass, if assigned to packing group III (low hazard);

(c) Available data do not allow a more precise classification;

(d) The sample is not packed together with other goods; and

(e) The sample is packed in accordance with packing instruction P520 and special packing provisions PP94 or PP95 of 4.1.4.1, as applicable.

2.0.5 Classification of articles as articles containing dangerous goods, N.O.S.

NOTE: *For articles which do not have an existing proper shipping name and which contain only dangerous goods within the permitted limited quantity amounts specified in Column 7a of the Dangerous Goods List, see UN No. 3363 and special provision 301 of Chapter 3.3.*

2.0.5.1 Articles containing dangerous goods may be classified as otherwise provided by these Regulations under the proper shipping name for the dangerous goods they contain or in accordance with this section. For the purposes of this section "article" means machinery, apparatus or other devices containing one or more dangerous goods (or residues thereof) that are an integral element of the article, necessary for its functioning and that cannot be removed for the purpose of transport. An inner packaging shall not be an article.

2.0.5.2 Such articles may in addition contain batteries. Lithium batteries that are integral to the article shall be of a type proven to meet the testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3, except when otherwise specified by these Regulations (e.g. for pre-production prototype articles containing lithium batteries or for a small production run, consisting of not more than 100 such articles).

2.0.5.3 This section does not apply to articles for which a more specific proper shipping name already exists in the Dangerous Goods List of Chapter 3.2.

2.0.5.4 This section does not apply to dangerous goods of Class 1, Division 6.2, Class 7 or radioactive material contained in articles. However, this section applies to articles containing explosives which are excluded from Class 1 in accordance with 2.1.3.6.4.

2.0.5.5 Articles containing dangerous goods shall be assigned to the appropriate Class or Division determined by the hazards present using, where applicable, the Precedence of Hazards table in 2.0.3.3 for each of the dangerous goods contained in the article. If dangerous goods classified as Class 9 are contained within the article, all other dangerous goods present in the article shall be considered to present a higher hazard.

2.0.5.6 Subsidiary hazards shall be representative of the primary hazard posed by the other dangerous goods contained within the article. When only one item of dangerous goods is present in the article, the subsidiary hazard(s), if any, shall be the subsidiary hazard(s) identified in column 4 of the Dangerous Goods List. If the article contains more than one item of dangerous goods and these could react dangerously with one another during transport, each of the dangerous goods shall be enclosed separately (see 4.1.1.6).

CHAPTER 2.1

CLASS 1 - EXPLOSIVES

Introductory notes

NOTE 1: *Class 1 is a restricted class, that is, only those explosive substances and articles that are listed in the Dangerous Goods List in Chapter 3.2 may be accepted for transport. However, competent authorities retain the right by mutual agreement to approve transport of explosive substances and articles for special purposes under special conditions. Therefore entries have been included in the Dangerous Goods List for "Substances, explosive, not otherwise specified" and "Articles, explosive, not otherwise specified". It is intended that these entries shall be used only when no other method of operation is possible.*

NOTE 2: *General entries such as "Explosive, blasting, Type A" are used to allow for the transport of new substances. In preparing these requirements, military ammunition and explosives have been taken into consideration to the extent that they are likely to be transported by commercial carriers.*

NOTE 3: *A number of substances and articles in Class 1 are described in Appendix B. These descriptions are given because a term may not be well-known or may be at variance with its usage for regulatory purposes.*

NOTE 4: *Class 1 is unique in that the type of packaging frequently has a decisive effect on the hazard and therefore on the assignment to a particular division. The correct division is determined by use of the procedures provided in this Chapter.*

2.1.1 Definitions and general provisions

2.1.1.1 Class 1 comprises:

(a) Explosive substances (a substance which is not itself an explosive but which can form an explosive atmosphere of gas, vapour or dust is not included in Class 1), except those that are too dangerous to transport or those where the predominant hazard is appropriate to another class;

(b) Explosive articles, except devices containing explosive substances in such quantity or of such a character that their inadvertent or accidental ignition or initiation during transport shall not cause any effect external to the device either by projection, fire, smoke, heat or loud noise (see 2.1.3.6); and

(c) Substances and articles not mentioned under (a) and (b) which are manufactured with a view to producing a practical explosive or pyrotechnic effect.

2.1.1.2 Transport of explosive substances which are unduly sensitive or so reactive as to be subject to spontaneous reaction is prohibited.

2.1.1.3 *Definitions*

For the purposes of these Regulations, the following definitions apply:

(a) *Explosive substance* is a solid or liquid substance (or a mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases;

(b) *Pyrotechnic substance* is a substance or a mixture of substances designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative self-sustaining exothermic chemical reactions;

(c) *Explosive article* is an article containing one or more explosive substances;

(d) *Phlegmatized* means that a substance (or "phlegmatizer") has been added to an explosive to enhance its safety in handling and transport. The phlegmatizer renders the explosive insensitive, or less sensitive, to the following actions: heat, shock, impact, percussion or friction. Typical phlegmatizing agents include, but are not limited to: wax, paper, water, polymers (such as chlorofluoropolymers), alcohol and oils (such as petroleum jelly and paraffin).

2.1.1.4 ***Divisions***

Class 1 is divided into six divisions as follows:

(a) Division 1.1: Substances and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire load virtually instantaneously);

(b) Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard;

(c) Division 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

This division comprises substances and articles:

(i) which give rise to considerable radiant heat; or

(ii) which burn one after another, producing minor blast or projection effects or both;

(d) Division 1.4: Substances and articles which present no significant hazard

This division comprises substances and articles which present only a small hazard in the event of ignition or initiation during transport. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package;

NOTE: *Substances and articles of this division are in Compatibility Group S if they are so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity of the package.*

(e) Division 1.5: Very insensitive substances which have a mass explosion hazard

This division comprises substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport;

NOTE: *The probability of transition from burning to detonation is greater when large quantities are carried in a ship.*

(f) Division 1.6: Extremely insensitive articles which do not have a mass explosion hazard

This division comprises articles which predominantly contain extremely insensitive substances and which demonstrate a negligible probability of accidental initiation or propagation.

NOTE: *The hazard from articles of Division 1.6 is limited to the explosion of a single article.*

2.1.1.5 Any substance or article having or suspected of having explosive characteristics shall first be considered for classification in Class 1 in accordance with the procedures in 2.1.3. Goods are not classified in Class 1 when:

(a) Unless specially authorized, the transport of an explosive substance is prohibited because sensitivity of the substance is excessive;

(b) The substance or article comes within the scope of those explosive substances and articles which are specifically excluded from Class 1 by the definition of this class; or

(c) The substance or article has no explosive properties.

2.1.2 Compatibility groups

2.1.2.1 Goods of Class 1 are assigned to one of six divisions, depending on the type of hazard they present (see 2.1.1.4) and to one of thirteen compatibility groups which identify the kinds of explosive substances and articles that are deemed to be compatible. The tables in 2.1.2.1.1 and 2.1.2.1.2 show the scheme of classification into compatibility groups, the possible hazard divisions associated with each group and the consequential classification codes.

2.1.2.1.1 *Classification codes*

Description of substance or article to be classified	**Compatibility Group**	**Classification Code**
Primary explosive substance	A	1.1A
Article containing a primary explosive substance and not containing two or more effective protective features. Some articles, such as detonators for blasting, detonator assemblies for blasting and primers, cap-type, are included, even though they do not contain primary explosives	B	1.1B 1.2B 1.4B
Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance	C	1.1C 1.2C 1.3C 1.4C
Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and containing two or more effective protective features	D	1.1D 1.2D 1.4D 1.5D
Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids)	E	1.1E 1.2E 1.4E
Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids) or without a propelling charge	F	1.1F 1.2F 1.3F 1.4F
Pyrotechnic substance, or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear- or smoke-producing substance (other than a water-activated article or one containing white phosphorus, phosphides, a pyrophoric substance, a flammable liquid or gel, or hypergolic liquids)	G	1.1G 1.2G 1.3G 1.4G
Article containing both an explosive substance and white phosphorus	H	1.2H 1.3H
Article containing both an explosive substance and a flammable liquid or gel	J	1.1J 1.2J 1.3J
Article containing both an explosive substance and a toxic chemical agent	K	1.2K 1.3K
Explosive substance or article containing an explosive substance and presenting a special hazard (e.g. due to water-activation or presence of hypergolic liquids, phosphides or a pyrophoric substance) and needing isolation of each type (see 7.1.3.1.5)	L	1.1L 1.2L 1.3L
Articles predominantly containing extremely insensitive substances	N	1.6N
Substance or article so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prohibit fire fighting or other emergency response efforts in the immediate vicinity of the package	S	1.4S

NOTE 1: *Articles of compatibility groups D and E may be fitted or packed together with their own means of initiation provided that such means have at least two effective protective features designed to prevent an explosion in the event of accidental functioning of the means of initiation. Such articles and packages shall be assigned to compatibility groups D or E.*

NOTE 2: *Articles of compatibility groups D and E may be packed together with their own means of initiation, which do not have two effective protective features when, in the opinion of the competent authority of the country of origin, the accidental functioning of the means of initiation does not cause the explosion of an article under normal conditions of transport. Such packages shall be assigned to compatibility groups D or E.*

2.1.2.1.2 *Scheme of classification of explosives, combination of hazard division with compatibility group*

Compatibility Group

Hazard Division	A	B	C	D	E	F	G	H	J	K	L	N	S	A-S Σ
1.1	1.1A	1.1B	1.1C	1.1D	1.1E	1.1F	1.1G		1.1J		1.1L			9
1.2		1.2B	1.2C	1.2D	1.2E	1.2F	1.2G	1.2H	1.2J	1.2K	1.2L			10
1.3			1.3C			1.3F	1.3G	1.3H	1.3J	1.3K	1.3L			7
1.4		1.4B	1.4C	1.4D	1.4E	1.4F	1.4G						1.4S	7
1.5				1.5D										1
1.6												1.6N		1
1.1-1.6 Σ	1	3	4	4	3	4	4	2	3	2	3	1	1	35

2.1.2.2 The definitions of compatibility groups in 2.1.2.1.1 are intended to be mutually exclusive, except for a substance or article which qualifies for Compatibility Group S. Since the criterion of Compatibility Group S is an empirical one, assignment to this group is necessarily linked to the tests for assignment to Division 1.4.

2.1.3 Classification procedure

2.1.3.1 *General*

2.1.3.1.1 Any substance or article having or suspected of having explosives characteristics shall be considered for classification in Class 1. Substances and articles classified in Class 1 shall be assigned to the appropriate division and compatibility group.

2.1.3.1.2 Except for substances which are listed by their proper shipping name in the Dangerous Goods List in Chapter 3.2, goods shall not be offered for transport as Class 1 until they have been subjected to the classification procedure prescribed in this section. In addition, the classification procedure shall be undertaken before a new product is offered for transport. In this context a new product is one which, in the opinion of the competent authority, involves any of the following:

(a) A new explosive substance or a combination or a mixture of explosive substances which is considered to be significantly different from other combinations or mixtures already classified;

(b) A new design of article or an article containing a new explosive substance or a new combination or mixture of explosive substances;

(c) A new design of package for an explosive substance or article including a new type of inner packaging;

NOTE: *The importance of this can be overlooked unless it is realized that a relatively minor change in an inner or outer packaging can be critical and can convert a lesser hazard into a mass explosion hazard.*

2.1.3.1.3 The producer or other applicant for classification of a product shall provide adequate information concerning the names and characteristics of all explosive substances in the product and shall furnish the results of all relevant tests which have been done. It is assumed that all the explosive substances in a new article have been properly tested and then approved.

2.1.3.1.4 A report on the series of tests shall be drawn up in accordance with the requirements of the competent authority. It shall in particular contain information on:

(a) The composition of the substance or the structure of the article;

(b) The quantity of substance or number of articles per test;

(c) The type and construction of the packaging;

(d) The test assembly, including in particular the nature, quantity and arrangement of the means of initiation or ignition used;

(e) The course of the test, including in particular the time elapsing until the occurrence of the first noteworthy reaction of the substance or article, the duration and characteristics of the reaction, and an estimate of the latter's completeness;

(f) The effect of the reaction on the immediate surroundings (up to 25 m from the site of the test);

(g) The effect of the reaction on the more remote surroundings (more than 25 m from the site of the test); and

(h) The atmospheric conditions during the test.

2.1.3.1.5 Verification of the classification shall be undertaken if the substance or article or its packaging is degraded and the degradation might affect the behaviour of the item in the tests.

2.1.3.2 *Procedure*

2.1.3.2.1 Figure 2.1.1 indicates the general scheme for classifying a substance or article which is to be considered for inclusion in Class 1. The assessment is in two stages. First, the potential of a substance or article to explode must be ascertained and its stability and sensitivity, both chemical and physical, must be shown to be acceptable. In order to promote uniform assessments by competent authorities, it is recommended that data from suitable tests be analyzed systematically with respect to the appropriate test criteria using the flow chart of Figure 10.2 in Part I of the *Manual of Tests and Criteria*. If the substance or article is acceptable for Class 1 it is then necessary to proceed to the second stage, to assign the correct hazard division by the flow chart of Figure 10.3 in the same publication.

2.1.3.2.2 The tests for acceptance and the further tests to determine the correct division in Class 1 are conveniently grouped into seven series as listed in Part I of the *Manual of Tests and Criteria*. The numbering of these series relates to the sequence of assessing results rather than the order in which the tests are conducted.

2.1.3.2.3 *Scheme of procedure for classifying a substance or article*

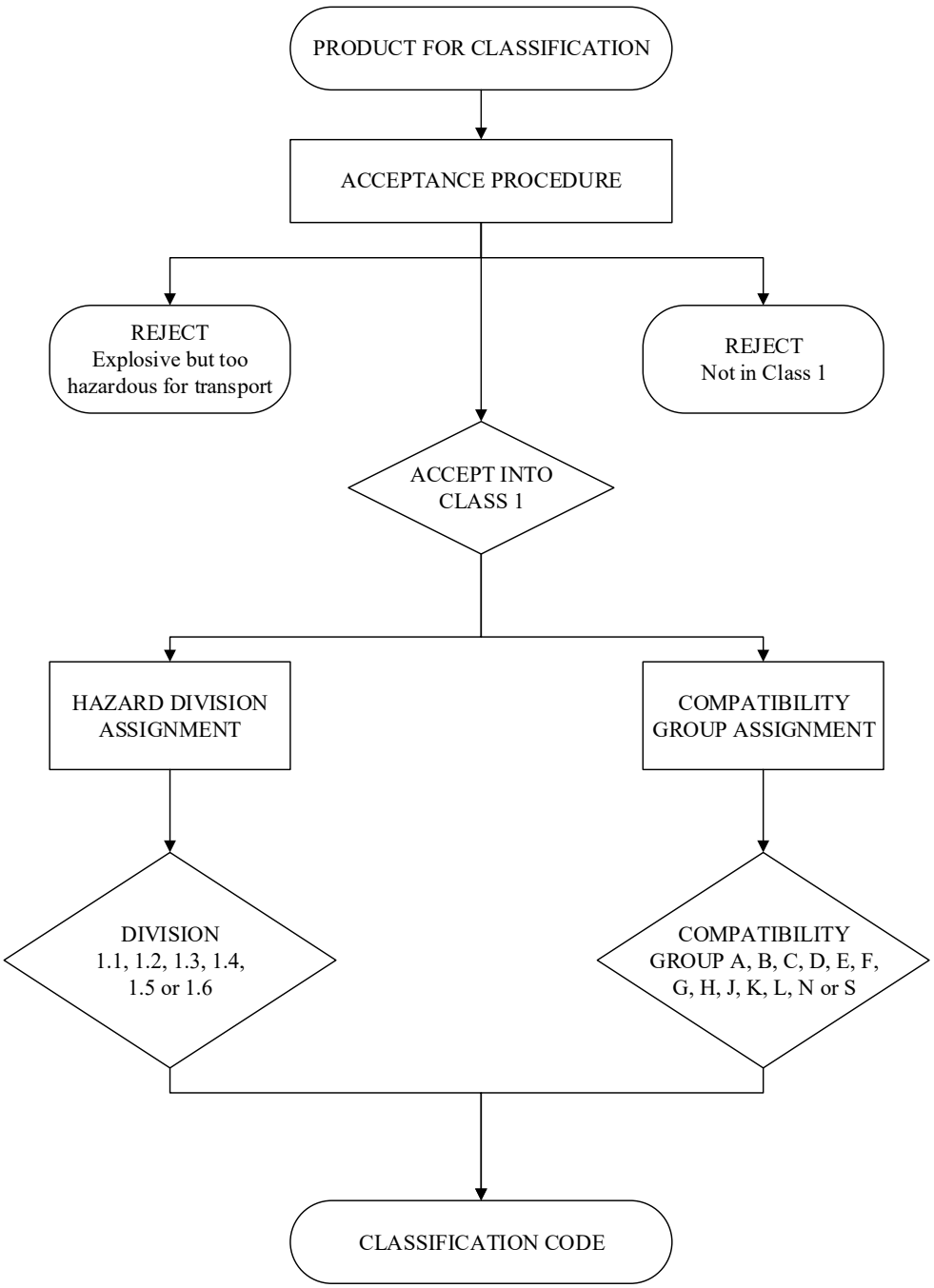
NOTE 1: *The competent authority which prescribes the definitive test method corresponding to each of the Test Types should specify the appropriate test criteria. Where there is international agreement on test criteria, the details are given in the publication referred to above describing the seven series of tests.*

NOTE 2: *The scheme of assessment is only designed for the classification of packaged substances and articles and for individual unpacked articles. Transport in freight containers, road vehicles and rail wagons*

may require special tests which take into consideration the quantity (self-confinement) and kind of substance and the container for the substance. Such tests may be specified by the competent authorities.

NOTE 3: *Since there will be borderline cases with any scheme of testing there should be an ultimate authority who will make the final decision. Such a decision may not receive international acceptance and may therefore be valid only in the country where it is made. The United Nations Committee of Experts on the Transport of Dangerous Goods provides a forum for the discussion of borderline cases. Where international recognition is sought for a classification, the competent authority should submit full details of all tests made including the nature of any variations introduced.*

Figure 2.1.1: Scheme of procedure for classifying a substance or article



2.1.3.3 *Acceptance procedure*

2.1.3.3.1 The results from preliminary tests and those from test series 1 to 4 are used to determine whether or not the product is acceptable for Class 1. If the substance is manufactured with a view to producing a practical explosive or pyrotechnic effect, it is unnecessary to conduct test series 1 and 2. If an article, a packaged article or a packaged substance is rejected by test series 3 and/or 4 it may be practicable to redesign the article or the packaging to render it acceptable.

NOTE: *Some devices may function accidentally during transport. Theoretical analysis, test data or other evidence of safety should be provided to establish that such an event is very unlikely or that the consequences would not be significant. The assessment should take account of vibration related to the proposed modes of transport, static electricity, electromagnetic radiation at all relevant frequencies (maximum intensity 100 $W \cdot m^{-2}$), adverse climatic conditions and compatibility of explosive substances with glues, paints and packaging materials with which they may come in contact. All articles containing primary explosive substances should be assessed to evaluate the risk and consequences of accidental functioning during transport. The reliability of fuzes should be assessed taking account of the number of independent safety features. All articles and packaged substances should be assessed to ensure they have been designed in a good workmanlike manner (e.g. there is no possibility of formation of voids or thin films of explosive substance, and no possibility of grinding or nipping explosive substances between hard surfaces).*

2.1.3.4 *Assignment to hazard divisions*

2.1.3.4.1 Assessment of the hazard division is usually made on the basis of test results. A substance or article shall be assigned to the hazard division which corresponds to the results of the tests to which the substance or article, as offered for transport, has been subjected. Other test results, and data assembled from accidents which have occurred, may also be taken into account.

2.1.3.4.2 Test series 5, 6 and 7 are used for the determination of the hazard division. Test series 5 is used to determine whether a substance can be assigned to Division 1.5. Test series 6 is used for the assignment of substances and articles to Divisions 1.1, 1.2, 1.3 and 1.4. Test series 7 is used for the assignment of articles to Division 1.6.

2.1.3.4.3 In the case of Compatibility Group S the tests may be waived by the competent authority if classification by analogy is possible using test results for a comparable article.

2.1.3.5 *Assignment of fireworks to hazard divisions*

2.1.3.5.1 Fireworks shall normally be assigned to hazard divisions 1.1, 1.2, 1.3, and 1.4 on the basis of test data derived from test series 6. However:

(a) waterfalls containing flash composition (see Note 2 of 2.1.3.5.5) shall be classified as 1.1G regardless of the results of test series 6;

(b) since the range of fireworks is very extensive and the availability of test facilities may be limited, assignment to hazard divisions may also be made in accordance with the procedure in 2.1.3.5.2.

2.1.3.5.2 Assignment of fireworks to UN Nos. 0333, 0334, 0335 or 0336, and assignment of articles to UN 0431 for those used for theatrical effects meeting the definition for article type and the 1.4G specification in the default fireworks classification table in 2.1.3.5.5 may be made on the basis of analogy, without the need for test series 6 testing, in accordance with the default fireworks classification table in 2.1.3.5.5. Such assignment shall be made with the agreement of the competent authority. Items not specified in the table shall be classified on the basis of test data derived from test series 6.

NOTE 1: *The addition of other types of fireworks to Column 1 of the table in 2.1.3.5.5 should only be made on the basis of full test data submitted to the UN Sub-Committee on the Transport of Dangerous Goods for consideration.*

NOTE 2: *Test data derived by competent authorities which validates, or contradicts the assignment of fireworks specified in Column 4 of the table in 2.1.3.5.5 to hazard divisions in Column 5 should be submitted to the UN Sub-Committee on the Transport of Dangerous Goods for information (see also note 3 in 2.1.3.2.3).*

2.1.3.5.3 Where fireworks of more than one hazard division are packed in the same package they shall be classified on the basis of the highest hazard division unless test data derived from test series 6 indicate otherwise.

2.1.3.5.4 The classification shown in the table in 2.1.3.5.5 applies only for articles packed in fibreboard boxes (4G).

2.1.3.5.5 *Default fireworks classification table*[1]

NOTE 1: *References to percentages in the table, unless otherwise stated, are to the mass of all pyrotechnic substances (e.g. rocket motors, lifting charge, bursting charge and effect charge).*

NOTE 2: *"Flash composition" in this table refers to pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks that are used in waterfalls, or to produce an aural effect or used as a bursting charge, or propellant charge unless:*

(a) The time taken for the pressure rise in the HSL Flash Composition Test in Appendix 7 of the Manual of Tests and Criteria is demonstrated to be more than 6 ms for 0.5 g of pyrotechnic substance; or

(b) The pyrotechnic substance gives a negative "-" result in the US Flash Composition Test in Appendix 7 of the Manual of Tests and Criteria.

NOTE 3: *Dimensions in mm refer to:*

(a) for spherical and peanut shells, the diameter of the sphere of the shell;

(b) for cylinder shells, the length of the shell;

(c) for a shell in mortar, Roman candle, shot tube firework or mine, the inside diameter of the tube comprising or containing the firework;

(d) for a bag mine or cylinder mine, the inside diameter of the mortar intended to contain the mine.

[1] *This table contains a list of firework classifications that may be used in the absence of test series 6 data (see 2.1.3.5.2).*

Type	Includes: / Synonym:	Definition	Specification	Classification
Shell, spherical or cylindrical	spherical display shell: aerial shell, colour shell, dye shell, multi-break shell, multi-effect shell, nautical shell, parachute shell, smoke shell, star shell; report shell: maroon, salute, sound shell, thunderclap, aerial shell kit	device with or without propellant charge, with delay fuse and bursting charge, pyrotechnic unit(s) or loose pyrotechnic substance and designed to be projected from a mortar	all report shells	1.1G
			colour shell: ≥ 180 mm	1.1G
			colour shell: < 180 mm with > 25 % flash composition, as loose powder and/ or report effects	1.1G
			colour shell: < 180 mm with ≤ 25 % flash composition, as loose powder and/ or report effects	1.3G
			colour shell: ≤ 50 mm, or ≤ 60 g pyrotechnic substance, with ≤ 2 % flash composition as loose powder and/ or report effects	1.4G
	peanut shell	device with two or more spherical aerial shells in a common wrapper propelled by the same propellant charge with separate external delay fuses	the most hazardous spherical aerial shell determines the classification	
	preloaded mortar, shell in mortar	assembly comprising a spherical or cylindrical shell inside a mortar from which the shell is designed to be projected	all report shells	1.1G
			colour shell: ≥ 180 mm	1.1G
			colour shell: > 25 % flash composition as loose powder and/or report effects	1.1G
			colour shell: > 50 mm and < 180 mm	1.2G
			Colour shell: ≤ 50 mm, or ≤ 60 g pyrotechnic substance, with ≤ 25 % flash composition as loose powder and/ or report effects	1.3G

Type	Includes: / Synonym:	Definition	Specification	Classification
Shell, spherical or cylindrical *(cont'd)*	shell of shells (spherical) (Reference to percentages for shell of shells are to the gross mass of the fireworks article)	device without propellant charge, with delay fuse and bursting charge, containing report shells and inert materials and designed to be projected from a mortar	> 120 mm	1.1G
		device without propellant charge, with delay fuse and bursting charge, containing report shells ≤ 25g flash composition per report unit, with ≤ 33 % flash composition and ≥ 60 % inert materials and designed to be projected from a mortar	≤ 120 mm	1.3G
		device without propellant charge, with delay fuse and bursting charge, containing colour shells and/or pyrotechnic units and designed to be projected from a mortar	> 300 mm	1.1G
		device without propellant charge, with delay fuse and bursting charge, containing colour shells ≤ 70mm and/or pyrotechnic units, with ≤ 25 % flash composition and ≤ 60 % pyrotechnic substance and designed to be projected from a mortar	> 200 mm and ≤ 300 mm	1.3G
		device with propellant charge, with delay fuse and bursting charge, containing colour shells ≤ 70 mm and/or pyrotechnic units, with ≤ 25 % flash composition and ≤ 60 % pyrotechnic substance and designed to be projected from a mortar	≤ 200 mm	1.3G
Battery/ combination	barrage, bombardos, cakes, finale box, flowerbed, hybrid, multiple tubes, shell cakes, banger batteries, flash banger batteries	assembly including several elements either containing the same type or several types each corresponding to one of the types of fireworks listed in this table, with one or two points of ignition	the most hazardous firework type determines the classification	

Type	Includes: / Synonym:	Definition	Specification	Classification
Roman candle	exhibition candle, candle, bombettes	tube containing a series of pyrotechnic units consisting of alternate pyrotechnic substance, propellant charge, and transmitting fuse	≥ 50 mm inner diameter, containing flash composition, or < 50 mm with >25 % flash composition	1.1G
			≥ 50 mm inner diameter, containing no flash composition	1.2G
			< 50 mm inner diameter and ≤ 25 % flash composition	1.3G
			≤ 30 mm. inner diameter, each pyrotechnic unit ≤ 25 g and ≤ 5 % flash composition	1.4G
Shot tube	single shot Roman candle, small preloaded mortar	tube containing a pyrotechnic unit consisting of pyrotechnic substance, propellant charge with or without transmitting fuse	≤ 30 mm inner diameter and pyrotechnic unit > 25 g, or > 5 % and ≤ 25 % flash composition	1.3G
			≤ 30 mm inner diameter, pyrotechnic unit ≤ 25 g and ≤ 5 % flash composition	1.4G
Rocket	avalanche rocket, signal rocket, whistling rocket, bottle rocket, sky rocket, missile type rocket, table rocket	tube containing pyrotechnic substance and/or pyrotechnic units, equipped with stick(s) or other means for stabilization of flight, and designed to be propelled into the air	Flash composition effects only	1.1G
			Flash composition > 25 % of the pyrotechnic substance	1.1G
			> 20 g pyrotechnic substance and flash composition ≤ 25 %	1.3G
			≤ 20 g pyrotechnic substance, black powder bursting charge and ≤ 0.13 g flash composition per report and ≤ 1 g in total	1.4G
Mine	pot-a-feu, ground mine, bag mine, cylinder mine	tube containing propellant charge and pyrotechnic units and designed to be placed on the ground or to be fixed in the ground. The principal effect is ejection of all the pyrotechnic units in a single burst producing a widely dispersed visual and/or aural effect in the air; or cloth or paper bag or cloth or paper cylinder containing propellant charge and pyrotechnic units, designed to be placed in a mortar and to function as a mine	> 25 % flash composition, as loose powder and/ or report effects	1.1G
			≥ 180mm and ≤ 25 % flash composition, as loose powder and/ or report effects	1.1G
			< 180mm and ≤ 25 % flash composition, as loose powder and/ or report effects	1.3G
			≤ 150g pyrotechnic substance, containing ≤ 5 % flash composition as loose powder and/ or report effects. Each pyrotechnic unit ≤ 25 g, each report effect < 2g ; each whistle, if any, ≤ 3 g	1.4G

Type	Includes: / Synonym:	Definition	Specification	Classification
Fountain	volcanos, gerbs, lances, Bengal fire, flitter sparkle, cylindrical fountains, cone fountains, illuminating torch	non-metallic case containing pressed or consolidated sparks and flame producing pyrotechnic substance ***NOTE:*** *Fountains intended to produce a vertical cascade or curtain of sparks are considered to be waterfalls (see row below).*	≥ 1 kg pyrotechnic substance	1.3G
			< 1 kg pyrotechnic substance	1.4G
Waterfall	cascades, showers	pyrotechnic fountain intended to produce a vertical cascade or curtain of sparks	containing flash composition regardless of the results of test series 6 (see 2.1.3.5.1 (a))	1.1G
			not containing flash composition	1.3G
Sparkler	handheld sparklers, non-handheld sparklers, wire sparklers	rigid wire partially coated (along one end) with slow burning pyrotechnic substance with or without an ignition tip	perchlorate based sparklers: > 5 g per item or > 10 items per pack	1.3G
			perchlorate based sparklers: ≤ 5 g per item and ≤ 10 items per pack; nitrate based sparklers: ≤ 30 g per item	1.4G
Bengal stick	Dipped stick	non-metallic stick partially coated (along one end) with slow-burning pyrotechnic substance and designed to be held in the hand	perchlorate based items: > 5 g per item or > 10 items per pack	1.3 G
			perchlorate based items: ≤ 5 g per item and ≤ 10 items per pack; nitrate based items: ≤ 30 g per item	1.4G
Low hazard fireworks and novelties	table bombs, throwdowns, crackling granules, smokes, fog, snakes, glow worm, serpents, snaps, party poppers	device designed to produce very limited visible and/ or audible effect which contains small amounts of pyrotechnic and/or explosive substance	Throwdowns and snaps may contain up to 1.6 mg of silver fulminate; snaps and party poppers may contain up to 16 mg of potassium chlorate/ red phosphorous mixture; other articles may contain up to 5 g of pyrotechnic substance, but no flash composition	1.4G
Spinner	aerial spinner, helicopter, chaser, ground spinner	non-metallic tube or tubes containing gas- or spark-producing pyrotechnic substance, with or without noise producing composition, with or without aerofoils attached	pyrotechnic substance per item > 20 g, containing ≤ 3 % flash composition as report effects, or whistle composition ≤ 5 g	1.3G
			pyrotechnic substance per item ≤ 20 g, containing ≤ 3 % flash composition as report effects, or whistle composition ≤ 5 g	1.4G

Type	Includes: / Synonym:	Definition	Specification	Classification
Wheels	Catherine wheels, Saxon	assembly including drivers containing pyrotechnic substance and provided with a means of attaching it to a support so that it can rotate	≥ 1 kg total pyrotechnic substance, no report effect, each whistle (if any) ≤ 25 g and ≤ 50 g whistle composition per wheel	1.3G
			< 1 kg total pyrotechnic substance, no report effect, each whistle (if any) ≤ 5 g and ≤ 10 g whistle composition per wheel	1.4G
Aerial wheel	flying Saxon, UFO's, rising crown	tubes containing propellant charges and sparks- flame- and/ or noise producing pyrotechnic substances, the tubes being fixed to a supporting ring	> 200 g total pyrotechnic substance or > 60 g pyrotechnic substance per driver, ≤ 3 % flash composition as report effects, each whistle (if any) ≤ 25 g and ≤ 50 g whistle composition per wheel	1.3G
			≤ 200 g total pyrotechnic substance and ≤ 60 g pyrotechnic substance per driver, ≤ 3 % flash composition as report effects, each whistle (if any) ≤ 5 g and ≤ 10 g whistle composition per wheel	1.4G
Selection pack	display selection box, display selection pack, garden selection box, indoor selection box; assortment	A pack of more than one type each corresponding to one of the types of fireworks listed in this table	The most hazardous firework type determines the classification	
Firecracker	Celebration cracker, celebration roll, string cracker	Assembly of tubes (paper or cardboard) linked by a pyrotechnic fuse, each tube intended to produce an aural effect	each tube ≤ 140 mg of flash composition or ≤ 1 g black powder	1.4G
Banger	Salute, flash banger, lady cracker	Non-metallic tube containing report composition intended to produce an aural effect	> 2 g flash composition per item	1.1G
			≤ 2 g flash composition per item and ≤ 10 g per inner packaging	1.3G
			≤ 1 g flash composition per item and ≤ 10 g per inner packaging or ≤ 10 g black powder per item	1.4G

2.1.3.6 *Exclusion from Class 1*

2.1.3.6.1 The competent authority may exclude an article or substance from Class 1 by virtue of test results and the Class 1 definition.

2.1.3.6.2 Where a substance provisionally accepted into Class 1 is excluded from Class 1 by performing test series 6 on a specific type and size of package, this substance, when meeting the classification criteria or definition for another class or division, should be listed in the Dangerous Goods List of Chapter 3.2 in that class or division with a special provision restricting it to the type and size of package tested.

2.1.3.6.3 Where a substance is assigned to Class 1 but is diluted to be excluded from Class 1 by test series 6, this diluted substance (hereafter referred to as desensitized explosive) shall be listed in the Dangerous Goods List of Chapter 3.2 with an indication of the highest concentration which excluded it from Class 1 (see 2.3.1.4 and 2.4.2.4.1) and if applicable, the concentration below which it is no longer deemed subject to these Regulations. New solid desensitized explosives subject to these Regulations shall be listed in Division 4.1 and new liquid desensitized explosives shall be listed in Class 3. When the desensitized explosive meets the criteria or definition for another class or division, the corresponding subsidiary hazard(s) shall be assigned to it.

2.1.3.6.4 An article may be excluded from Class 1 when three unpackaged articles, each individually activated by its own means of initiation or ignition or external means to function in the designed mode, meet the following test criteria:

(a) No external surface shall have a temperature of more than 65º C. A momentary spike in temperature up to 200 ºC is acceptable;

(b) No rupture or fragmentation of the external casing or movement of the article or detached parts thereof of more than one metre in any direction;

NOTE: *Where the integrity of the article may be affected in the event of an external fire these criteria shall be examined by a fire test. One such method is described in ISO 14451-2 using a heating rate of 80 K/min.*

(c) No audible report exceeding 135 dB(C) peak at a distance of one metre;

(d) No flash or flame capable of igniting a material such as a sheet of 80 ± 10 g/m² paper in contact with the article; and

(e) No production of smoke, fumes or dust in such quantities that the visibility in a one cubic metre chamber equipped with appropriately sized blow out panels is reduced more than 50 % as measured by a calibrated light (lux) meter or radiometer located one metre from a constant light source located at the midpoint on opposite walls. The general guidance on Optical Density Testing in ISO 5659-1 and the general guidance on the Photometric System described in Section 7.5 in ISO 5659-2 may be used or similar optical density measurement methods designed to accomplish the same purpose may also be employed. A suitable hood cover surrounding the back and sides of the light meter shall be used to minimize effects of scattered or leaking light not emitted directly from the source.

NOTE 1: *If during the tests addressing criteria (a), (b), (c) and (d) no or very little smoke is observed the test described in (e) may be waived.*

NOTE 2: *The competent authority may require testing in packaged form if it is determined that, as packaged for transport, the article may pose a greater hazard.*

2.1.3.7 *Classification documentation*

2.1.3.7.1 A competent authority assigning an article or substance into Class 1 should confirm with the applicant that classification in writing.

2.1.3.7.2 A competent authority classification document may be in any form and may consist of more than one page, provided pages are numbered consecutively. The document should have a unique reference.

2.1.3.7.3 The information provided shall be easy to identify, legible and durable.

2.1.3.7.4 Examples of the information that may be provided in the classification documents are as follows:

(a) The name of the competent authority and the provisions in national legislation under which it is granted its authority;

(b) The modal or national regulations for which the classification document is applicable;

(c) Confirmation that the classification has been approved, made or agreed in accordance with the United Nations Recommendations on the Transport of Dangerous Goods or the relevant modal regulations;

(d) The name and address of the person in law to which the classification has been assigned and any company registration which uniquely identifies a company or other body corporate under national legislation;

(e) The name under which the explosives will be placed onto the market or otherwise supplied for transport;

(f) The Proper Shipping Name, UN number, Class, Hazard Division and corresponding compatibility group of the explosives;

(g) Where appropriate, the maximum net explosive mass of the package or article;

(h) The name, signature, stamp, seal or other identification of the person authorised by the competent authority to issue the classification document is clearly visible;

(i) Where safety in transport or the hazard division is assessed as being dependent upon the packaging, the packaging mark or a description of the permitted:

- Inner packagings
- Intermediate packagings
- Outer packagings

(j) The classification document states the part number, stock number or other identifying reference under which the explosives will be placed onto the market or otherwise supplied for transport;

(k) The name and address of the person in law who manufactured the explosives and any company registration which uniquely identifies a company or other body corporate under national legislation;

(l) Any additional information regarding the applicable packing instruction and special packing provisions where appropriate;

(m) The basis for assigning the classification, i.e. whether on the basis of test results, default for fireworks, analogy with classified explosive, by definition from the Dangerous Goods List etc.;

(n) Any special conditions or limitations that the competent authority has identified as relevant to the safety for transport of the explosives, the communication of the hazard and international transport;

(o) The expiry date of the classification document is given where the competent authority considers one to be appropriate.

CHAPTER 2.2

CLASS 2 - GASES

2.2.1 Definitions and general provisions

2.2.1.1 A gas is a substance which:

(a) At 50 °C has a vapour pressure greater than 300 kPa; or

Is completely gaseous at 20 °C at a standard pressure of 101.3 kPa.

2.2.1.2 The transport condition of a gas is described according to its physical state as:

(a) *Compressed gas* – a gas which when packaged under pressure for transport is entirely gaseous at -50 °C; this category includes all gases with a critical temperature less than or equal to -50 °C;

(b) *Liquefied gas* – a gas which when packaged under pressure for transport is partially liquid at temperatures above -50 °C. A distinction is made between:

(i) *High pressure liquefied gas* – a gas with a critical temperature between -50 °C and +65 °C, and

(ii) *Low pressure liquefied gas* – a gas with a critical temperature above +65 °C;

(c) *Refrigerated liquefied gas* – a gas which when packaged for transport is made partially liquid because of its low temperature;

(d) *Dissolved gas* – a gas which when packaged under pressure for transport is dissolved in a liquid phase solvent;

(e) *Adsorbed gas* – a gas which when packaged for transport is adsorbed onto a solid porous material resulting in an internal receptacle pressure of less than 101.3 kPa at 20 °C and less than 300 kPa at 50 °C.

2.2.1.3 The class comprises compressed gases, liquefied gases, dissolved gases, refrigerated liquefied gases, adsorbed gases, mixtures of one or more gases with one or more vapours of substances of other classes, articles charged with a gas, aerosols and chemicals under pressure.

2.2.2 Divisions

2.2.2.1 Substances of Class 2 are assigned to one of three divisions based on the primary hazard of the gas during transport.

NOTE: *For UN 1950 AEROSOLS, see also the criteria in special provision 63. For chemicals under pressure of UN Nos. 3500 to 3505, see also special provision 362. For UN 2037 RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) see also special provision 303.*

(a) Division 2.1: *Flammable gases*

Gases which at 20 °C and a standard pressure of 101.3 kPa:

(i) are ignitable when in a mixture of 13 per cent or less by volume with air; or

(ii) have a flammable range with air of at least 12 percentage points regardless of the lower flammability limit. Flammability shall be determined by tests or by

calculation in accordance with methods adopted by ISO (see ISO 10156:2017). Where insufficient data are available to use these methods, tests by a comparable method recognized by a national competent authority may be used;

(b) Division 2.2: *Non-flammable, non-toxic gases*

Gases which:

(i) are asphyxiant - gases which dilute or replace the oxygen normally in the atmosphere; or

(ii) are oxidizing - gases which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does; or

(iii) do not come under the other divisions;

NOTE: *In 2.2.2.1 (b) (ii), "gases which cause or contribute to the combustion of other material more than air does" means pure gases or gas mixtures with an oxidizing power greater than 23.5 % as determined by a method specified in ISO 10156:2017.*

(c) Division 2.3: *Toxic gases*

Gases which:

(i) are known to be so toxic or corrosive to humans as to pose a hazard to health; or

(ii) are presumed to be toxic or corrosive to humans because they have an LC_{50} value (as defined in 2.6.2.1) equal to or less than 5 000 ml/m^3 (ppm).

NOTE: *Gases meeting the above criteria owing to their corrosivity are to be classified as toxic with a subsidiary corrosive hazard.*

2.2.2.2 Gases and gas mixtures with hazards associated with more than one division take the following precedence:

(a) Division 2.3 takes precedence over all other divisions;

(b) Division 2.1 takes precedence over Division 2.2.

2.2.2.3 Gases of Division 2.2 are not subject to these Regulations if they are transported at a pressure of less than 200 kPa at 20 °C and are not liquefied or refrigerated liquefied gases.

2.2.2.4 Gases of Division 2.2 are not subject to these Regulations when contained in the following:

(a) Foodstuffs, including carbonated beverages (except UN 1950);

(b) Balls intended for use in sports; or

(c) Tyres (except for air transport).

NOTE: *This exemption does not apply to lamps. For lamps see 1.1.1.9.*

2.2.3 Mixtures of gases

Gas mixtures are to be classified in one of the three divisions (including vapours of substances from other classes) by applying the following procedures:

(a) Flammability shall be determined by tests or by calculation in accordance with methods adopted by ISO (see ISO 10156:2017). Where insufficient data are available to use these

methods, tests by a comparable method recognized by a national competent authority may be used;

(b) The level of toxicity is determined either by tests to measure the LC_{50} value (as defined in 2.6.2.1) or by a calculation method using the following formula:

$$LC_{50}\,\text{Toxic (mixture)} = \frac{1}{\sum_{i=1}^{n} \frac{f_i}{T_i}}$$

where: f_i = mole fraction of the i^{th} component substance of the mixture

T_i = Toxicity index of the i^{th} component substance of the mixture (the T_i equals the LC_{50} value when available).

When LC_{50} values are unknown the toxicity index is determined by using the lowest LC_{50} value of substances of similar physiological and chemical effects, or through testing if this is the only practical possibility;

(c) A gas mixture has a subsidiary hazard of corrosivity when the mixture is known by human experience to be destructive to the skin, eyes or mucous membranes or when the LC_{50} value of the corrosive components of the mixture is equal to or less than 5 000 ml/m^3 (ppm) when the LC_{50} is calculated by the formula:

$$LC_{50}\,\text{Corrosive (mixture)} = \frac{1}{\sum_{i=1}^{n} \frac{f_{ci}}{T_{ci}}}$$

where: f_{ci} = mole fraction of the i^{th} corrosive component substance of the mixture

T_{ci} = Toxicity index of the i^{th} corrosive component substance of the mixture (the T_{ci} equals the LC_{50} value when available);

(d) Oxidizing ability is determined either by tests or by calculation methods adopted by ISO (see the Note in 2.2.2.1 (b) and ISO 10156:2017).

2.2.4 Gases not accepted for transport

Chemically unstable gases of Class 2 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport or unless transported in accordance with special packing provision (r) of packing instruction P200 (5) of 4.1.4.1, as applicable. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.

CHAPTER 2.3

CLASS 3 - FLAMMABLE LIQUIDS

Introductory notes

NOTE 1: *The word "flammable" has the same meaning as "inflammable".*

NOTE 2: *The flash point of a flammable liquid may be altered by the presence of an impurity. The substances listed in Class 3 in the Dangerous Goods List in Chapter 3.2 shall generally be regarded as chemically pure. Since commercial products may contain added substances or impurities, flash points may vary, and this may have an effect on classification or determination of the packing group for the product. In the event of doubt regarding the classification or packing group of a substance, the flash point of the substance shall be determined experimentally.*

2.3.1 Definition and general provisions

2.3.1.1 Class 3 includes the following substances:

(a) Flammable liquids (see 2.3.1.2 and 2.3.1.3);

(b) Liquid desensitized explosives (see 2.3.1.4).

2.3.1.2 *Flammable liquids* are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc., but not including substances otherwise classified on account of their dangerous characteristics) which give off a flammable vapour at temperatures of not more than 60 °C, closed-cup test, or not more than 65.6 °C, open-cup test, normally referred to as the flash point. This class also includes:

(a) Liquids offered for transport at temperatures at or above their flash point; and

(b) Substances that are transported or offered for transport at elevated temperatures in a liquid state and which give off a flammable vapour at a temperature at or below the maximum transport temperature.

NOTE: *Since the results of open-cup tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition.*

2.3.1.3 Liquids meeting the definition in 2.3.1.2 with a flash point of more than 35 °C which do not sustain combustion need not be considered as flammable liquids for the purposes of these Regulations. Liquids are considered to be unable to sustain combustion for the purposes of these Regulations (i.e. they do not sustain combustion under defined test conditions) if:

(a) They have passed a suitable combustibility test (see SUSTAINED COMBUSTIBILITY TEST prescribed in the *Manual of Tests and Criteria*, Part III, sub-section 32.5.2);

(b) Their fire point according to ISO 2592:2000 is greater than 100 °C; or

(c) They are water miscible solutions with a water content of more than 90 % by mass.

2.3.1.4 Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form an homogeneous liquid mixture to suppress their explosive properties (see 2.1.3.6.3). Entries in the Dangerous Goods List for liquid desensitized explosives are: UN 1204, UN 2059, UN 3064, UN 3343, UN 3357 and UN 3379.

2.3.2 Assignment of packing groups

2.3.2.1 The criteria in 2.3.2.6 are used to determine the hazard grouping of a liquid that presents a hazard due to flammability.

2.3.2.1.1 For liquids whose only hazard is flammability, the packing group for the substance is the hazard grouping shown in 2.3.2.6.

2.3.2.1.2 For a liquid with additional hazard(s), the hazard group determined from 2.3.2.6 and the hazard group based on the severity of the additional hazard(s) shall be considered, and the classification and packing group determined in accordance with the provisions in Chapter 2.0.

2.3.2.2 Viscous flammable liquids such as paints, enamels, lacquers, varnishes, adhesives and polishes having a flash-point of less than 23 °C may be placed in packing group III in conformity with the procedures prescribed in the *Manual of Tests and Criteria*, Part III, sub-section 32.3, provided that:

(a) The viscosity[1] and flash-point are in accordance with the following table:

Kinematic viscosity (extrapolated) v (at near-zero shear rate) mm²/s at 23 °C	**Flow-time t in seconds**	**Jet diameter (mm)**	**Flash-point, closed-cup (°C)**
$20 < v \leq 80$	$20 < t \leq 60$	4	above 17
$80 < v \leq 135$	$60 < t \leq 100$	4	above 10
$135 < v \leq 220$	$20 < t \leq 32$	6	above 5
$220 < v \leq 300$	$32 < t \leq 44$	6	above -1
$300 < v \leq 700$	$44 < t \leq 100$	6	above -5
$700 < v$	$100 < t$	6	No limit

(b) Less than 3 % of the clear solvent layer separates in the solvent separation test;

(c) The mixture or any separated solvent does not meet the criteria for Division 6.1 or Class 8;

(d) The substances are packed in receptacles of not more than 450 litre capacity.

2.3.2.3 *Reserved.*

2.3.2.4 Substances classified as flammable liquids due to their being transported or offered for transport at elevated temperatures are included in packing group III.

2.3.2.5 *Viscous liquids*

2.3.2.5.1 Except as provided for in 2.3.2.5.2, viscous liquids which:

- have a flash point of 23 °C or above and less than or equal to 60 °C;
- are not toxic, corrosive or environmentally hazardous;

[1] *Viscosity determination: Where the substance concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer shall be used to determine the dynamic viscosity coefficient of the substance, at 23 °C, at a number of shear rates. The values obtained are plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.*

- contain not more than 20 % nitrocellulose provided the nitrocellulose contains not more than 12.6 % nitrogen by dry mass; and

- are packed in receptacles of not more than 450 litre capacity;

are not subject to these Regulations, if:

(a) in the solvent separation test (see *Manual of Tests and Criteria*, Part III, sub-section 32.5.1), the height of the separated layer of solvent is less than 3 % of the total height; and

(b) the flowtime in the viscosity test (see *Manual of Tests and Criteria*, Part III, sub-section 32.4.3), with a jet diameter of 6 mm is equal to or greater than:

(i) 60 seconds; or

(ii) 40 seconds if the viscous liquid contains not more than 60 % of Class 3 substances.

2.3.2.5.2 Viscous liquids which are also environmentally hazardous, but meet all other criteria in 2.3.2.5.1, are not subject to any other provisions of these Regulations when they are transported in single or combination packagings containing a net quantity per single or inner packaging of 5 litres or less, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

2.3.2.6 ***Hazard grouping based on flammability***

Packing group	Flash point (closed-cup)	Initial boiling point
I	--	≤ 35 °C
II	< 23 °C	> 35 °C
III	≥ 23 °C ≤ 60 °C	> 35 °C

2.3.3 Determination of flash point

The following methods for determining the flash point of flammable liquids may be used:

International standards:

ISO 1516
ISO 1523
ISO 2719
ISO 13736
ISO 3679
ISO 3680

National standards:

American Society for Testing Materials International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, USA 19428-2959:

ASTM D3828-07a, Standard Test Methods for Flash Point by Small Scale Closed Cup Tester
ASTM D56-05, Standard Test Method for Flash Point by Tag Closed Cup Tester
ASTM D3278-96(2004)e1, Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D93-08, Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester

Association française de normalisation, AFNOR, 11, rue de Pressensé, 93571 La Plaine Saint-Denis Cedex:
French Standard NF M 07 - 019

French Standards NF M 07 - 011 / NF T 30 - 050 / NF T 66 - 009
French Standard NF M 07 - 036

Deutsches Institut für Normung, Burggrafenstr. 6, D-10787 Berlin:

Standard DIN 51755 (flash points below 65 °C)

State Committee of the Council of Ministers for Standardization, 113813, GSP, Moscow, M-49 Leninsky Prospect, 9:

GOST 12.1.044-84.

2.3.4 Determination of initial boiling point

The following methods for determining the initial boiling point of flammable liquids may be used:

International standards:

ISO 3924
ISO 4626
ISO 3405

National standards:

American Society for Testing Materials International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, USA 19428-2959:

ASTM D86-07a, Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure
ASTM D1078-05, Standard Test Method for Distillation Range of Volatile Organic Liquids

Further acceptable methods:

Method A.2 as described in Part A of the Annex to Commission Regulation (EC) No 440/2008[2].

2.3.5 Substances not accepted for transport

Chemically unstable substances of Class 3 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.

[2] *Commission Regulation (EC) No 440/2008 of 30 May 2008 laying down test methods pursuant to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (Official Journal of the European Union, No. L 142 of 31.05.2008, p.1-739 and No. L 143 of 03.06.2008, p.55).*

CHAPTER 2.4

CLASS 4 - FLAMMABLE SOLIDS; SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION; SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

Introductory notes

NOTE 1: *Where the term "water-reactive" is used in these Regulations, it refers to a substance which in contact with water emits flammable gas.*

NOTE 2: *Because of the different properties exhibited by dangerous goods within Divisions 4.1 and 4.2, it is impracticable to establish a single criterion for classification in either of these divisions. Tests and criteria for assignment to the three divisions of Class 4 are addressed in this Chapter (and in the Manual of Tests and Criteria, Part III, Section 33).*

NOTE 3: *Since organometallic substances can be classified in divisions 4.2 or 4.3 with additional subsidiary hazards, depending on their properties, a specific classification flow chart for these substances is given in 2.4.5.*

2.4.1 Definitions and general provisions

2.4.1.1 Class 4 is divided into three divisions as follows:

(a) Division 4.1 – *Flammable solids*

Solids which, under conditions encountered in transport, are readily combustible or may cause or contribute to fire through friction; self-reactive substances and polymerizing substances which are liable to undergo a strongly exothermic reaction; solid desensitized explosives which may explode if not diluted sufficiently;

(b) Division 4.2 – *Substances liable to spontaneous combustion*

Substances which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up in contact with air, and being then liable to catch fire;

(c) Division 4.3 – *Substances which in contact with water emit flammable gases*

Substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

2.4.1.2 As referenced in this Chapter, test methods and criteria, with advice on application of the tests, are given in the *Manual of Tests and Criteria*, for the classification of the following types of substances of Class 4:

(a) Flammable solids (Division 4.1);

(b) Self-reactive substances (Division 4.1);

(c) Polymerizing substances (Division 4.1);

(d) Pyrophoric solids (Division 4.2);

(e) Pyrophoric liquids (Division 4.2);

(f) Self-heating substances (Division 4.2); and

(g) Substances which, in contact with water, emit flammable gases (Division 4.3).

Test methods and criteria for self-reactive substances and polymerizing substances are given in Part II of the *Manual of Tests and Criteria*, and test methods and criteria for the other types of substances of Class 4 are given in the *Manual of Tests and Criteria*, Part III, section 33.

2.4.2 Division 4.1 – Flammable solids, self-reactive substances, solid desensitized explosives and polymerizing substances

2.4.2.1 *General*

Division 4.1 includes the following types of substances:

(a) Flammable solids (see 2.4.2.2);

(b) Self-reactive substances (see 2.4.2.3);

(c) Solid desensitized explosives (see 2.4.2.4); and

(d) Polymerizing substances (see 2.4.2.5).

2.4.2.2 *Division 4.1 Flammable solids*

2.4.2.2.1 *Definitions and properties*

2.4.2.2.1.1 *Flammable solids* are readily combustible solids and solids which may cause fire through friction.

2.4.2.2.1.2 *Readily combustible solids* are powdered, granular, or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. The danger may come not only from the fire but also from toxic combustion products. Metal powders are especially dangerous because of the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.

2.4.2.2.2 *Classification of flammable solids*

2.4.2.2.2.1 Powdered, granular or pasty substances shall be classified as readily combustible solids of Division 4.1 when the time of burning of one or more of the test runs, performed in accordance with the test method described in the *Manual of Tests and Criteria*, Part III, sub-section 33.2, is less than 45 s or the rate of burning is more than 2.2 mm/s. Powders of metals or metal alloys shall be classified in Division 4.1 when they can be ignited and the reaction spreads over the whole length of the sample in 10 minutes or less.

2.4.2.2.2.2 Solids which may cause fire through friction shall be classified in Division 4.1 by analogy with existing entries (e.g. matches) until definitive criteria are established.

2.4.2.2.3 *Assignment of packing groups*

2.4.2.2.3.1 Packing groups are assigned on the basis of the test methods referred to in 2.4.2.2.2.1. For readily combustible solids (other than metal powders), Packing group II shall be assigned if the burning time is less than 45 s and the flame passes the wetted zone. Packing group II shall be assigned to powders of metal or metal alloys if the zone of reaction spreads over the whole length of the sample in five minutes or less.

2.4.2.2.3.2 Packing groups are assigned on the basis of the test methods referred to in 2.4.2.2.2.1. For readily combustible solids (other than metal powders), Packing group III shall be assigned if the burning time is less than 45 s and the wetted zone stops the flame propagation for at least four minutes. Packing group III shall be assigned to metal powders if the reaction spreads over the whole length of the sample in more than five minutes but not more than ten minutes.

2.4.2.2.3.3 For solids which may cause fire through friction, the packing group shall be assigned by analogy with existing entries or in accordance with any appropriate special provision.

2.4.2.3 *Division 4.1 Self-reactive substances*

2.4.2.3.1 *Definitions and properties*

2.4.2.3.1.1 Definitions

For the purposes of these Regulations:

Self-reactive substances are thermally unstable substances liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). Substances are not considered to be self-reactive substances of Division 4.1, if:

(a) They are explosives according to the criteria of Class 1;

(b) They are oxidizing substances according to the classification procedure for Division 5.1 (see 2.5.2.1.1) except that mixtures of oxidizing substances which contain 5.0 % or more of combustible organic substances shall be subjected to the classification procedure defined in note 3;

(c) They are organic peroxides according to the criteria of Division 5.2;

(d) Their heat of decomposition is less than 300 J/g; or

(e) Their self-accelerating decomposition temperature (SADT) (see 2.4.2.3.4) is greater than 75 °C for a 50 kg package.

NOTE 1: *The heat of decomposition can be determined using any internationally recognised method e.g. differential scanning calorimetry and adiabatic calorimetry.*

NOTE 2: *Any substance which shows the properties of a self-reactive substance shall be classified as such, even if this substance gives a positive test result according to 2.4.3.2 for inclusion in Division 4.2.*

NOTE 3: *Mixtures of oxidizing substances meeting the criteria of Division 5.1 which contain 5.0 % or more of combustible organic substances, which do not meet the criteria mentioned in (a), (c), (d) or (e) above, shall be subjected to the self-reactive substance classification procedure.*

A mixture showing the properties of a self-reactive substance, type B to F, shall be classified as a self-reactive substance of Division 4.1.

A mixture showing the properties of a self-reactive substance, type G, according to the principle of 2.4.2.3.3.2 (g) shall be considered for classification as a substance of Division 5.1 (see 2.5.2.1.1).

2.4.2.3.1.2 Properties

The decomposition of self-reactive substances can be initiated by heat, contact with catalytic impurities (e.g. acids, heavy-metal compounds, bases), friction or impact. The rate of decomposition increases with temperature and varies with the substance. Decomposition, particularly if no ignition occurs, may result in the evolution of toxic gases or vapours. For certain self-reactive substances, the temperature shall be controlled. Some self-reactive substances may decompose explosively, particularly if confined. This characteristic may be modified by the addition of diluents or by the use of appropriate packagings. Some self-reactive substances burn vigorously. Self-reactive substances are, for example, some compounds of the types listed below:

(a) Aliphatic azo compounds (-C-N=N-C-);

(b) Organic azides (-C-N_3);

(c) Diazonium salts (-$CN_2^+Z^-$);

(d) N-nitroso compounds (-N-N=O); and

(e) Aromatic sulphonylhydrazides (-SO_2-NH-NH_2).

This list is not exhaustive and substances with other reactive groups and some mixtures of substances may have similar properties.

2.4.2.3.2 *Classification of self-reactive substances*

2.4.2.3.2.1 Self-reactive substances are classified into seven types according to the degree of danger they present. The types of self-reactive substance range from type A, which may not be accepted for transport in the packaging in which it is tested, to type G, which is not subject to the provisions for self-reactive substances of Division 4.1. The classification of types B to F is directly related to the maximum quantity allowed in one packaging.

2.4.2.3.2.2 Self-reactive substances permitted for transport in packagings are listed in 2.4.2.3.2.3, those permitted for transport in IBCs are listed in packing instruction IBC520 and those permitted for transport in portable tanks are listed in portable tank instruction T23. For each permitted substance listed, the appropriate generic entry of the Dangerous Goods List (UN Nos. 3221 to 3240) is assigned, and appropriate subsidiary hazards and remarks providing relevant transport information are given. The generic entries specify:

(a) Self-reactive substance type (B to F);

(b) Physical state (liquid or solid); and

(c) Temperature control, when required (see 2.4.2.3.4).

2.4.2.3.2.3 List of currently assigned self-reactive substances in packagings

In the column “Packing Method”, codes “OP1” to “OP8” refer to packing methods in packing instruction P520. Self-reactive substances to be transported shall fulfil the classification and the control and emergency temperatures (derived from the SADT) as listed. For substances permitted in IBCs, see packing instruction IBC520, and for those permitted in tanks, see portable tank instruction T23. The formulations not listed in this provision but listed in packing instruction IBC520 of 4.1.4.2 and in portable tank instruction T23 of 4.2.5.2.6 may also be transported packed in accordance with packing method OP8 of packing instruction P520 of 4.1.4.1, with the same control and emergency temperatures, if applicable.

NOTE: *The classification given in this table is based on the technically pure substance (except where a concentration of less than 100 % is specified). For other concentrations, the substances may be classified differently following the procedures in 2.4.2.3.3 and 2.4.2.3.4.*

SELF-REACTIVE SUBSTANCE	Concentration (%)	Packing method	Control temperature (°C)	Emergency temperature (°C)	UN generic entry	Remarks
ACETONE-PYROGALLOL COPOLYMER 2-DIAZO-1-NAPHTHOL-5-SULPHONATE	100	OP8			3228	
AZODICARBONAMIDE FORMULATION TYPE B, TEMPERATURE CONTROLLED	< 100	OP5			3232	(1) (2)
AZODICARBONAMIDE FORMULATION TYPE C	< 100	OP6			3224	(3)
AZODICARBONAMIDE FORMULATION TYPE C, TEMPERATURE CONTROLLED	< 100	OP6			3234	(4)
AZODICARBONAMIDE FORMULATION TYPE D	< 100	OP7			3226	(5)
AZODICARBONAMIDE FORMULATION TYPE D, TEMPERATURE CONTROLLED	< 100	OP7			3236	(6)
2,2' -AZODI(2,4-DIMETHYL- 4-METHOXY VALERONITRILE)	100	OP7	-5	+5	3236	
2,2' -AZODI(2,4-DIMETHYL- VALERONITRILE)	100	OP7	+10	+15	3236	
2,2' -AZODI(ETHYL-2-METHYLPROPIONATE)	100	OP7	+20	+25	3235	
1,1-AZODI(HEXAHYDROBENZONITRILE)	100	OP7			3226	
2,2'-AZODI(ISOBUTYRONITRILE)	100	OP6	+40	+45	3234	
2,2'-AZODI(ISOBUTYRONITRILE) as a water based paste	≤ 50	OP6			3224	
2,2'-AZODI(2-METHYLBUTYRONITRILE)	100	OP7	+35	+40	3236	
BENZENE-1,3-DISULPHONYL HYDRAZIDE, as a paste	52	OP7			3226	
BENZENESULPHONYL HYDRAZIDE	100	OP7			3226	
4-(BENZYL(ETHYL)AMINO)-3-ETHOXY-BENZENEDIAZONIUM ZINC CHLORIDE	100	OP7			3226	
4-(BENZYL(METHYL)AMINO)-3-ETHOXY BENZENEDIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
3-CHLORO-4-DIETHYLAMINOBENZENE-DIAZONIUM ZINC CHLORIDE	100	OP7			3226	
2-DIAZO-1-NAPHTHOL-4- SULPHONYL-CHLORIDE	100	OP5			3222	(2)
2-DIAZO-1-NAPHTHOL-5- SULPHONYL CHLORIDE	100	OP5			3222	(2)
2-DIAZO-1-NAPHTHOL SULPHONIC ACID ESTER MIXTURE, TYPE D	<100	OP7			3226	(9)
2,5-DIBUTOXY-4-(4-MORPHOLINYL) BENZENEDIAZONIUM, TETRACHLOROZINCATE (2:1)	100	OP8			3228	
2,5-DIETHOXY-4-MORPHOLINO- BENZENEDIAZONIUM ZINC CHLORIDE	67-100	OP7	+35	+40	3236	
2,5-DIETHOXY-4-MORPHOLINO- BENZENEDIAZONIUM ZINC CHLORIDE	66	OP7	+40	+45	3236	
2,5-DIETHOXY-4-MORPHOLINO- BENZENEDIAZONIUM TETRAFLUOROBORATE	100	OP7	+30	+35	3236	
2,5-DIETHOXY-4-(4-MORPHOLINYL)- BENZENEDIAZONIUM SULPHATE	100	OP7			3226	

SELF-REACTIVE SUBSTANCE	Concen-tration (%)	Packing method	Control tempera-ture (°C)	Emergency tempera-ture (°C)	UN generic entry	Remarks
2,5- DIETHOXY-4-(PHENYLSULPHONYL)-BENZENEDIAZONIUM ZINC CHLORIDE	67	OP7	+40	+45	3236	
DIETHYLENEGLYCOL BIS (ALLYL CARBONATE) + DI ISOPROPYLPEROXYDICARBONATE	≥ 88 + ≤ 12	OP8	-10	0	3237	
2,5-DIMETHOXY-4-(4-METHYL-PHENYLSULPHONYL)BENZENE- DIAZONIUM ZINC CHLORIDE	79	OP7	+40	+45	3236	
4-(DIMETHYLAMINO)-BENZENE-DIAZONIUM TRICHLOROZINCATE (-1)	100	OP8			3228	
4-DIMETHYLAMINO-6-(2-DIMETHYL-AMINOETHOXY) TOLUENE- 2-DIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
N,N'-DINITROSO-N,N'-DIMETHYL TEREPHTHALAMIDE, as a paste	72	OP6			3224	
N,N'-DINITROSOPENTAMETHYLENE-TETRAMINE	82	OP6			3224	(7)
DIPHENYLOXIDE-4,4'-DISULPHONYL HYDRAZIDE	100	OP7			3226	
4-DIPROPYLAMINOBENZENE-DIAZONIUM ZINC CHLORIDE	100	OP7			3226	
2-(N,N-ETHOXYCARBONYL-PHENYLAMINO)-3-METHOXY-4- (N-METHYL-N-CYCLOHEXYLAMINO BENZENEDIAZONIUM ZINC CHLORIDE	63-92	OP7	+40	+45	3236	
2-(N,N-ETHOXYCARBONYL- PHENYLAMINO)-3-METHOXY-4- (N-METHYL-N- CYCLOHEXYLAMINO) BENZENEDIAZONIUM ZINC CHLORIDE	62	OP7	+35	+40	3236	
N-FORMYL-2-(NITROMETHYLENE) -1,3-PERHYDROTHIAZINE	100	OP7	+45	+50	3236	
2-(2-HYDROXYETHOXY)-1- (PYRROLIDIN-1-YL)BENZENE-4- DIAZONIUM ZINC CHLORIDE	100	OP7	+ 45	+ 50	3236	
3-(2-HYDROXYETHOXY)-4- (PYRROLIDIN-1-YL)BENZENE DIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
(7-METHOXY-5-METHYL-BENZOTHIOPHEN-2-YL) BORONIC ACID	88-100	OP7			3230	(11)
2-(N,N-METHYLAMINOETHYL- CARBONYL)-4-(3,4-DIMETHYL- PHENYLSULPHONYL)BENZENE- DIAZONIUM HYDROGEN SULPHATE	96	OP7	+45	+50	3236	
4-METHYLBENZENESULPHONYL- HYDRAZIDE	100	OP7			3226	
3-METHYL-4-(PYRROLIDIN-1-YL) BENZENEDIAZONIUM TETRAFLUOROBORATE	95	OP6	+45	+50	3234	
4-NITROSOPHENOL	100	OP7	+35	+40	3236	

SELF-REACTIVE SUBSTANCE	Concen-tration (%)	Packing method	Control tempera-ture (°C)	Emergency tempera-ture (°C)	UN generic entry	Remarks
PHOSPHOROTHIOIC ACID, O-[(CYANOPHENYL METHYLENE) AZANYL] O,O-DIETHYL ESTER	82-91 (Z isomer)	OP8			3227	(10)
SELF-REACTIVE LIQUID, SAMPLE		OP2			3223	(8)
SELF-REACTIVE LIQUID, SAMPLE, TEMPERATURE CONTROLLED		OP2			3233	(8)
SELF-REACTIVE SOLID, SAMPLE		OP2			3224	(8)
SELF-REACTIVE SOLID, SAMPLE, TEMPERATURE CONTROLLED		OP2			3234	(8)
SODIUM 2-DIAZO-1-NAPHTHOL- 4-SULPHONATE	100	OP7			3226	
SODIUM 2-DIAZO-1-NAPHTHOL- 5-SULPHONATE	100	OP7			3226	
TETRAMINE PALLADIUM (II) NITRATE	100	OP6	+30	+35	3234	

Remarks

(1) Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (b). The control and emergency temperatures shall be determined by the procedure given in 7.1.5.3 to 7.1.5.3.6.

(2) "EXPLOSIVE" subsidiary hazard label (Model No 1, see 5.2.2.2.2) required.

(3) Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (c).

(4) Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (c). The control and emergency temperatures shall be determined by the procedure given in 7.1.5.3 to 7.1.5.3.6.

(5) Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (d).

(6) Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (d). The control and emergency temperatures shall be determined by the procedure given in 7.1.5.3 to 7.1.5.3.6.

(7) With a compatible diluent having a boiling point of not less than 150 °C.

(8) See 2.4.2.3.2.4 (b).

(9) This entry applies to mixtures of esters of 2-diazo-1-naphthol-4-sulphonic acid and 2-diazo-1-naphthol-5-sulphonic acid meeting the criteria of 2.4.2.3.3.2 (d).

(10) This entry applies to the technical mixture in n-butanol within the specified concentration limits of the (Z) isomer.

(11) The technical compound with the specified concentration limits may contain up to 12 % water and up to 1 % organic impurities.

2.4.2.3.2.4 Classification of self-reactive substances not listed in 2.4.2.3.2.3, packing instruction IBC520 or portable tank instruction T23 and assignment to a generic entry shall be made by the competent authority of the country of origin on the basis of a test report. Principles applying to the classification of such substances are provided in 2.4.2.3.3. The applicable classification procedures, test methods and criteria, and an example of a suitable test report, are given in the *Manual of Tests and Criteria*, Part II. The statement of approval shall contain the classification and the relevant transport conditions.

(a) Activators, such as zinc compounds, may be added to some self-reactive substances to change their reactivity. Depending on both the type and the concentration of the activator, this may result in a decrease in thermal stability and a change in explosive properties. If either of these properties is altered, the new formulation shall be assessed in accordance with this classification procedure;

(b) Samples of self-reactive substances or formulations of self-reactive substances not listed in 2.4.2.3.2.3, for which a complete set of test results is not available and which are to be transported for further testing or evaluation, may be assigned to one of the appropriate entries for self-reactive substances type C provided the following conditions are met:

(i) The available data indicate that the sample would be no more dangerous than self-reactive substances type B;

(ii) The sample is packaged in accordance with packing method OP2 (see applicable packing instruction) and the quantity per cargo transport unit is limited to 10 kg; and

(iii) The available data indicate that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation.

2.4.2.3.3 *Principles for classification of self-reactive substances*

NOTE: *This section refers only to those properties of self-reactive substances which are decisive for their classification. A flow chart, presenting the classification principles in the form of a graphically arranged scheme of questions concerning the decisive properties together with the possible answers, is given in Figure 2.4.1. These properties shall be determined experimentally using the test methods and criteria given in the Manual of Tests and Criteria, Part II.*

2.4.2.3.3.1 A self-reactive substance is regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.

2.4.2.3.3.2 The following principles apply to the classification of self-reactive substances not listed in 2.4.2.3.2.3.

(a) Any substance which can detonate or deflagrate rapidly, as packaged for transport, is prohibited from transport under the provisions for self-reactive substances of Division 4.1 in that packaging (defined as self-reactive substance type A, exit box A of Figure 2.4.1);

(b) Any substance possessing explosive properties and which, as packaged for transport, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package, shall also bear an “EXPLOSIVE” subsidiary hazard label (Model No. 1, see 5.2.2.2.2). Such a substance may be packaged in amounts of up to 25 kg unless the maximum quantity has to be limited to a lower amount to preclude detonation or rapid deflagration in the package (defined as self-reactive substance type B, exit box B of Figure 2.4.1);

(c) Any substance possessing explosive properties may be transported without an “EXPLOSIVE” subsidiary hazard label when the substance as packaged (maximum 50 kg) for transport cannot detonate or deflagrate rapidly or undergo a thermal explosion (defined as self-reactive substance type C, exit box C of Figure 2.4.1);

(d) Any substance which in laboratory testing:

(i) detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or

(ii) does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or

(iii) does not detonate or deflagrate at all and shows a medium effect when heated under confinement;

may be accepted for transport in packages of not more than 50 kg net mass (defined as self-reactive substance type D, exit box D of Figure 2.4.1);

(e) Any substance which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement may be accepted for transport in packages of not more than 400 kg/450 litres (defined as self-reactive substance type E, exit box E of Figure 2.4.1);

(f) Any substance which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power may be considered for transport in IBCs or tanks (defined as self-reactive substance type F, exit box F of Figure 2.4.1); (for additional provisions see 4.1.7.2.2 and 4.2.1.13);

(g) Any substance which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power shall be exempted from classification as a self-reactive substance of Division 4.1 provided that the formulation is thermally stable (self-accelerating decomposition temperature 60 °C to 75 °C for a 50 kg package) and any diluent meets the requirements of 2.4.2.3.5 (defined as self-reactive substance type G, exit box G of Figure 2.4.1). If the formulation is not thermally stable or a compatible diluent having a boiling point less than 150 °C is used for desensitization, the formulation shall be defined as SELF-REACTIVE LIQUID/SOLID TYPE F.

Figure 2.4.1: Flow chart scheme for self-reactive substances

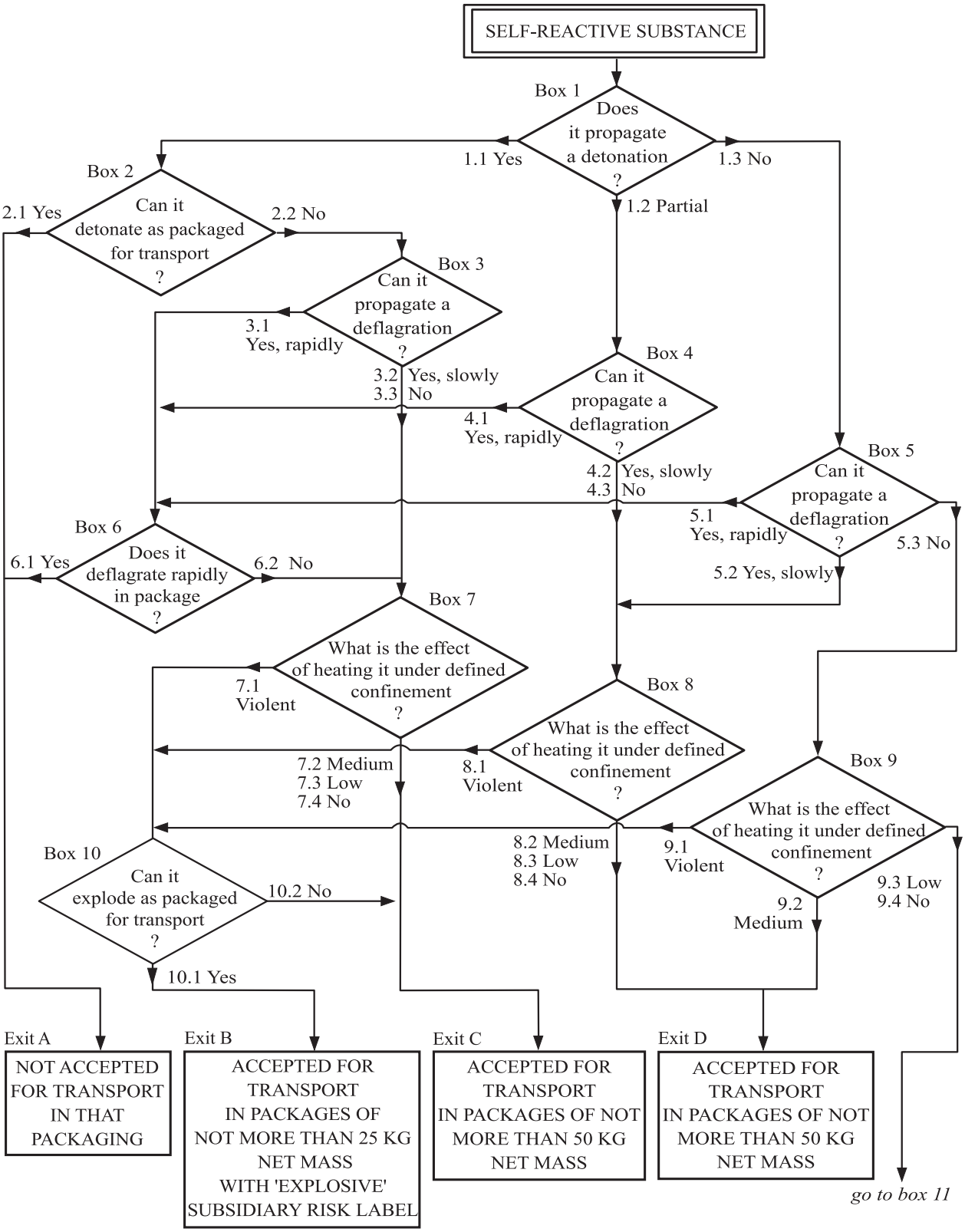
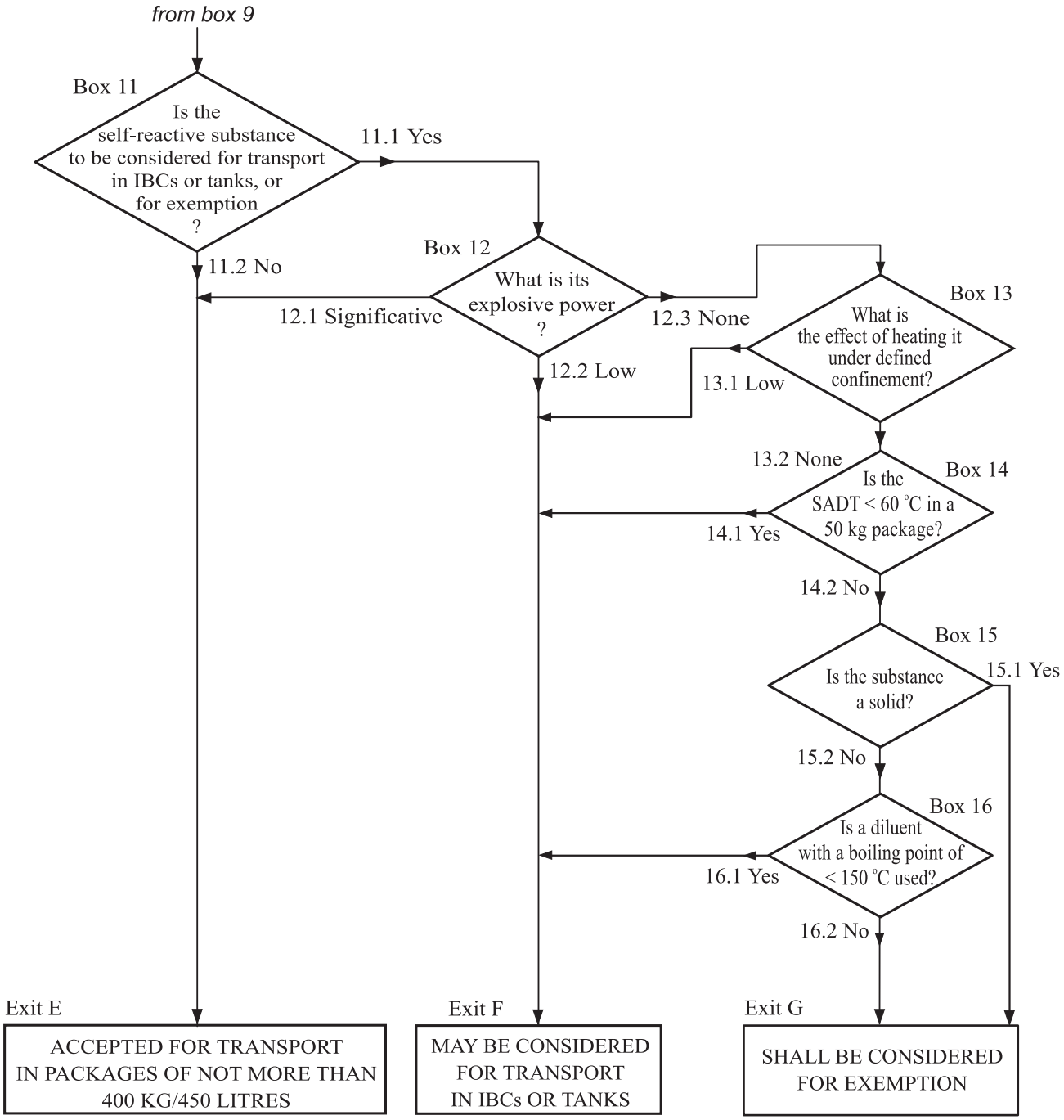


Figure 2.4.1: Flow chart scheme for self-reactive substances (cont'd)



2.4.2.3.4 *Temperature control requirements*

Self-reactive substances are subject to temperature control in transport if their self-accelerating decomposition temperature (SADT) is less than or equal to 55 °C. Test methods for determining the SADT are given in the *Manual of Tests and Criteria*, Part II, section 28. The test selected shall be conducted in a manner which is representative, both in size and material, of the package to be transported.

2.4.2.3.5 *Desensitization of self-reactive substances*

2.4.2.3.5.1 In order to ensure safety during transport, self-reactive substances may be desensitized through the use of a diluent. If a diluent is used, the self-reactive substance shall be tested with the diluent present in the concentration and form used in transport.

2.4.2.3.5.2 Diluents which may allow a self-reactive substance to concentrate to a dangerous extent in the event of leakage from a package shall not be used.

2.4.2.3.5.3 The diluent shall be compatible with the self-reactive substance. In this regard, compatible diluents are those solids or liquids which have no detrimental influence on the thermal stability and hazard type of the self-reactive substance.

2.4.2.3.5.4 Liquid diluents in liquid formulations requiring temperature control shall have a boiling point of at least 60 °C and a flash point not less than 5 °C. The boiling point of the liquid shall be at least 50 °C higher than the control temperature of the self-reactive substance (see 7.1.5.3).

2.4.2.4 *Division 4.1 Solid desensitized explosives*

2.4.2.4.1 *Definition*

Solid desensitized explosives are explosive substances which are wetted with water or alcohols or are diluted with other substances, to form a homogeneous solid mixture to suppress their explosive properties (see 2.1.3.6.3). Entries in the Dangerous Goods List for solid desensitized explosives are UN 1310, UN 1320, UN 1321, UN 1322, UN 1336, UN 1337, UN 1344, UN 1347, UN 1348, UN 1349, UN 1354, UN 1355, UN 1356, UN 1357, UN 1517, UN 1571, UN 2555, UN 2556, UN 2557, UN 2852, UN 2907, UN 3317, UN 3319, UN 3344, UN 3364, UN 3365, UN 3366, UN 3367, UN 3368, UN 3369, UN 3370, UN 3376, UN 3380 and UN 3474.

2.4.2.4.2 Substances that:

(a) have been provisionally accepted into Class 1 according to test series 1 and 2 but exempted from Class 1 by test series 6;

(b) are not self-reactive substances of Division 4.1;

(c) are not substances of Class 5;

are also assigned to Division 4.1. Though not desensitized explosives, UN 2956, UN 3241, UN 3242 and UN 3251 are such entries that are assigned to Division 4.1.

2.4.2.5 *Division 4.1 Polymerizing substances and mixtures (stabilized)*

2.4.2.5.1 *Definitions and properties*

Polymerizing substances are substances which, without stabilization, are liable to undergo a strongly exothermic reaction resulting in the formation of larger molecules or resulting in the formation of polymers under conditions normally encountered in transport. Such substances are considered to be polymerizing substances of Division 4.1 when:

(a) Their self-accelerating polymerization temperature (SAPT) is 75 °C or less under the conditions (with or without chemical stabilization as offered for transport) and in the packaging, IBC or portable tank in which the substance or mixture is to be transported;

(b) They exhibit a heat of reaction of more than 300 J/g; and

(c) They do not meet any other criteria for inclusion in Classes 1-8.

A mixture meeting the criteria of a polymerizing substance shall be classified as a polymerizing substance of Division 4.1.

2.4.2.5.2 Polymerizing substances are subject to temperature control in transport if their self-accelerating polymerization temperature (SAPT) is:

(a) When offered for transport in a packaging or IBC, 50 °C or less in the packaging or IBC in which the substance is to be transported; or

(b) When offered for transport in a portable tank, 45 °C or less in the portable tank in which the substance is to be transported.

NOTE: *Substances meeting the criteria of a polymerizing substance and also for inclusion in Classes 1 to 8 are subject to the requirements of special provision 386 of Chapter 3.3.*

2.4.3 Division 4.2 – Substances liable to spontaneous combustion

2.4.3.1 *Definitions and properties*

2.4.3.1.1 Division 4.2 includes:

(a) Pyrophoric substances, which are substances, including mixtures and solutions (liquid or solid), which even in small quantities ignite within five minutes of coming in contact with air. These are the Division 4.2 substances the most liable to spontaneous combustion; and

(b) Self-heating substances, which are substances, other than pyrophoric substances, which in contact with air without energy supply are liable to self-heating. These substances will ignite only when in large amounts (kilograms) and after long periods of time (hours or days).

2.4.3.1.2 Self-heating of a substance is a process where the gradual reaction of that substance with oxygen (in air) generates heat. If the rate of heat production exceeds the rate of heat loss, then the temperature of the substance will rise which, after an induction time, may lead to self-ignition and combustion.

2.4.3.2 *Classification in Division 4.2*

2.4.3.2.1 Solids are considered pyrophoric solids which shall be classified in Division 4.2 if, in tests performed in accordance with the test method given in the *Manual of Tests and Criteria*, Part III, sub-section 33.4.4, the sample ignites in one of the tests.

2.4.3.2.2 Liquids are considered pyrophoric liquids which shall be classified in Division 4.2 if, in tests performed in accordance with the test method given in the *Manual of Tests and Criteria*, Part III, sub-section 33.4.5, the liquid ignites in the first part of the test, or if it ignites or chars the filter paper.

2.4.3.2.3 *Self-heating substances*

2.4.3.2.3.1 A substance shall be classified as a self-heating substance of Division 4.2 if, in tests performed in accordance with the test method given in the *Manual of Tests and Criteria*, Part III, sub-section 33.4.6:

(a) A positive result is obtained using a 25 mm cube sample at 140 °C;

(b) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 100 mm cube sample at 120 °C and the substance is to be transported in packages with a volume of more than 3 m^3;

(c) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 100 mm cube sample at 100 °C and the substance is to be transported in packages with a volume of more than 450 litres;

(d) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a positive result is obtained using a 100 mm cube sample at 100 °C.

NOTE: *Self-reactive substances giving also a positive result with this test method, shall not be classified in Division 4.2 but in Division 4.1 (see 2.4.2.3.1.1).*

2.4.3.2.3.2 A substance shall not be classified in Division 4.2 if:

(a) A negative result is obtained in a test using a 100 mm cube sample at 140 °C;

(b) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C, a negative result is obtained in a test using a 100 mm cube sample at 120 °C and the substance is to be transported in packages with a volume not more than 3 m^3;

(c) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C, a negative result is obtained in a test using a 100 mm cube sample at 100 °C and the substance is to be transported in packages with a volume not more than 450 litres.

2.4.3.3 ***Assignment of packing groups***

2.4.3.3.1 Packing group I shall be assigned to all pyrophoric solids and liquids.

2.4.3.3.2 Packing group II shall be assigned to self-heating substances which give a positive result in a test using a 25 mm sample cube at 140 °C.

2.4.3.3.3 Packing group III shall be assigned to self-heating substances if:

(a) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C and the substance is to be transported in packages with a volume of more than 3 m^3;

(b) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C, a positive result is obtained in a test using a 100 mm cube sample at 120 °C and the substance is to be transported in packages with a volume of more than 450 litres;

(c) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C and a positive result is obtained in a test using a 100 mm cube sample at 100 °C.

2.4.4 Division 4.3 – Substances which in contact with water emit flammable gases

2.4.4.1 ***Definitions and properties***

Certain substances in contact with water may emit flammable gases that can form explosive mixtures with air. Such mixtures are easily ignited by all ordinary sources of ignition, for example naked lights, sparking handtools or unprotected lamps. The resulting blast wave and flames may endanger people and the environment. The test method referred to in 2.4.4.2 is used to determine whether the reaction of a substance

with water leads to the development of a dangerous amount of gases which may be flammable. This test method shall not be applied to pyrophoric substances.

2.4.4.2 ***Classification in Division 4.3***

Substances which in contact with water emit flammable gases shall be classified in Division 4.3 if, in tests performed in accordance with the test method given in the *Manual of Tests and Criteria*, Part III, sub-section 33.5:

(a) Spontaneous ignition takes place in any step of the test procedure; or

(b) There is an evolution of a flammable gas at a rate greater than 1 litre per kilogram of the substance per hour.

2.4.4.3 ***Assignment of packing groups***

2.4.4.3.1 Packing group I shall be assigned to any substance which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 litres per kilogram of substance over any one minute.

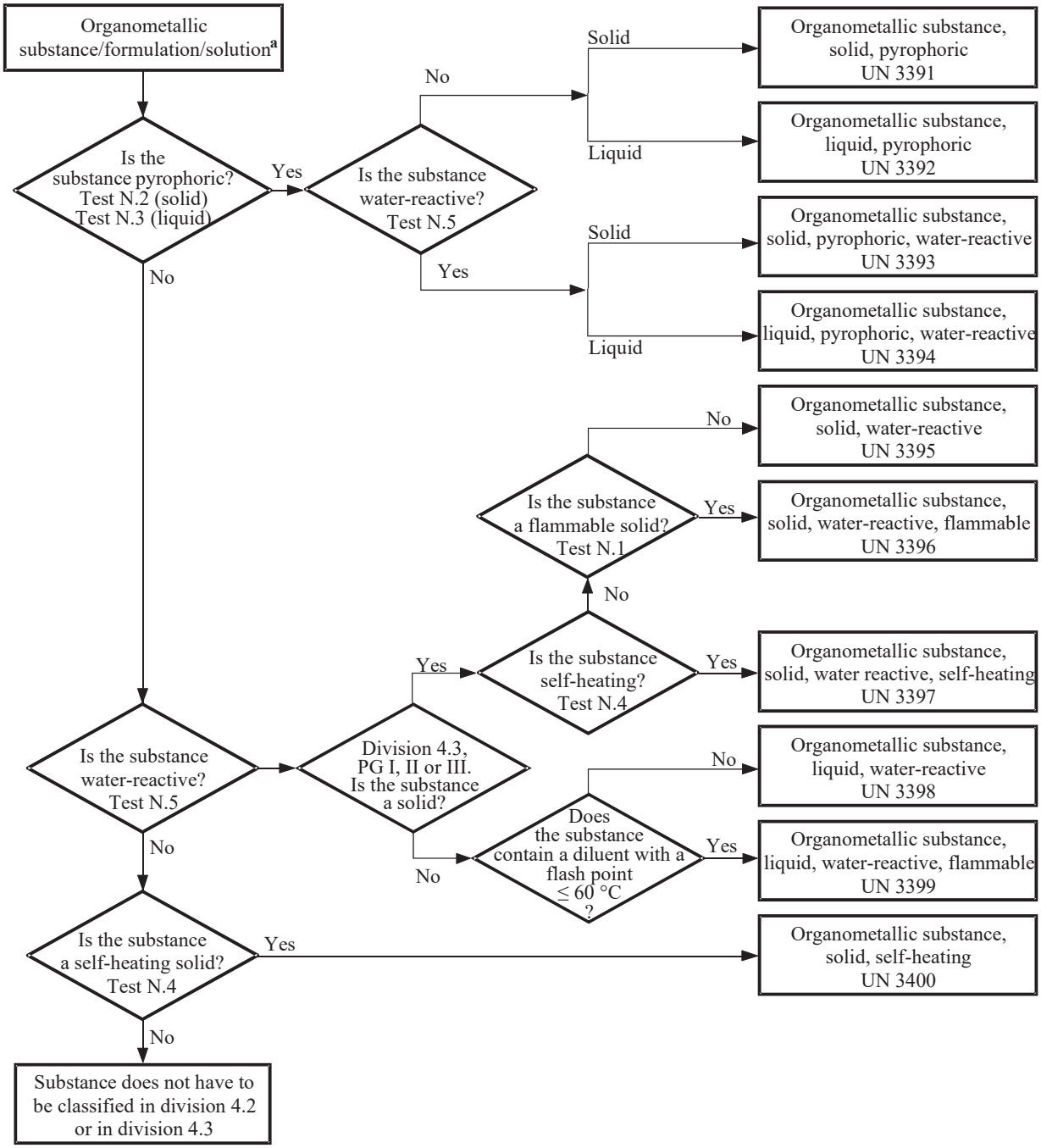
2.4.4.3.2 Packing group II shall be assigned to any substance which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 litres per kilogram of substance per hour, and which does not meet the criteria for packing group I.

2.4.4.3.3 Packing group III shall be assigned to any substance which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is greater than 1 litre per kilogram of substance per hour, and which does not meet the criteria for packing groups I or II.

2.4.5 Classification of organometallic substances

Depending on their properties, organometallic substances may be classified in divisions 4.2 or 4.3, as appropriate, in accordance with the flowchart scheme given in figure 2.4.2.

Figure 2.4.2: Flowchart scheme for organometallic substances[b]



[a] *If applicable and testing is relevant, taking into account reactivity properties, class 6.1 and 8 properties should be considered according to the precedence of hazard table 2.0.3.3.*

[b] *Test methods N.1 to N.5 can be found in the Manual of tests and Criteria, Part III, Section 33.*

CHAPTER 2.5

CLASS 5 - OXIDIZING SUBSTANCES AND ORGANIC PEROXIDES

Introductory note

NOTE: *Because of the different properties exhibited by dangerous goods within Divisions 5.1 and 5.2, it is impracticable to establish a single criterion for classification in either division. Tests and criteria for assignment to the two divisions of Class 5 are addressed in this Chapter.*

2.5.1 Definitions and general provisions

Class 5 is divided into two divisions as follows:

(a) Division 5.1 – *Oxidizing substances*

Substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material. Such substances may be contained in an article;

(b) Division 5.2 – *Organic peroxides*

Organic substances which contain the bivalent -O-O- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. Organic peroxides are thermally unstable substances, which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties:

(i) be liable to explosive decomposition;

(ii) burn rapidly;

(iii) be sensitive to impact or friction;

(iv) react dangerously with other substances;

(v) cause damage to the eyes.

2.5.2 Division 5.1 – Oxidizing substances

2.5.2.1 *Classification in Division 5.1*

2.5.2.1.1 Oxidizing substances are classified in Division 5.1 in accordance with the test methods, procedures and criteria in 2.5.2.2, 2.5.2.3 and the *Manual of Tests and Criteria*, Part III, section 34. In the event of divergence between test results and known experience, judgement based on known experience shall take precedence over test results.

NOTE: *Where substances of this Division are listed in the Dangerous Goods List in Chapter 3.2, reclassification of those substances in accordance with this criteria shall be undertaken only when this is necessary for safety.*

2.5.2.1.2 By exception, solid ammonium nitrate based fertilizers shall be classified in accordance with the procedure as set out in the Manual of Tests and Criteria, Part III, Section 39.

2.5.2.1.3 For substances having other hazards, e.g. toxicity or corrosivity, the requirements of Chapter 2.0 shall be met.

2.5.2.2 *Oxidizing solids*

2.5.2.2.1 *Criteria for classification in Division 5.1*

2.5.2.2.1.1 Tests are performed to measure the potential for the solid substance to increase the burning rate or burning intensity of a combustible substance when the two are thoroughly mixed. The procedure is given in the *Manual of Tests and Criteria,* Part III, sub-section 34.4.1 (test O.1) or alternatively, in sub-section 34.4.3 (test O.3). Tests are conducted on the substance to be evaluated mixed with dry fibrous cellulose in mixing ratios of 1:1 and 4:1, by mass, of sample to cellulose. The burning characteristics of the mixtures are compared:

(a) In the test O.1, with the standard 3:7 mixture, by mass, of potassium bromate to cellulose. If the burning time is equal to or less than this standard mixture, the burning times shall be compared with those from the packing group I or II reference standards, 3:2 and 2:3 ratios, by mass, of potassium bromate to cellulose respectively; or

(b) In the test O.3, with the standard 1:2 mixture, by mass, of calcium peroxide to cellulose. If the burning rate is equal to or greater than this standard mixture, the burning rates shall be compared with those from the packing group I or II reference standards 3:1 and 1:1 ratios, by mass, of calcium peroxide to cellulose, respectively.

2.5.2.2.1.2 The classification test results are assessed on the basis of:

(a) The comparison of the mean burning time (for the test O.1) or burning rate (for the test O.3) with those of the reference mixtures; and

(b) Whether the mixture of substance and cellulose ignites and burns.

2.5.2.2.1.3 A solid substance is classified in Division 5.1 if the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits:

(a) In the test O.1, a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose; or

(b) In the test O.3, a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose.

2.5.2.2.2 *Assignment of packing groups*

Solid oxidizing substances are assigned to a packing group according to the test procedure in the *Manual of Tests and Criteria*, Part III, section 34.4.1 (test O.1) or alternatively, in sub-section 34.4.3 (test O.3), in accordance with the following criteria:

(a) Test O.1:

(i) Packing group I: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture, by mass, of potassium bromate and cellulose;

(ii) Packing group II: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for packing group I are not met;

(iii) Packing group III: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for packing groups I and II are not met;

(iv) Not Division 5.1: any substance which, in both the 4:1 and 1:1 sample-to-cellulose ratio (by mass) tested, does not ignite and burn, or exhibits mean burning times greater than that of a 3:7 mixture (by mass) of potassium bromate and cellulose.

(b) Test O.3:

(i) Packing group I: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate greater than the mean burning rate of a 3:1 mixture (by mass) of calcium peroxide and cellulose;

(ii) Packing group II: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:1 mixture (by mass) of calcium peroxide and cellulose, and the criteria for packing group I are not met;

(iii) Packing group III: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose, and the criteria for packing groups I and II are not met;

(iv) Not Division 5.1: any substance which, in both the 4:1 and 1:1 sample-to-cellulose ratio (by mass) tested, does not ignite and burn, or exhibits a mean burning rate less than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose.".

2.5.2.3 *Oxidizing liquids*

2.5.2.3.1 *Criteria for classification in Division 5.1*

2.5.2.3.1.1 A test is performed to determine the potential for a liquid substance to increase the burning rate or burning intensity of a combustible substance or for spontaneous ignition to occur when the two are thoroughly mixed. The procedure is given in the *Manual of Tests and Criteria*, Part III, sub-section 34.4.2 (Test O.2). It measures the pressure rise time during combustion. Whether a liquid is an oxidizing substance of Division 5.1 and, if so, whether packing groups I, II or III shall be assigned, is decided on the basis of the test result (see also precedence of hazards characteristics in 2.0.3).

2.5.2.3.1.2 The classification test results are assessed on the basis of:

(a) Whether the mixture of substance and cellulose spontaneously ignites;

(b) The comparison of the mean time taken for the pressure to rise from 690 kPa to 2070 kPa gauge with those of the reference substances.

2.5.2.3.1.3 A liquid substance is classified in Division 5.1 if the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 65 % aqueous nitric acid and cellulose.

2.5.2.3.2 *Assignment of packing groups*

Liquid oxidizing substances are assigned to a packing group according to the test procedure in the *Manual of Tests and Criteria*, Part III, section 34.4.2, in accordance with the following criteria:

(a) Packing group I: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture, by mass, of substance and cellulose is less than that of a 1:1 mixture, by mass, of 50 % perchloric acid and cellulose;

(b) Packing group II: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 40 % aqueous sodium chlorate solution and cellulose; and the criteria for packing group I are not met;

(c) Packing group III: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 65 % aqueous nitric acid and cellulose; and the criteria for packing groups I and II are not met;

(d) Not Division 5.1: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a pressure rise of less than 2 070 kPa gauge; or exhibits a mean pressure rise time greater than the mean pressure rise time of a 1:1 mixture, by mass, of 65 % aqueous nitric acid and cellulose.

2.5.3 Division 5.2 – Organic peroxides

2.5.3.1 *Properties*

2.5.3.1.1 Organic peroxides are liable to exothermic decomposition at normal or elevated temperatures. The decomposition can be initiated by heat, contact with impurities (e.g. acids, heavy-metal compounds, amines), friction or impact. The rate of decomposition increases with temperature and varies with the organic peroxide formulation. Decomposition may result in the evolution of harmful, or flammable, gases or vapours. For certain organic peroxides the temperature shall be controlled during transport. Some organic peroxides may decompose explosively, particularly if confined. This characteristic may be modified by the addition of diluents or by the use of appropriate packagings. Many organic peroxides burn vigorously.

2.5.3.1.2 Contact of organic peroxides with the eyes is to be avoided. Some organic peroxides will cause serious injury to the cornea, even after brief contact, or will be corrosive to the skin.

2.5.3.2 *Classification of organic peroxides*

2.5.3.2.1 Any organic peroxide shall be considered for classification in Division 5.2, unless the organic peroxide formulation contains:

(a) Not more than 1.0 % available oxygen from the organic peroxides when containing not more than 1.0 % hydrogen peroxide; or

(b) Not more than 0.5 % available oxygen from the organic peroxides when containing more than 1.0 % but not more than 7.0 % hydrogen peroxide.

NOTE: *The available oxygen content (%) of an organic peroxide formulation is given by the formula:*

$$16 \times \sum \left(n_i \times c_i / m_i \right)$$

where: n_i *= number of peroxygen groups per molecule of organic peroxide i;*

c_i *= concentration (mass %) of organic peroxide i;*

m_i *= molecular mass of organic peroxide i.*

2.5.3.2.2 Organic peroxides are classified into seven types according to the degree of danger they present. The types of organic peroxide range from type A, which may not be accepted for transport in the packaging in which it is tested, to type G, which is not subject to the provisions for organic peroxides of Division 5.2. The classification of types B to F is directly related to the maximum quantity allowed in one packaging.

2.5.3.2.3 Organic peroxides permitted for transport in packagings are listed in 2.5.3.2.4, those permitted for transport in IBCs are listed in packing instruction IBC520 and those permitted for transport in portable

tanks are listed in portable tank instruction T23. For each permitted substance listed, the generic entry of the Dangerous Goods List (UN Nos. 3101 to 3120) is assigned, appropriate subsidiary hazards and remarks providing relevant transport information are given. The generic entries specify:

(a) Organic peroxide type (B to F);

(b) Physical state (liquid or solid); and

(c) Temperature control, when required (see 2.5.3.4).

2.5.3.2.3.1 Mixtures of the listed formulations may be classified as the same type of organic peroxide as that of the most dangerous component and be transported under the conditions of transport given for this type. However, as two stable components can form a thermally less stable mixture, the self-accelerating decomposition temperature (SADT) of the mixture shall be determined and, if necessary, temperature control applied as required by 2.5.3.4.

2.5.3.2.4 *List of currently assigned organic peroxides in packagings*

"Packing Method" codes "OP1" to "OP8" refer to packing methods in packing instruction P520. Peroxides to be transported should fulfil the classification and the control and emergency temperatures (derived from the SADT) as listed. For substances permitted in IBCs see packing instruction IBC520, and for those permitted in tanks, see portable tank instruction T23. The formulations not listed in this provision but listed in packing instruction IBC520 of 4.1.4.2 and in portable tank instruction T23 of 4.2.5.2.6 may also be transported packed in accordance with packing method OP8 of packing instruction P520 of 4.1.4.1, with the same control and emergency temperatures, if applicable.

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
ACETYL ACETONE PEROXIDE	≤ 42	≥ 48			≥8	OP7			3105	2)
"	≤ 35	≥ 57			≥ 8	OP8			3107	32)
"	≤ 32 as a paste					OP7			3106	20)
ACETYL CYCLOHEXANESULPHONYL PEROXIDE	≤ 82				≥ 12	OP4	-10	0	3112	3)
"	≤ 32		≥ 68			OP7	-10	0	3115	
tert-AMYL HYDROPEROXIDE	≤ 88	≥ 6			≥ 6	OP8			3107	
tert-AMYL PEROXYACETATE	≤ 62	≥ 38				OP7			3105	
tert-AMYL PEROXYBENZOATE	≤ 100					OP5			3103	
tert-AMYL PEROXY-2-ETHYLHEXANOATE	≤ 100					OP7	+20	+25	3115	
tert-AMYL PEROXY-2-ETHYLHEXYL CARBONATE	≤ 100					OP7			3105	
tert-AMYL PEROXY ISOPROPYL CARBONATE	≤77	≥ 23				OP5			3103	
tert-AMYL PEROXYNEODECANOATE	≤ 77		≥ 23			OP7	0	+10	3115	
"	≤ 47	≥ 53				OP8	0	+ 10	3119	
tert-AMYL PEROXYPIVALATE	≤ 77		≥ 23			OP5	+10	+15	3113	
tert-AMYLPEROXY-3,5,5-TRIMETHYLHEXANOATE	≤ 100					OP7			3105	
tert-BUTYL CUMYL PEROXIDE	> 42 - 100					OP8			3109	
"	≤ 52			≥ 48		OP8			3108	
n-BUTYL-4,4-DI-(tert-BUTYLPEROXY)VALERATE	> 52 - 100					OP5			3103	
"	≤ 52			≥ 48		OP8			3108	
tert-BUTYL HYDROPEROXIDE	>79 - 90				≥ 10	OP5			3103	13)
"	≤ 80	≥ 20				OP7			3105	4) 13)
"	≤ 79				> 14	OP8			3107	13) 23)
"	≤ 72				≥ 28	OP8			3109	13)
tert-BUTYL HYDROPEROXIDE + DI-tert-BUTYLPEROXIDE	< 82 + >9				≥ 7	OP5			3103	13)

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
tert-BUTYL MONOPEROXYMALEATE	> 52 - 100					OP5			3102	3)
"	≤ 52	≥ 48				OP6			3103	
"	≤ 52			≥ 48		OP8			3108	
"	≤ 52 as a paste					OP8			3108	
tert-BUTYL PEROXYACETATE	> 52 - 77	≥ 23				OP5			3101	3)
"	> 32 - 52	≥ 48				OP6			3103	
"	≤ 32		≥ 68			OP8			3109	
tert-BUTYL PEROXYBENZOATE	> 77 - 100					OP5			3103	
"	> 52 - 77	≥23				OP7			3105	
"	≤ 52			≥ 48		OP7			3106	
tert-BUTYL PEROXYBUTYL FUMARATE	≤ 52	≥ 48				OP7			3105	
tert-BUTYL PEROXYCROTONATE	≤ 77	≥ 23				OP7			3105	
tert-BUTYL PEROXYDIETHYLACETATE	≤ 100					OP5	+20	+25	3113	
tert-BUTYL PEROXY-2-ETHYLHEXANOATE	> 52 – 100					OP6	+20	+25	3113	
"	> 32 - 52		≥ 48			OP8	+30	+35	3117	
"	≤ 52			≥ 48		OP8	+20	+25	3118	
"	≤ 32		≥ 68			OP8	+40	+45	3119	
tert-BUTYL PEROXY-2-ETHYLHEXANOATE + 2,2-DI-(tert-BUTYLPEROXY)BUTANE	≤ 12 +≤ 14	≥ 14		≥ 60		OP7			3106	
"	≤ 31 + ≤ 36		≥ 33			OP7	+35	+40	3115	
tert-BUTYL PEROXY-2-ETHYLHEXYLCARBONATE	≤ 100					OP7			3105	
tert-BUTYL PEROXYISOBUTYRATE	> 52 - 77		≥ 23			OP5	+15	+20	3111	3)
"	≤ 52		≥ 48			OP7	+15	+20	3115	
tert-BUTYLPEROXY ISOPROPYLCARBONATE	≤ 77	≥ 23				OP5			3103	
"	≤ 62		≥ 38			OP7			3105	
1-(2-tert-BUTYLPEROXY ISOPROPYL)-3-ISOPROPENYLBENZENE	≤ 77	≥ 23				OP7			3105	
"	≤ 42			≥ 58		OP8			3108	
tert-BUTYL PEROXY-2-METHYLBENZOATE	≤ 100					OP5			3103	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
tert-BUTYL PEROXYNEODECANOATE	> 77 - 100					OP7	-5	+5	3115	
"	≤ 77		≥ 23			OP7	0	+10	3115	
"	≤ 52 as a stable dispersion in water					OP8	0	+10	3119	
"	≤ 42 as a stable dispersion in water (frozen)					OP8	0	+10	3118	
"	≤ 32	≥ 68				OP8	0	+10	3119	
tert-BUTYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23				OP7	0	+10	3115	
"	≤ 42 as a stable dispersion in water					OP8	0	+10	3117	
tert-BUTYL PEROXYPIVALATE	> 67 - 77	≥ 23				OP5	0	+10	3113	
"	> 27 - 67		≥ 33			OP7	0	+10	3115	
"	≤ 27		≥ 73			OP8	+30	+35	3119	
tert-BUTYLPEROXY STEARYLCARBONATE	≤ 100					OP7			3106	
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	> 37 - 100					OP7			3105	
"	≤ 42			≥ 58		OP7			3106	
"	≤ 37		≥ 63			OP8			3109	
3-CHLOROPEROXYBENZOIC ACID	> 57 - 86			≥ 14		OP1			3102	3)
"	≤ 57			≥ 3	≥ 40	OP7			3106	
"	≤ 77			≥ 6	≥ 17	OP7			3106	
CUMYL HYDROPEROXIDE	> 90 - 98	≤10				OP8			3107	13)
"	≤ 90	≥ 10				OP8			3109	13) 18)
CUMYL PEROXYNEODECANOATE	≤ 87	≥ 13				OP7	- 10	0	3115	
"	≤ 77		≥ 23			OP7	-10	0	3115	
"	≤ 52 as a stable dispersion in water					OP8	-10	0	3119	
CUMYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23				OP7	-10	0	3115	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
CUMYL PEROXYPIVALATE	≤ 77		≥ 23			OP7	-5	+5	3115	
CYCLOHEXANONE PEROXIDE(S)	≤ 91				≥ 9	OP6			3104	13)
"	≤ 72	≥ 28				OP7			3105	5)
"	≤ 72 as a paste					OP7			3106	5) 20)
"	≤ 32			≥ 68					Exempt	29)
([3R-(3R,5aS,6S,8aS,9R,10R,12S,12aR**)]-DECAHYDRO-10-METHOXY-3,6,9-TRIMETHYL-3,12-EPOXY-12H-PYRANO[4,3-j]-1,2-BENZODIOXEPIN)	≤ 100					OP7			3106	
DIACETONE ALCOHOL PEROXIDES	≤ 57		≥ 26		≥ 8	OP7	+40	+45	3115	6)
DIACETYL PEROXIDE	≤ 27		≥ 73			OP7	+20	+25	3115	7) 13)
DI-tert-AMYL PEROXIDE	≤ 100					OP8			3107	
2,2-DI-(tert-AMYLPEROXY)BUTANE	≤ 57	≥ 43				OP7			3105	
1,1-DI-(tert-AMYLPEROXY)CYCLOHEXANE	≤ 82	≥ 18				OP6			3103	
DIBENZOYL PEROXIDE	> 52 - 100			≤ 48		OP2			3102	3)
"	> 77 - 94				≥ 6	OP4			3102	3)
"	≤ 77				≥ 23	OP6			3104	
"	≤ 62			≥ 28	≥ 10	OP7			3106	
"	> 52 – 62 as a paste					OP7			3106	20)
"	> 35 - 52			≥ 48		OP7			3106	
"	> 36 - 42	≥ 18			≤ 40	OP8			3107	
"	≤ 56.5 as a paste				≥ 15	OP8			3108	
"	≤ 52 as a paste					OP8			3108	20)
"	≤ 42 as a stable dispersion in water					OP8			3109	
"	≤ 35			≥ 65					Exempt	29)
DI-(4-tert-BUTYLCYCLOHEXYL) PEROXYDICARBONATE	≤ 100					OP6	+30	+35	3114	
"	≤ 42 as a stable dispersion in water					OP8	+30	+35	3119	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
DI-(4-tert-BUTYLCYCLOHEXYL) PEROXYDICARBONATE	≤42 (as a paste)					OP8	+35	+40	3118	
DI-tert-BUTYL PEROXIDE	> 52 - 100					OP8			3107	
"	≤ 52		≥ 48			OP8			3109	25)
DI-tert-BUTYL PEROXYAZELATE	≤ 52	≥ 48				OP7			3105	
2,2-DI-(tert-BUTYLPEROXY)BUTANE	≤ 52	≥ 48				OP6			3103	
1,6-DI-(tert-BUTYLPEROXYCARBONYLOXY) HEXANE	≤ 72	≥ 28				OP5			3103	
1,1-DI-(tert-BUTYLPEROXY) CYCLOHEXANE	> 80 - 100					OP5			3101	3)
"	≤ 72		≥ 28			OP5			3103	30)
"	> 52 - 80	≥ 20				OP5			3103	
"	> 42 - 52	≥ 48				OP7			3105	
"	≤ 42	≥ 13		≥ 45		OP7			3106	
"	≤ 42	≥ 58				OP8			3109	
"	≤ 27	≥ 25				OP8			3107	21)
"	≤ 13	≥ 13	≥ 74			OP8			3109	
1,1-DI-(tert-BUTYLPEROXY)CYCLOHEXANE + tert-BUTYL PEROXY-2-ETHYLHEXANOATE	≤ 43 + ≤ 16	≥ 41				OP 7			3105	
DI-n-BUTYL PEROXYDICARBONATE	> 27 - 52		≥ 48			OP7	-15	-5	3115	
"	≤ 42 as a stable dispersion in water (frozen)					OP8	-15	-5	3118	
"	≤ 27		≥ 73			OP8	-10	0	3117	
DI-sec-BUTYL PEROXYDICARBONATE	> 52 - 100					OP4	-20	-10	3113	
"	≤ 52		≥ 48			OP7	-15	-5	3115	
DI-(tert-BUTYLPEROXYISOPROPYL)BENZENE(S)	> 42 - 100			≤ 57		OP7			3106	
"	≤ 42			≥ 58					Exempt	29)
DI-(tert-BUTYLPEROXY) PHTHALATE	> 42 - 52	≥ 48				OP7			3105	
"	≤ 52 as a paste					OP7			3106	20)
"	≤ 42	≥ 58				OP8			3107	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
2,2-DI-(tert-BUTYLPEROXY)PROPANE	≤ 52	≥ 48				OP7			3105	
"	≤ 42	≥ 13		≥ 45		OP7			3106	
1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE	> 90 - 100					OP5			3101	3)
"	≤ 90		≥ 10			OP5			3103	30)
"	> 57 - 90	≥ 10				OP5			3103	
"	≤ 77		≥ 23			OP5			3103	
"	≤ 57			≥ 43		OP8			3110	
"	≤ 57	≥ 43				OP8			3107	
"	≤ 32	≥ 26	≥ 42			OP8			3107	
DICETYL PEROXYDICARBONATE	≤ 100					OP8	+30	+35	3120	
"	≤ 42 as a stable dispersion in water					OP8	+30	+35	3119	
DI-4-CHLOROBENZOYL PEROXIDE	≤ 77				≥ 23	OP5			3102	3)
"	≤ 52 as a paste					OP7			3106	20)
"	≤ 32			≥ 68					Exempt	29)
DICUMYL PEROXIDE	> 52 - 100					OP8			3110	12)
"	≤ 52			≥ 48					Exempt	29)
DICYCLOHEXYL PEROXYDICARBONATE	> 91 - 100					OP3	+10	+15	3112	3)
"	≤ 91				≥ 9	OP5	+10	+15	3114	
"	≤ 42 as a stable dispersion in water					OP8	+15	+20	3119	
DIDECANOYL PEROXIDE	≤ 100					OP6	+30	+35	3114	
2,2-DI-(4,4-DI (tert-BUTYLPEROXY)CYCLOHEXYL) PROPANE	≤ 42			≥ 58		OP7			3106	
"	≤ 22		≥ 78			OP8			3107	
DI-2,4-DICHLOROBENZOYL PEROXIDE	≤ 77				≥ 23	OP5			3102	3)
"	≤ 52 as a paste					OP8	+ 20	+ 25	3118	
"	≤ 52 as a paste with silicon oil					OP7			3106	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
DI-(2-ETHOXYETHYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-10	0	3115	
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE	> 77 - 100					OP5	-20	-10	3113	
"	≤ 77		≥ 23			OP7	-15	-5	3115	
"	≤ 62 as a stable dispersion in water					OP8	-15	-5	3119	
"	≤ 52 as a stable dispersion in water (frozen)					OP8	-15	-5	3120	
2,2-DIHYDROPEROXYPROPANE	≤ 27			≥ 73		OP5			3102	3)
DI-(1-HYDROXYCYCLOHEXYL) PEROXIDE	≤ 100					OP7			3106	
DIISOBUTYRYL PEROXIDE	> 32 - 52		≥ 48			OP5	-20	-10	3111	3)
"	≤ 42 (as a stable dispersion in water)					OP8	-20	-10	3119	
"	≤ 32		≥ 68			OP7	-20	-10	3115	
DIISOPROPYLBENZENE DIHYDROPEROXIDE	≤ 82	≥ 5			≥ 5	OP7			3106	24)
DIISOPROPYL PEROXYDICARBONATE	> 52-100					OP2	-15	-5	3112	3)
"	≤ 52		≥ 48			OP7	-20	-10	3115	
"	≤ 32	≥ 68				OP7	-15	-5	3115	
DILAUROYL PEROXIDE	≤ 100					OP7			3106	
"	≤ 42 as a stable dispersion in water					OP8			3109	
DI-(3-METHOXYBUTYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-5	+5	3115	
DI-(2-METHYLBENZOYL) PEROXIDE	≤ 87				≥ 13	OP5	+30	+35	3112	3)
DI-(3-METHYLBENZOYL) PEROXIDE + BENZOYL (3-METHYLBENZOYL) PEROXIDE + DIBENZOYL PEROXIDE	≤ 20 + ≤ 18 + ≤ 4		≥ 58			OP7	+35	+40	3115	
DI-(4-METHYLBENZOYL) PEROXIDE	≤ 52 as a paste with silicon oil					OP7			3106	
2,5-DIMETHYL-2,5-DI-(BENZOYLPEROXY)HEXANE	> 82-100					OP5			3102	3)
"	≤ 82			≥ 18		OP7			3106	
"	≤ 82				≥ 18	OP5			3104	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
2,5-DIMETHYL-2,5-DI-(tert-BUTYLPEROXY)HEXANE	> 90 - 100					OP5			3103	
"	> 52 - 90	≥ 10				OP7			3105	
"	≤ 77			≥ 23		OP8			3108	
"	≤ 52	≥ 48				OP8			3109	
"	≤ 47 as a paste					OP8			3108	
2,5-DIMETHYL-2,5-DI-(tert-BUTYLPEROXY)HEXYNE-3	> 86-100					OP5			3101	3)
"	>52-86	≥ 14				OP5			3103	26)
"	≤ 52			≥ 48		OP7			3106	
2,5-DIMETHYL-2,5-DI-(2-ETHYLHEXANOYLPEROXY) HEXANE	≤ 100					OP5	+20	+25	3113	
2,5-DIMETHYL-2,5-DIHYDROPEROXYHEXANE	≤ 82				≥ 18	OP6			3104	
2,5-DIMETHYL-2,5-DI-(3,5,5-TRIMETHYLHEXANOYL-PEROXY)HEXANE	≤ 77	≥ 23				OP7			3105	
1,1-DIMETHYL-3-HYDROXYBUTYL PEROXYNEOHEPTANOATE	≤ 52	≥ 48				OP8	0	+10	3117	
DIMYRISTYL PEROXYDICARBONATE	≤ 100					OP7	+20	+25	3116	
"	≤ 42 as a stable dispersion in water					OP8	+20	+25	3119	
DI-(2-NEODECANOYLPEROXYISOPROPYL) BENZENE	≤ 52	≥ 48				OP7	-10	0	3115	
DI-n-NONANOYL PEROXIDE	≤ 100					OP7	0	+10	3116	
DI-n-OCTANOYL PEROXIDE	≤ 100					OP5	+10	+15	3114	
DI-(2-PHENOXYETHYL) PEROXYDICARBONATE	>85-100					OP5			3102	3)
"	≤ 85				≥ 15	OP7			3106	
DIPROPIONYL PEROXIDE	≤ 27		≥ 73			OP8	+15	+20	3117	
DI-n-PROPYL PEROXYDICARBONATE	≤ 100					OP3	-25	-15	3113	
"	≤ 77		≥ 23			OP5	-20	-10	3113	
DISUCCINIC ACID PEROXIDE	> 72-100					OP4			3102	3) 17)
"	≤ 72				≥ 28	OP7	+10	+15	3116	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
DI-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE	> 52-82	≥ 18				OP7	0	+10	3115	
"	≤ 52 as a stable dispersion in water					OP8	+10	+15	3119	
"	> 38-52	≥ 48				OP8	+10	+15	3119	
"	≤ 38	≥ 62				OP8	+20	+25	3119	
ETHYL 3,3-DI-(tert-AMYLPEROXY)BUTYRATE	≤ 67	≥ 33				OP7			3105	
ETHYL 3,3-DI-(tert-BUTYLPEROXY)BUTYRATE	> 77 - 100					OP5			3103	
"	≤ 77	≥ 23				OP7			3105	
"	≤ 52			≥ 48		OP7			3106	
1-(2-ETHYLHEXANOYLPEROXY)-1,3-DIMETHYLBUTYL PEROXYPIVALATE	≤ 52	≥ 45	≥ 10			OP7	-20	-10	3115	
tert-HEXYL PEROXYNEODECANOATE	≤ 71	≥ 29				OP7	0	+10	3115	
tert-HEXYL PEROXYPIVALATE	≤ 72		≥ 28			OP7	+10	+15	3115	
"	≤ 52 as a stable dispersion in water					OP8	+15	+20	3117	
3-HYDROXY-1,1-DIMETHYLBUTYL PEROXYNEODECANOATE	≤ 77	≥ 23				OP 7	- 5	+ 5	3115	
"	≤ 52	≥ 48				OP 8	- 5	+ 5	3117	
"	≤ 52 as a stable dispersion in water					OP 8	- 5	+ 5	3119	
ISOPROPYL sec-BUTYL PEROXYDICARBONATE + DI-sec-BUTYL PEROXYDICARBONATE+DI-ISOPROPYL PEROXYDICARBONATE	≤ 32 + ≤ 15 - 18 ≤ 12 - 15	≥ 38				OP7	-20	-10	3115	
"	≤ 52 + ≤ 28 + ≤ 22					OP5	-20	-10	3111	3)
ISOPROPYLCUMYL HYDROPEROXIDE	≤ 72	≥ 28				OP8			3109	13)
p-MENTHYL HYDROPEROXIDE	> 72 - 100					OP7			3105	13)
"	≤ 72	≥ 28				OP8			3109	27)
METHYLCYCLOHEXANONE PEROXIDE(S)	≤ 67		≥ 33			OP7	+35	+40	3115	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B[1] (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	Number (Generic entry)	Subsidiary hazards and remarks
METHYL ETHYL KETONE PEROXIDE(S)	See remark 8)	≥ 48				OP5			3101	3) 8) 13)
"	See remark 9)	≥ 55				OP7			3105	9)
"	See remark 10)	≥ 60				OP8			3107	10)
METHYL ISOBUTYL KETONE PEROXIDE(S)	≤ 62	≥ 19				OP7			3105	22)
METHYL ISOPROPYL KETONE PEROXIDE(S)	See remark 31)	≥ 70				OP8			3109	31)
ORGANIC PEROXIDE, LIQUID, SAMPLE						OP2			3103	11)
ORGANIC PEROXIDE, LIQUID, SAMPLE, TEMPERATURE CONTROLLED						OP2			3113	11)
ORGANIC PEROXIDE, SOLID, SAMPLE						OP2			3104	11)
ORGANIC PEROXIDE, SOLID, SAMPLE, TEMPERATURE CONTROLLED						OP2			3114	11)
3,3,5,7,7-PENTAMETHYL-1,2,4-TRIOXEPANE	≤ 100					OP8			3107	
PEROXYACETIC ACID, TYPE D, stabilized	≤ 43					OP7			3105	13) 14) 19)
PEROXYACETIC ACID, TYPE E, stabilized	≤ 43					OP8			3107	13) 15) 19)
PEROXYACETIC ACID, TYPE F, stabilized	≤ 43					OP8			3109	13) 16) 19)
PEROXYLAURIC ACID	≤ 100					OP8	+35	+40	3118	
1-PHENYLETHYL HYDROPEROXIDE	≤38		≥62			OP8			3109	
PINANYL HYDROPEROXIDE	> 56 - 100					OP7			3105	13)
"	≤ 56	≥ 44				OP8			3109	
POLYETHER POLY-tert-BUTYLPEROXYCARBONATE	≤ 52		≥ 48			OP8			3107	
1,1,3,3-TETRAMETHYLBUTYL HYDROPEROXIDE	≤ 100					OP7			3105	
1,1,3,3-TETRAMETHYLBUTYL PEROXY-2 ETHYL-HEXANOATE	≤ 100					OP7	+15	+20	3115	
1,1,3,3- TETRAMETHYLBUTYL PEROXYNEODECANOATE	≤ 72		≥ 28			OP7	-5	+5	3115	
"	≤ 52 as a stable dispersion in water					OP8	-5	+5	3119	
1,1,3,3-TETRAMETHYLBUTYL PEROXYPIVALATE	≤ 77	≥ 23				OP7	0	+10	3115	
3,6,9-TRIETHYL-3,6,9-TRIMETHYL-1,4,7 TRIPEROXONANE	≤ 42	≥ 58				OP7			3105	28)
"	≤ 17	≥ 18		≥ 65		OP8			3110	

Notes on 2.5.3.2.4:

1) Diluent type B may always be replaced by diluent type A. The boiling point of diluent type B should be at least 60 °C higher than the SADT of the organic peroxide.

2) Available oxygen ≤ 4.7 %.

3) "EXPLOSIVE" subsidiary hazard label required (Model No.1, see 5.2.2.2.2).

4) Diluent may be replaced by di-tert-butyl peroxide.

5) Available oxygen ≤ 9 %.

6) With ≤ 9 % hydrogen peroxide; available oxygen ≤ 10 %.

7) Only non-metallic packagings allowed.

8) Available oxygen > 10 % and ≤ 10.7 %, with or without water.

9) Available oxygen ≤ 10 %, with or without water.

10) Available oxygen ≤ 8.2 %, with or without water.

11) See 2.5.3.2.5.1.

12) Up to 2 000 kg per receptacle assigned to ORGANIC PEROXIDE TYPE F on the basis of large scale trials.

13) "CORROSIVE" subsidiary hazard label required (Model No 8, see 5.2.2.2.2).

14) Peroxyacetic acid formulations which fulfil the criteria of 2.5.3.3.2 (d).

15) Peroxyacetic acid formulations which fulfil the criteria of 2.5.3.3.2 (e).

16) Peroxyacetic acid formulations which fulfil the criteria of 2.5.3.3.2 (f).

17) Addition of water to this organic peroxide will decrease its thermal stability.

18) No "CORROSIVE" subsidiary hazard label required for concentrations below 80 %.

19) Mixtures with hydrogen peroxide, water and acid(s).

20) With diluent type A, with or without water.

21) With ≥ 25 % diluent type A by mass, and in addition ethylbenzene.

22) With ≥ 19 % diluent type A by mass, and in addition methyl isobutyl ketone.

23) With < 6 % di-tert-butyl peroxide.

24) With ≤ 8 % 1-isopropylhydroperoxy-4-isopropylhydroxybenzene.

25) Diluent type B with boiling point > 110 °C.

26) With < 0.5 % hydroperoxides content.

27) For concentrations more than 56 %, "CORROSIVE" subsidiary hazard label (Model No 8, see 5.2.2.2.2) required.

28) Available active oxygen ≤ 7.6 % in diluent Type A having a 95 % boil-off point in the range of 200 - 260 °C.

29) Not subject to the requirements of these Model Regulations for Division 5.2.

30) Diluent type B with boiling point > 130 °C.

31) Active oxygen ≤ 6.7 %.

32) Active oxygen ≤ 4.15 %

2.5.3.2.5 Classification of organic peroxides not listed in 2.5.3.2.4, packing instruction IBC520 or portable tank instruction T23 and assignment to a generic entry shall be made by the competent authority of the country of origin on the basis of a test report. Principles applying to the classification of such substances

are provided in 2.5.3.3. The applicable classification procedures, test methods and criteria, and an example of a suitable test report, are given in the current edition of the *Manual of Tests and Criteria*, Part II. The statement of approval shall contain the classification and the relevant transport conditions.

2.5.3.2.5.1 Samples of new organic peroxides or new formulations of organic peroxides not listed in 2.5.3.2.4, for which complete test data are not available and which are to be transported for further testing or evaluation, may be assigned to one of the appropriate entries for ORGANIC PEROXIDE TYPE C provided the following conditions are met:

(a) The available data indicate that the sample would be no more dangerous than ORGANIC PEROXIDE TYPE B;

(b) The sample is packaged in accordance with packing method OP2 (see applicable packing instruction) and the quantity per cargo transport unit is limited to 10 kg;

(c) The available data indicate that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation.

2.5.3.3 *Principles for classification of organic peroxides*

NOTE: *This section refers only to those properties of organic peroxides which are decisive for their classification. A flow chart, presenting the classification principles in the form of a graphically arranged scheme of questions concerning the decisive properties together with the possible answers, is given in Figure 2.5.1. These properties shall be determined experimentally. Suitable test methods with pertinent evaluation criteria are given in the Manual of Tests and Criteria, Part II.*

2.5.3.3.1 An organic peroxide formulation shall be regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.

2.5.3.3.2 The following principles apply to the classification of organic peroxide formulations not listed in 2.5.3.2.4:

(a) Any organic peroxide formulation which can detonate or deflagrate rapidly, as packaged for transport, is prohibited from transport in that packaging under Division 5.2 (defined as ORGANIC PEROXIDE TYPE A, exit box A of Figure 2.5.1);

(b) Any organic peroxide formulation possessing explosive properties and which, as packaged for transport, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package, shall bear an “EXPLOSIVE” subsidiary hazard label (Model No 1, see 5.2.2.2.2). Such an organic peroxide may be packaged in amounts of up to 25 kg unless the maximum quantity has to be limited to a lower amount to preclude detonation or rapid deflagration in the package (defined as ORGANIC PEROXIDE TYPE B, exit box B of Figure 2.5.1);

(c) Any organic peroxide formulation possessing explosive properties may be transported without an “EXPLOSIVE” subsidiary hazard label when the substance as packaged (maximum 50 kg) for transport cannot detonate or deflagrate rapidly or undergo a thermal explosion (defined as ORGANIC PEROXIDE TYPE C, exit box C of Figure 2.5.1);

(d) Any organic peroxide formulation which in laboratory testing:

(i) detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or

(ii) does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or

(iii) does not detonate or deflagrate at all and shows a medium effect when heated under confinement;

is acceptable for transport in packages of not more than 50 kg net mass (defined as ORGANIC PEROXIDE TYPE D, exit box D of Figure 2.5.1);

(e) Any organic peroxide formulation which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement is acceptable for transport in packages of not more than 400 kg/450 litres (defined as ORGANIC PEROXIDE TYPE E, exit box E of Figure 2.5.1);

(f) Any organic peroxide formulation which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power may be considered for transport in IBCs or tanks (defined as ORGANIC PEROXIDE TYPE F, exit box F of Figure 2.5.1); for additional requirements see 4.1.7 and 4.2.1.13;

(g) Any organic peroxide formulation which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power shall be exempted from Division 5.2, provided that the formulation is thermally stable (self-accelerating decomposition temperature is 60 °C or higher for a 50 kg package) and for liquid formulations diluent type A is used for desensitization (defined as ORGANIC PEROXIDE TYPE G, exit box G of Figure 2.5.1). If the formulation is not thermally stable or a diluent other than type A is used for desensitization, the formulation shall be defined as ORGANIC PEROXIDE TYPE F.

Figure 2.5.1: Flow chart scheme for organic peroxides

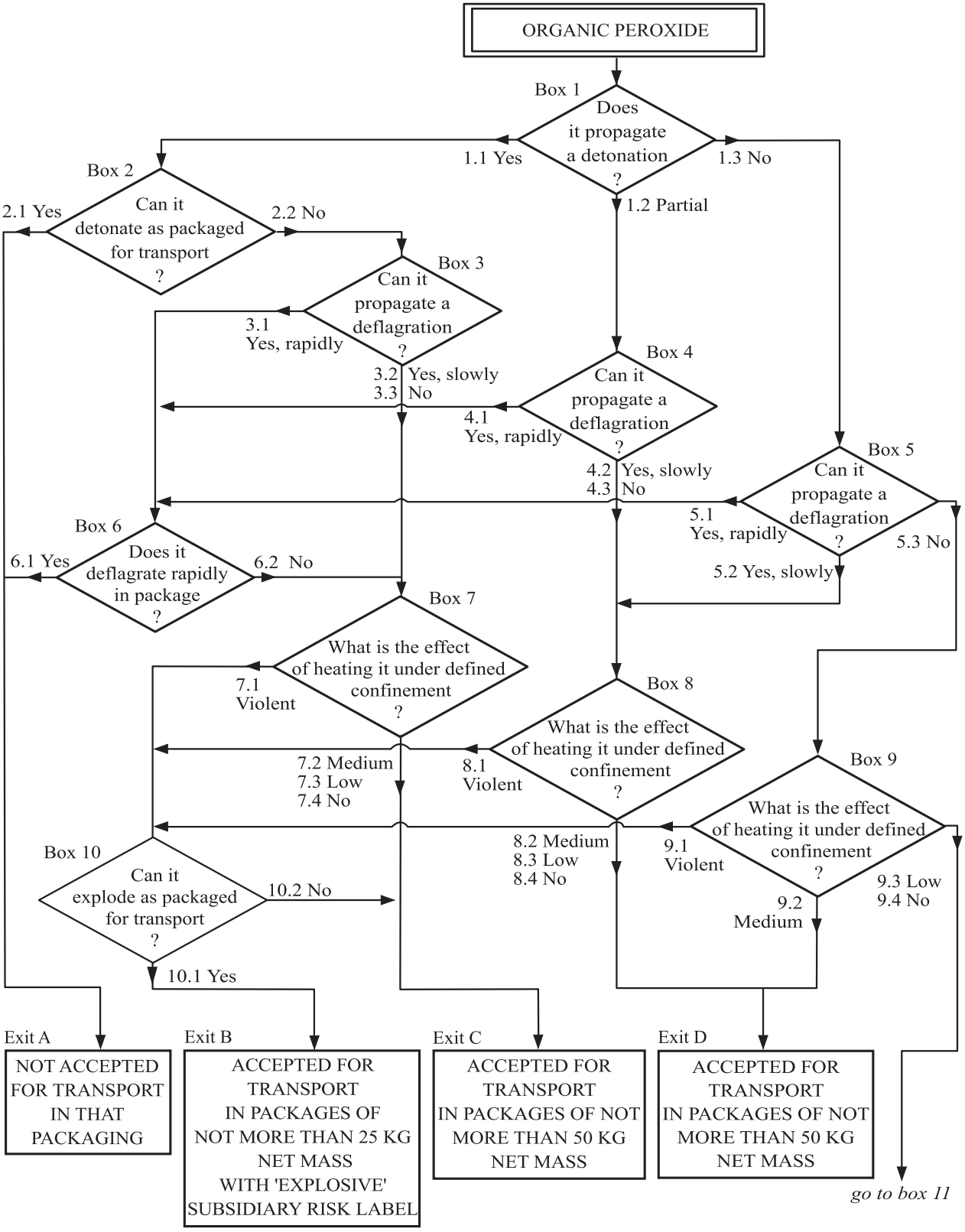
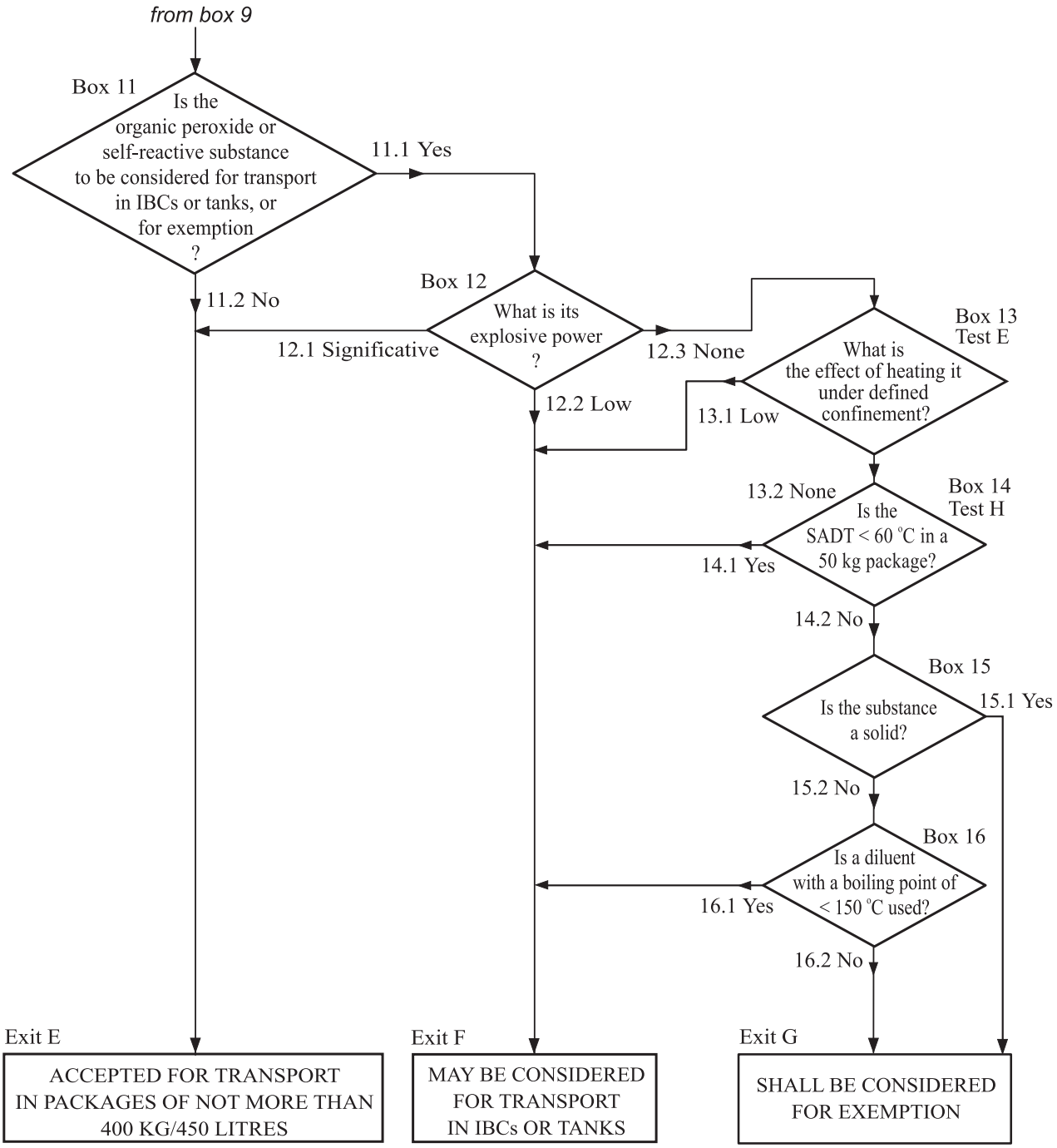


Figure 2.5.1: Flow chart scheme for organic peroxides (cont'd)



2.5.3.4 ***Temperature control requirements***

2.5.3.4.1 The following organic peroxides shall be subjected to temperature control during transport:

(a) Organic peroxides type B and C with an SADT ≤ 50 °C;

(b) Organic peroxides type D showing a medium effect when heated under confinement[1] with an SADT ≤ 50 °C or showing a low or no effect when heated under confinement with an SADT ≤ 45 °C; and

(c) Organic peroxides types E and F with an SADT ≤ 45 °C.

2.5.3.4.2 Test methods for determining the SADT are given in the *Manual of Tests and Criteria*, Part II, section 28. The test selected shall be conducted in a manner which is representative, both in size and material, of the package to be transported.

2.5.3.4.3 Test methods for determining the flammability are given in the *Manual of Tests and Criteria*, Part III, sub-section 32.4. Because organic peroxides may react vigorously when heated it is recommended to determine their flash point using small sample sizes such as described in ISO 3679.

2.5.3.5 ***Desensitization of organic peroxides***

2.5.3.5.1 In order to ensure safety during transport, organic peroxides are in many cases desensitized by organic liquids or solids, inorganic solids or water. Where a percentage of a substance is stipulated, this refers to the percentage by mass, rounded to the nearest whole number. In general, desensitization shall be such that, in case of spillage or fire, the organic peroxide will not concentrate to a dangerous extent.

2.5.3.5.2 Unless otherwise stated for the individual organic peroxide formulation, the following definitions apply for diluents used for desensitization:

(a) *Diluents type A* are organic liquids which are compatible with the organic peroxide and which have a boiling point of not less than 150 °C. Type A diluents may be used for desensitizing all organic peroxides;

(b) *Diluents type B* are organic liquids which are compatible with the organic peroxide and which have a boiling point of less than 150 °C but not less than 60 °C and a flash point of not less than 5 °C. Type B diluents may be used for desensitization of all organic peroxides provided that the boiling point is at least 60 °C higher than the SADT in a 50 kg package.

2.5.3.5.3 Diluents, other than type A or type B, may be added to organic peroxide formulations as listed in 2.5.3.2.4 provided that they are compatible. However, replacement of all or part of a type A or type B diluent by another diluent with differing properties requires that the organic peroxide formulation be re-assessed in accordance with the normal acceptance procedure for Division 5.2.

2.5.3.5.4 Water may only be used for the desensitization of organic peroxides which are shown in 2.5.3.2.4 or in the statement of approval according to 2.5.3.2.5 as being with water or as a stable dispersion in water.

2.5.3.5.5 Organic and inorganic solids may be used for desensitization of organic peroxides provided that they are compatible.

2.5.3.5.6 Compatible liquids and solids are those which have no detrimental influence on the thermal stability and hazard type of the organic peroxide formulation.

[1] *As determined by test series E as prescribed in the Manual of Tests and Criteria, Part II.*

CHAPTER 2.6

CLASS 6 - TOXIC SUBSTANCES AND INFECTIOUS SUBSTANCES

Introductory notes

NOTE 1: *Genetically modified microorganisms and organisms which do not meet the definition of a toxic or an infectious substance shall be considered for classification in Class 9 and assignment to UN 3245.*

NOTE 2: *Toxins from plant, animal or bacterial sources which do not contain any infectious substances, or toxins that are contained in substances which are not infectious substances, shall be considered for classification in Division 6.1 and assignment to UN 3172* or UN 3462.

2.6.1 Definitions

Class 6 is divided into two divisions as follows:

(a) Division 6.1 – *Toxic substances*

These are substances liable either to cause death or serious injury or to harm human health swallowed or inhaled or by skin contact;

(b) Division 6.2 – *Infectious substances*

These are substances known or reasonably expected to contain pathogens. Pathogens are defined as microorganisms (including bacteria, viruses, parasites, fungi) and other agents such as prions, which can cause disease in humans or animals.

2.6.2 Division 6.1 – Toxic substances

2.6.2.1 *Definitions*

For the purposes of these Regulations:

2.6.2.1.1 *LD_{50} (median lethal dose) for acute oral toxicity* is the statistically derived single dose of a substance that can be expected to cause death within 14 days in 50 per cent of young adult albino rats when administered by the oral route. The LD_{50} value is expressed in terms of mass of test substance per mass of test animal (mg/kg).

2.6.2.1.2 *LD_{50} for acute dermal toxicity* is that dose of the substance which, administered by continuous contact for 24 hours with the bare skin of albino rabbits, is most likely to cause death within 14 days in one half of the animals tested. The number of animals tested shall be sufficient to give a statistically significant result and be in conformity with good pharmacological practice. The result is expressed in milligrams per kg body mass.

2.6.2.1.3 *LC_{50} for acute toxicity on inhalation* is that concentration of vapour, mist or dust which, administered by continuous inhalation to both male and female young adult albino rats for one hour, is most likely to cause death within 14 days in one half of the animals tested. A solid substance shall be tested if at least 10 % (by mass) of its total mass is likely to be dust in a respirable range, e.g. the aerodynamic diameter of that particle-fraction is 10 microns or less. A liquid substance shall be tested if a mist is likely to be generated in a leakage of the transport containment. Both for solid and liquid substances more than 90 % (by mass) of a specimen prepared for inhalation toxicity shall be in the respirable range as defined above. The result is expressed in milligrams per litre of air for dusts and mists or in millilitres per cubic metre of air (parts per million) for vapours.

2.6.2.2 ***Assignment of packing groups***

2.6.2.2.1 Substances of Division 6.1, including pesticides, are allocated among the three packing groups according to their degree of toxic hazard in transport as follows:

(a) *Packing group I*: Substances and preparations presenting a very severe toxicity hazard;

(b) *Packing group II*: Substances and preparations presenting a serious toxicity hazard;

(c) *Packing group III*: Substances and preparations presenting a relatively low toxicity hazard.

2.6.2.2.2 In making this grouping, account shall be taken of human experience in instances of accidental poisoning and of special properties possessed by any individual substance, such as liquid state, high volatility, any special likelihood of penetration, and special biological effects.

2.6.2.2.3 In the absence of human experience the grouping shall be based on data obtained from animal experiments. Three possible routes of administration shall be examined. These routes are exposure through:

(a) Oral ingestion;

(b) Dermal contact; and

(c) Inhalation of dusts, mists, or vapours.

2.6.2.2.3.1 Appropriate animal tests for the various routes of exposure are described in 2.6.2.1. When a substance exhibits a different order of toxicity by two or more of these routes of administration, the highest degree of danger indicated by the tests shall be assigned.

2.6.2.2.4 The criteria to be applied for grouping a substance according to the toxicity it exhibits by all three routes of administration are presented in the following paragraphs.

2.6.2.2.4.1 The grouping criteria for the oral and dermal routes as well as for inhalation of dusts and mists are as shown in the following table.

GROUPING CRITERIA FOR ADMINISTRATION THROUGH ORAL INGESTION, DERMAL CONTACT AND INHALATION OF DUSTS AND MISTS

Packing group	**Oral toxicity LD_{50} (mg/kg)**	**Dermal toxicity LD_{50} (mg/kg)**	**Inhalation toxicity by dusts and mists LC_{50} (mg/l)**
I	≤ 5.0	≤ 50	≤ 0.2
II	> 5.0 and ≤ 50	> 50 and ≤ 200	> 0.2 and ≤ 2.0
III[a]	> 50 and ≤ 300	> 200 and ≤ 1 000	> 2.0 and ≤ 4.0

[a] *Tear gas substances shall be included in packing group II even if their toxicity data correspond to packing group III values.*

NOTE: *Substances meeting the criteria of Class 8 and with an inhalation toxicity of dusts and mists (LC_{50}) leading to packing group I are only accepted for an allocation to Division 6.1 if the toxicity through oral ingestion or dermal contact is at least in the range of packing group I or II. Otherwise an allocation to Class 8 is made when appropriate (see 2.8.2.4).*

2.6.2.2.4.2 The criteria for inhalation toxicity of dusts and mists in 2.6.2.2.4.1 are based on LC_{50} data relating to 1 hour exposures and where such information is available it shall be used. However, where only LC_{50} data relating to 4 hours exposures to dusts and mists are available, such figures can be multiplied by four

and the product substituted in the above criteria, i.e. LC_{50} (4 hours) × 4 is considered the equivalent of LC_{50} (1 hour).

2.6.2.2.4.3 Liquids having toxic vapours shall be assigned to the following packing groups, where "V" is the saturated vapour concentration in millilitres per cubic metre of air (volatility) at 20 °C and standard atmospheric pressure:

(a) Packing group I: If $V \geq 10\ LC_{50}$ and $LC_{50} \leq 1\ 000$ ml/m^3;

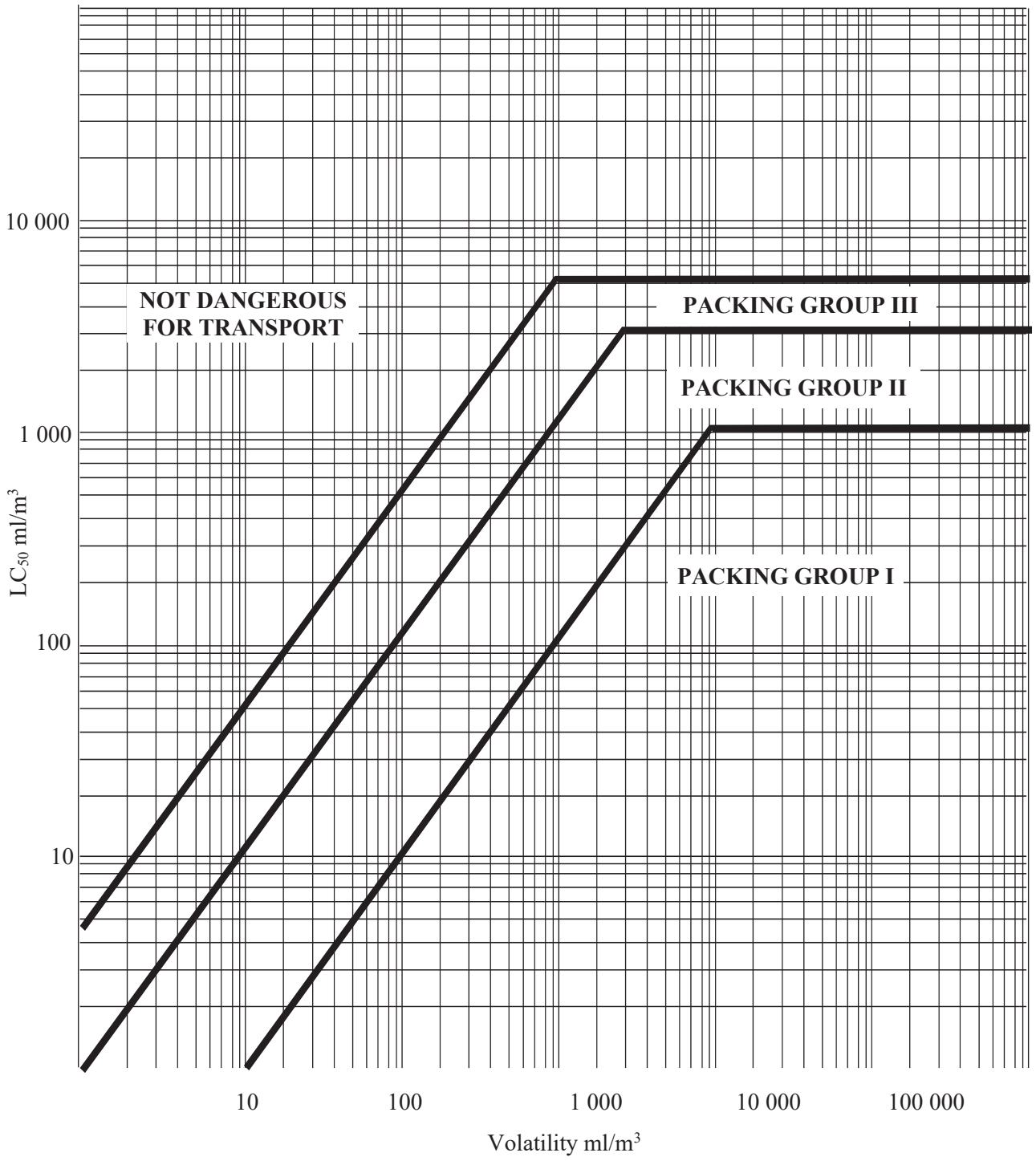
(b) Packing group II: If $V \geq LC_{50}$ and $LC_{50} \leq 3\ 000$ ml/m^3, and not meeting the criteria for packing group I;

(c) Packing group III[1]: If $V \geq 1/5\ LC_{50}$ and $LC_{50} \leq 5\ 000$ ml/m^3, and not meeting the criteria for packing groups I or II.

2.6.2.2.4.4 In Figure 2.6.1, the criteria according to 2.6.2.2.4.3 are expressed in graphical form, as an aid to easy classification. However, because of approximations inherent in the use of graphs, substances on or near packing group borderlines shall be checked using numerical criteria.

[1] *Tear gas substances are included in Packing group II even if their toxicity data correspond to packing group III values.*

Figure 2.6.1: Inhalation toxicity: packing group borderlines



2.6.2.2.4.5 The criteria for inhalation toxicity of vapours in 2.6.2.2.4.3 are based on LC_{50} data relating to 1 hour exposure, and where such information is available it shall be used. However, where only LC_{50} data relating to 4 hours exposures to the vapours are available, such figures can be multiplied by two and the product substituted in the above criteria, i.e. LC_{50} (4 hours) × 2 is considered to be the equivalent of LC_{50} (1 hour).

2.6.2.2.4.6 Mixtures of liquids that are toxic by inhalation shall be assigned to packing groups according to 2.6.2.2.4.7 or 2.6.2.2.4.8.

2.6.2.2.4.7 If LC_{50} data are available for each of the toxic substances comprising a mixture, the packing group may be determined as follows:

(a) Estimate the LC_{50} of the mixture using the formula:

$$LC_{50}\,(\text{mixture}) = \frac{1}{\sum_{i=1}^{n}\left(\frac{f_i}{LC_{50i}}\right)}$$

where: f_i = mole fraction of the i^{th} component substance of the mixture;
LC_{50i} = mean lethal concentration of the i^{th} component substance in ml/m^3;

(b) Estimate the volatility of each component substance comprising the mixture using the formula:

$$V_i = \left(\frac{P_i \times 10^6}{101.3}\right) \text{ml} / \text{m}^3$$

where: P_i = partial pressure of the i^{th} component substance in kPa at 20 °C and one atmosphere pressure;

(c) Calculate the ratio of the volatility to the LC_{50} using the formula:

$$R = \sum_{i=1}^{n}\left(\frac{V_i}{LC_{50_i}}\right);$$

(d) Using the calculated values LC_{50}(mixture) and R, the packing group for the mixture is determined:

(i) *Packing group I*: R ≥ 10 and LC_{50}(mixture) ≤ 1 000 ml/m^3;

(ii) *Packing group II*: R ≥ 1 and LC_{50}(mixture) ≤ 3 000 ml/m^3 and not meeting criteria for packing group I;

(iii) *Packing group III*: R ≥ 1/5 and LC_{50}(mixture) ≤ 5 000 ml/m^3 and not meeting criteria for packing groups I or II.

2.6.2.2.4.8 In the absence of LC_{50} data on the toxic constituent substances, the mixture may be assigned a packing group based on the following simplified threshold toxicity tests. When these threshold tests are used, the most restrictive packing group determined is used for transporting the mixture.

(a) A mixture is assigned to packing group I only if it meets both of the following criteria:

(i) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 1 000 ml/m^3 vaporized mixture in air. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen day observation period, the mixture is presumed to have an LC_{50} equal to or less than 1 000 ml/m^3;

(ii) A sample of the vapour in equilibrium with the liquid mixture at 20 °C is diluted with 9 equal volumes of air to form a test atmosphere. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen day observation period, the mixture is presumed to have a volatility equal to or greater than 10 times the mixture LC_{50};

(b) A mixture is assigned to packing group II only if it meets both of the following criteria, and the mixture does not meet the criteria for packing group I:

(i) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 3 000 ml/m^3 vaporized mixture in air. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen day observation period, the mixture is presumed to have an LC_{50} equal to or less than 3 000 ml/m^3;

(ii) A sample of the vapour in equilibrium with the liquid mixture at 20 °C is used to form a test atmosphere. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen day observation period, the mixture is presumed to have a volatility equal to or greater than the mixture LC_{50};

(c) A mixture is assigned to packing group III only if it meets both of the following criteria, and the mixture does not meet the criteria for packing groups I or II:

(i) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 5 000 ml/m^3 vaporized mixture in air. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen day observation period, the mixture is presumed to have an LC_{50} equal to or less than 5 000 ml/m^3;

(ii) The vapour pressure of the liquid mixture is measured and if the vapour concentration is equal to or greater than 1 000 ml/m^3, the mixture is presumed to have a volatility equal to or greater than 1/5 the mixture LC_{50}.

2.6.2.3 ***Methods for determining oral and dermal toxicity of mixtures***

2.6.2.3.1 When classifying and assigning the appropriate packing group to mixtures in Division 6.1, in accordance with the oral and dermal toxicity criteria in 2.6.2.2, it is necessary to determine the acute LD_{50} of the mixture.

2.6.2.3.2 If a mixture contains only one active substance, and the LD_{50} of that constituent is known, in the absence of reliable acute oral and dermal toxicity data on the actual mixture to be transported, the oral or dermal LD_{50} may be obtained by the following method:

$$LD_{50}\ \text{value of preparation} = \frac{LD_{50}\ \text{value of active substance} \times 100}{\text{percentage of active substance by mass}}$$

2.6.2.3.3 If a mixture contains more than one active constituent, there are three possible approaches that may be used to determine the oral or dermal LD_{50} of the mixture. The preferred method is to obtain reliable acute oral and dermal toxicity data on the actual mixture to be transported. If reliable, accurate data are not available, then either of the following methods may be performed:

(a) Classify the formulation according to the most hazardous constituent of the mixture as if that constituent were present in the same concentration as the total concentration of all active constituents; or

(b) Apply the formula: $\frac{C_A}{T_A} + \frac{C_B}{T_B} + \ldots + \frac{C_Z}{T_Z} = \frac{100}{T_M}$

where: C = the % concentration of constituent A, B ... Z in the mixture;
T = the oral LD_{50} values of constituent A, B ... Z;
T_M = the oral LD_{50} value of the mixture.

NOTE: *This formula can also be used for dermal toxicities provided that this information is available on the same species for all constituents. The use of this formula does not take into account any potentiation or protective phenomena.*

2.6.2.4 ***Classification of pesticides***

2.6.2.4.1 All active pesticide substances and their preparations for which the LC_{50} and/or LD_{50} values are known and which are classified in Division 6.1 shall be classified under appropriate packing groups in accordance with the criteria given in 2.6.2.2. Substances and preparations which are characterized by subsidiary hazards shall be classified according to the precedence of hazard table in Chapter 2.0 with the assignment of appropriate packing groups.

2.6.2.4.2 If the oral or dermal LD_{50} value for a pesticide preparation is not known, but the LD_{50} value of its active substance(s) is known, the LD_{50} value for the preparation may be obtained by applying the procedures in 2.6.2.3.

NOTE: *LD_{50} toxicity data for a number of common pesticides may be obtained from the most current edition of the document "The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification" available from the International Programme on Chemical Safety, World Health Organisation (WHO), 1211 Geneva 27, Switzerland. While that document may be used as a source of LD_{50} data for pesticides, its classification system shall not be used for purposes of transport classification of, or assignment of packing groups to, pesticides, which shall be in accordance with these regulations.*

2.6.2.4.3 The proper shipping name used in the transport of the pesticide shall be selected on the basis of the active ingredient, of the physical state of the pesticide and any subsidiary hazards it may exhibit.

2.6.2.5 ***Substances not accepted for transport***

Chemically unstable substances of Division 6.1 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.

2.6.3 Division 6.2 – Infectious substances

2.6.3.1 ***Definitions***

For the purposes of these Regulations:

2.6.3.1.1 *Infectious substances* are substances which are known or are reasonably expected to contain pathogens. Pathogens are defined as microorganisms (including bacteria, viruses, parasites, fungi) and other agents such as prions, which can cause disease in humans or animals.

2.6.3.1.2 *Biological products* are those products derived from living organisms which are manufactured and distributed in accordance with the requirements of appropriate national authorities, which may have special licensing requirements, and are used either for prevention, treatment, or diagnosis of disease in humans or animals, or for development, experimental or investigational purposes related thereto. They include, but are not limited to, finished or unfinished products such as vaccines.

2.6.3.1.3 *Cultures* are the result of a process by which pathogens are intentionally propagated. This definition does not include human or animal patient specimens as defined in 2.6.3.1.4.

2.6.3.1.4 *Patient specimens* are those, collected directly from humans or animals, including, but not limited to, excreta, secreta, blood and its components, tissue and tissue fluid swabs, and body parts being

transported for purposes such as research, diagnosis, investigational activities, disease treatment and prevention.

2.6.3.1.5 *Deleted.*

2.6.3.1.6 *Medical or clinical wastes* are wastes derived from the veterinary treatment of animals, the medical treatment of humans or from bio-research.

2.6.3.2 *Classification of infectious substances*

2.6.3.2.1 Infectious substances shall be classified in Division 6.2 and assigned to UN 2814, UN 2900, UN 3291, UN 3373 or UN 3549, as appropriate.

2.6.3.2.2 Infectious substances are divided into the following categories:

2.6.3.2.2.1 Category A: An infectious substance which is transported in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals. Indicative examples of substances that meet these criteria are given in the table in this paragraph.

NOTE: *An exposure occurs when an infectious substance is released outside of the protective packaging, resulting in physical contact with humans or animals.*

(a) Infectious substances meeting these criteria which cause disease in humans or both in humans and animals shall be assigned to UN 2814. Infectious substances which cause disease only in animals shall be assigned to UN 2900.

(b) Assignment to UN 2814 or UN 2900 shall be based on the known medical history and symptoms of the source human or animal, endemic local conditions, or professional judgement concerning individual circumstances of the source human or animal.

NOTE 1: *The proper shipping name for UN 2814 is INFECTIOUS SUBSTANCE, AFFECTING HUMANS. The proper shipping name for UN 2900 is INFECTIOUS SUBSTANCE, AFFECTING ANIMALS only.*

NOTE 2: *The following table is not exhaustive. Infectious substances, including new or emerging pathogens, which do not appear in the table but which meet the same criteria shall be assigned to Category A. In addition, if there is doubt as to whether or not a substance meets the criteria it shall be included in Category A.*

NOTE 3: *In the following table, the microorganisms written in italics are bacteria or fungi.*

INDICATIVE EXAMPLES OF INFECTIOUS SUBSTANCES INCLUDED IN CATEGORY A IN ANY FORM UNLESS OTHERWISE INDICATED (2.6.3.2.2.1 (a))	
UN Number and Proper Shipping Name	**Microorganism**
UN 2814 Infectious substances affecting humans	*Bacillus anthracis* (cultures only) *Brucella abortus* (cultures only) *Brucella melitensis* (cultures only) *Brucella suis* (cultures only) *Burkholderia mallei* - *Pseudomonas mallei* – Glanders (cultures only) *Burkholderia pseudomallei* – *Pseudomonas pseudomallei* (cultures only) *Chlamydia psittaci* - avian strains (cultures only) *Clostridium botulinum* (cultures only) *Coccidioides immitis* (cultures only) *Coxiella burnetii* (cultures only) Crimean-Congo haemorrhagic fever virus Dengue virus (cultures only) Eastern equine encephalitis virus (cultures only) *Escherichia coli*, verotoxigenic (cultures only) Ebola virus Flexal virus *Francisella tularensis* (cultures only) Guanarito virus Hantaan virus Hantaviruses causing haemorrhagic fever with renal syndrome Hendra virus Hepatitis B virus (cultures only) Herpes B virus (cultures only) Human immunodeficiency virus (cultures only) Highly pathogenic avian influenza virus (cultures only) Japanese Encephalitis virus (cultures only) Junin virus Kyasanur Forest disease virus Lassa virus Machupo virus Marburg virus Monkeypox virus *Mycobacterium tuberculosis* (cultures only) Nipah virus Omsk haemorrhagic fever virus Poliovirus (cultures only) Rabies virus (cultures only) *Rickettsia prowazekii* (cultures only) *Rickettsia rickettsii* (cultures only) Rift Valley fever virus (cultures only) Russian spring-summer encephalitis virus (cultures only) Sabia virus *Shigella dysenteriae* type 1 (cultures only) Tick-borne encephalitis virus (cultures only) Variola virus Venezuelan equine encephalitis virus (cultures only) West Nile virus (cultures only) Yellow fever virus (cultures only) *Yersinia pestis* (cultures only)

INDICATIVE EXAMPLES OF INFECTIOUS SUBSTANCES INCLUDED IN CATEGORY A IN ANY FORM UNLESS OTHERWISE INDICATED (2.6.3.2.2.1 (a))	
UN Number and Proper Shipping Name	**Microorganism**
UN 2900 Infectious substances affecting animals only	African swine fever virus (cultures only) Avian paramyxovirus Type 1 - Velogenic Newcastle disease virus (cultures only) Classical swine fever virus (cultures only) Foot and mouth disease virus (cultures only) Lumpy skin disease virus (cultures only) *Mycoplasma mycoides* - Contagious bovine pleuropneumonia (cultures only) Peste des petits ruminants virus (cultures only) Rinderpest virus (cultures only) Sheep-pox virus (cultures only) Goatpox virus (cultures only) Swine vesicular disease virus (cultures only) Vesicular stomatitis virus (cultures only)

2.6.3.2.2.2 Category B: An infectious substance which does not meet the criteria for inclusion in Category A. Infectious substances in Category B shall be assigned to UN 3373.

NOTE: *The proper shipping name of UN 3373 is "BIOLOGICAL SUBSTANCE, CATEGORY B".*

2.6.3.2.3 *Exemptions*

2.6.3.2.3.1 Substances which do not contain infectious substances or substances which are unlikely to cause disease in humans or animals are not subject to these Regulations unless they meet the criteria for inclusion in another class.

2.6.3.2.3.2 Substances containing microorganisms which are non-pathogenic to humans or animals are not subject to these Regulations unless they meet the criteria for inclusion in another class.

2.6.3.2.3.3 Substances in a form that any present pathogens have been neutralized or inactivated such that they no longer pose a health risk are not subject to these Regulations unless they meet the criteria for inclusion in another class.

NOTE: *Medical equipment which has been drained of free liquid is deemed to meet the requirements of this paragraph and is not subject to these Regulations.*

2.6.3.2.3.4 Environmental samples (including food and water samples) which are not considered to pose a significant risk of infection are not subject to these Regulations unless they meet the criteria for inclusion in another class.

2.6.3.2.3.5 Dried blood spots, collected by applying a drop of blood onto absorbent material, are not subject to these Regulations.

2.6.3.2.3.6 Faecal occult blood screening samples are not subject to these Regulations.

2.6.3.2.3.7 Blood or blood components which have been collected for the purposes of transfusion or for the preparation of blood products to be used for transfusion or transplantation and any tissues or organs intended for use in transplantation as well as samples drawn in connection with such purposes are not subject to these Regulations.

2.6.3.2.3.8 Human or animal specimens for which there is minimal likelihood that pathogens are present are not subject to these Regulations if the specimen is transported in a packaging which will prevent any leakage and which is marked with the words "Exempt human specimen" or "Exempt animal specimen", as appropriate. The packaging should meet the following conditions:

(a) The packaging should consist of three components:

(i) a leak-proof primary receptacle(s);

(ii) a leak-proof secondary packaging; and

(iii) an outer packaging of adequate strength for its capacity, mass and intended use, and with at least one surface having minimum dimensions of 100 mm × 100 mm;

(b) For liquids, absorbent material in sufficient quantity to absorb the entire contents should be placed between the primary receptacle(s) and the secondary packaging so that, during transport, any release or leak of a liquid substance will not reach the outer packaging and will not compromise the integrity of the cushioning material;

(c) When multiple fragile primary receptacles are placed in a single secondary packaging, they should be either individually wrapped or separated to prevent contact between them.

NOTE 1: *An element of professional judgment is required to determine if a substance is exempt under this paragraph. That judgment should be based on the known medical history, symptoms and individual circumstances of the source, human or animal, and endemic local conditions. Examples of specimens which may be transported under this paragraph include the blood or urine tests to monitor cholesterol levels, blood glucose levels, hormone levels, or prostate specific antibodies (PSA); those required to monitor organ function such as heart, liver or kidney function for humans or animals with non-infectious diseases, or for therapeutic drug monitoring; those conducted for insurance or employment purposes and are intended to determine the presence of drugs or alcohol; pregnancy test; biopsies to detect cancer; and antibody detection in humans or animals in the absence of any concern for infection (e.g. evaluation of vaccine induced immunity, diagnosis of autoimmune disease, etc.).*

NOTE 2: *For air transport, packagings for specimens exempted under this paragraph shall meet the conditions in (a) to (c).*

2.6.3.2.3.9 Except for:

(a) Medical waste (UN 3291 and UN 3549);

(b) Medical devices or equipment contaminated with or containing infectious substances in Category A (UN 2814 or UN 2900); and

(c) Medical devices or equipment contaminated with or containing other dangerous goods that meet the definition of another hazard class,

medical devices or equipment potentially contaminated with or containing infectious substances which are being transported for disinfection, cleaning, sterilization, repair, or equipment evaluation are not subject to the provisions of these Regulations if packed in packagings designed and constructed in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents. Packagings shall be designed to meet the construction requirements listed in 6.1.4 or 6.6.5.

These packagings shall meet the general packing requirements of 4.1.1.1 and 4.1.1.2 and be capable of retaining the medical devices and equipment when dropped from a height of 1.2 m. For air transport, additional requirements may apply.

The packagings *shall be marked "USED MEDICAL DEVICE" or "USED MEDICAL EQUIPMENT". When using overpacks, these shall be marked in the same way, except when the inscription remains visible.*

2.6.3.3 *Biological products*

2.6.3.3.1 For the purposes of these Regulations, biological products are divided into the following groups:

(a) those which are manufactured and packaged in accordance with the requirements of appropriate national authorities and transported for the purposes of final packaging or distribution, and use for personal health care by medical professionals or individuals. Substances in this group are not subject to these Regulations;

(b) those which do not fall under paragraph (a) and are known or reasonably believed to contain infectious substances and which meet the criteria for inclusion in Category A or Category B. Substances in this group shall be assigned to UN 2814, UN 2900 or UN 3373, as appropriate.

NOTE: *Some licensed biological products may present a biohazard only in certain parts of the world. In that case, competent authorities may require these biological products to be in compliance with local requirements for infectious substances or may impose other restrictions.*

2.6.3.4 *Genetically modified microorganisms and organisms*

2.6.3.4.1 Genetically modified microorganisms not meeting the definition of infectious substance shall be classified according to Chapter 2.9.

2.6.3.5 *Medical or clinical wastes*

2.6.3.5.1 Medical or clinical wastes containing:

(a) Category A infectious substances shall be assigned to UN 2814, UN 2900 or UN 3549, as appropriate. Solid medical waste containing Category A infectious substances generated from the medical treatment of humans or veterinary treatment of animals may be assigned to UN 3549. The UN 3549 entry shall not be used for waste from bio-research or liquid waste;

(b) Category B infectious substances shall be assigned to UN 3291.

2.6.3.5.2 Medical or clinical wastes which are reasonably believed to have a low probability of containing infectious substances shall be assigned to UN 3291.

For the assignment, international, regional or national waste catalogues may be taken into account.

NOTE: *The proper shipping name for UN 3291 is "CLINICAL WASTE, UNSPECIFIED, N.O.S." or "(BIO) MEDICAL WASTE, N.O.S" or "REGULATED MEDICAL WASTE, N.O.S.".*

2.6.3.5.3 Decontaminated medical or clinical wastes which previously contained infectious substances are not subject to these Regulations unless they meet the criteria for inclusion in another class.

2.6.3.6 *Infected animals*

2.6.3.6.1 Unless an infectious substance cannot be consigned by any other means, live animals shall not be used to consign such a substance. A live animal which has been intentionally infected and is known or suspected to contain an infectious substance shall only be transported under terms and conditions approved by the competent authority.

2.6.3.6.2 *Deleted.*

CHAPTER 2.7

CLASS 7 - RADIOACTIVE MATERIAL

NOTE: *For Class 7, the type of packaging may have a decisive effect on classification.*

2.7.1 Definitions

2.7.1.1 *Radioactive material* means any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in 2.7.2.2.1 to 2.7.2.2.6.

2.7.1.2 *Contamination*

Contamination means the presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm^2 for all other alpha emitters.

Non-fixed contamination means contamination that can be removed from a surface during routine conditions of transport.

Fixed contamination means contamination other than non-fixed contamination.

2.7.1.3 *Definitions of specific terms*

A_1 and A_2

A_1 means the activity value of special form radioactive material which is listed in the Table in 2.7.2.2.1 or derived in 2.7.2.2.2 and is used to determine the activity limits for the requirements of these Regulations.

A_2 means the activity value of radioactive material, other than special form radioactive material, which is listed in the Table in 2.7.2.2.1 or derived in 2.7.2.2.2 and is used to determine the activity limits for the requirements of these Regulations.

Fissile nuclides means uranium-233, uranium-235, plutonium-239 and plutonium-241. *Fissile material* means a material containing any of the fissile nuclides. Excluded from the definition of fissile material are the following:

(a) Natural uranium or depleted uranium which is unirradiated;

(b) Natural uranium or depleted uranium which has been irradiated in thermal reactors only;

(c) material with fissile nuclides less than a total of 0.25 g;

(d) any combination of (a), (b) and/or (c).

These exclusions are only valid if there is no other material with fissile nuclides in the package or in the consignment if shipped unpackaged.

Low dispersible radioactive material means either a solid radioactive material or a solid radioactive material in a sealed capsule, that has limited dispersibility and is not in powder form.

Low specific activity (LSA) material means radioactive material which by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply. External shielding materials surrounding the LSA material shall not be considered in determining the estimated average specific activity.

Low toxicity alpha emitters are: natural uranium; depleted uranium; natural thorium; uranium-235 or uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical and chemical concentrates; or alpha emitters with a half-life of less than 10 days.

Special form radioactive material means either:

(a) An indispersible solid radioactive material; or

(b) A sealed capsule containing radioactive material.

Specific activity of a radionuclide means the activity per unit mass of that nuclide. The specific activity of a material shall mean the activity per unit mass of the material in which the radionuclides are essentially uniformly distributed.

Surface contaminated object (SCO) means a solid object which is not itself radioactive but which has radioactive material distributed on its surface.

Unirradiated thorium means thorium containing not more than 10^{-7} g of uranium-233 per gram of thorium-232.

Unirradiated uranium means uranium containing not more than 2×10^3 Bq of plutonium per gram of uranium-235, not more than 9×10^6 Bq of fission products per gram of uranium-235 and not more than 5×10^{-3} g of uranium-236 per gram of uranium-235.

Uranium - natural, depleted, enriched means the following:

Natural uranium means uranium (which may be chemically separated) containing the naturally occurring distribution of uranium isotopes (approximately 99.28 % uranium-238, and 0.72 % uranium-235 by mass).

Depleted uranium means uranium containing a lesser mass percentage of uranium-235 than in natural uranium.

Enriched uranium means uranium containing a greater mass percentage of uranium-235 than 0.72 %.

In all cases, a very small mass percentage of uranium-234 is present.

2.7.2 Classification

2.7.2.1 *General provisions*

2.7.2.1.1 Radioactive material shall be assigned to one of the UN numbers specified in Table 2.7.2.1.1, in accordance with 2.7.2.4 to 2.7.2.5, taking into account the material characteristics determined in 2.7.2.3.

Table 2.7.2.1.1: Assignment of UN numbers

UN Nos.	Proper shipping name and description[a]
Excepted packages (1.5.1.5)	
UN 2908	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - EMPTY PACKAGING
UN 2909	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM
UN 2910	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL
UN 2911	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - INSTRUMENTS or ARTICLES
UN 3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE less than 0.1 kg per package, non-fissile or fissile-excepted[b,c]
Low specific activity radioactive material (2.7.2.3.1)	
UN 2912	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile-excepted[b]
UN 3321	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non fissile or fissile-excepted[b]
UN 3322	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non fissile or fissile-excepted[b]
UN 3324	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE
UN 3325	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, (LSA-III), FISSILE
Surface contaminated objects (2.7.2.3.2)	
UN 2913	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I, SCO-II or SCO-III), non-fissile or fissile-excepted[b]
UN 3326	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE
Type A packages (2.7.2.4.4)	
UN 2915	RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non-fissile or fissile-excepted[b]
UN 3327	RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE, non-special form
UN 3332	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, non fissile or fissile-excepted[b]
UN 3333	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSILE
Type B(U) packages (2.7.2.4.6)	
UN 2916	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non-fissile or fissile-excepted[b]
UN 3328	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSILE
Type B(M) packages (2.7.2.4.6)	
UN 2917	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non-fissile or fissile-excepted[b]
UN 3329	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSILE
Type C packages (2.7.2.4.6)	
UN 3323	RADIOACTIVE MATERIAL, TYPE C PACKAGE, non fissile or fissile-excepted[b]
UN 3330	RADIOACTIVE MATERIAL, TYPE C PACKAGE, FISSILE
Special arrangement (2.7.2.5)	
UN 2919	*RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non-fissile or fissile-excepted[b]*
UN 3331	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE
Uranium hexafluoride (2.7.2.4.5)	
UN 2977	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE
UN 2978	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted[b]
UN 3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE less than 0.1 kg per package, non-fissile or fissile-excepted[b,c]

[a] *The proper shipping name is found in the column "proper shipping name and description" and is restricted to that part shown in capital letters. In the cases of UN Nos. 2909, 2911, 2913 and 3326, where alternative proper shipping names are separated by the word "or" only the relevant proper shipping name shall be used;*

[b] *The term "fissile-excepted" refers only to material excepted under 2.7.2.3.5.*

[c] *For UN No. 3507, see also special provision 369 in Chapter 3.3.*

2.7.2.2 *Determination of basic radionuclide values*

2.7.2.2.1 The following basic values for individual radionuclides are given in Table 2.7.2.2.1:

(a) A_1 and A_2 in TBq;

(b) Activity concentration limits for exempt material in Bq/g; and

(c) Activity limits for exempt consignments in Bq.

Table 2.7.2.2.1: Basic radionuclides values for individual radionuclides

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Actinium (89)				
Ac-225 (a)	8×10^{-1}	6×10^{-3}	1×10^{1}	1×10^{4}
Ac-227 (a)	9×10^{-1}	9×10^{-5}	1×10^{-1}	1×10^{3}
Ac-228	6×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Silver (47)				
Ag-105	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Ag-108m (a)	7×10^{-1}	7×10^{-1}	1×10^{1} (b)	1×10^{6} (b)
Ag-110m (a)	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Ag-111	2×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Aluminium (13)				
Al-26	1×10^{-1}	1×10^{-1}	1×10^{1}	1×10^{5}
Americium (95)				
Am-241	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Am-242m (a)	1×10^{1}	1×10^{-3}	1×10^{0} (b)	1×10^{4} (b)
Am-243 (a)	5×10^{0}	1×10^{-3}	1×10^{0} (b)	1×10^{3} (b)
Argon (18)				
Ar-37	4×10^{1}	4×10^{1}	1×10^{6}	1×10^{8}
Ar-39	4×10^{1}	2×10^{1}	1×10^{7}	1×10^{4}
Ar-41	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{9}
Arsenic (33)				
As-72	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
As-73	4×10^{1}	4×10^{1}	1×10^{3}	1×10^{7}
As-74	1×10^{0}	9×10^{-1}	1×10^{1}	1×10^{6}
As-76	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
As-77	2×10^{1}	7×10^{-1}	1×10^{3}	1×10^{6}
Astatine (85)				
At-211 (a)	2×10^{1}	5×10^{-1}	1×10^{3}	1×10^{7}
Gold (79)				
Au-193	7×10^{0}	2×10^{0}	1×10^{2}	1×10^{7}
Au-194	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Au-195	1×10^{1}	6×10^{0}	1×10^{2}	1×10^{7}
Au-198	1×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Au-199	1×10^{1}	6×10^{-1}	1×10^{2}	1×10^{6}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Barium (56)				
Ba-131 (a)	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Ba-133	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Ba-133m	2×10^{1}	6×10^{-1}	1×10^{2}	1×10^{6}
Ba-135m	2×10^{1}	6×10^{-1}	1×10^{2}	1×10^{6}
Ba-140 (a)	5×10^{-1}	3×10^{-1}	1×10^{1} (b)	1×10^{5} (b)
Beryllium (4)				
Be-7	2×10^{1}	2×10^{1}	1×10^{3}	1×10^{7}
Be-10	4×10^{1}	6×10^{-1}	1×10^{4}	1×10^{6}
Bismuth (83)				
Bi-205	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Bi-206	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Bi-207	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Bi-210	1×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Bi-210m (a)	6×10^{-1}	2×10^{-2}	1×10^{1}	1×10^{5}
Bi-212 (a)	7×10^{-1}	6×10^{-1}	1×10^{1} (b)	1×10^{5} (b)
Berkelium (97)				
Bk-247	8×10^{0}	8×10^{-4}	1×10^{0}	1×10^{4}
Bk-249 (a)	4×10^{1}	3×10^{-1}	1×10^{3}	1×10^{6}
Bromine (35)				
Br-76	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Br-77	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Br-82	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Carbon (6)				
C-11	1×10^{0}	6×10^{-1}	1×10^{1}	1×10^{6}
C-14	4×10^{1}	3×10^{0}	1×10^{4}	1×10^{7}
Calcium (20)				
Ca-41	Unlimited	Unlimited	1×10^{5}	1×10^{7}
Ca-45	4×10^{1}	1×10^{0}	1×10^{4}	1×10^{7}
Ca-47 (a)	3×10^{0}	3×10^{-1}	1×10^{1}	1×10^{6}
Cadmium (48)				
Cd-109	3×10^{1}	2×10^{0}	1×10^{4}	1×10^{6}
Cd-113m	4×10^{1}	5×10^{-1}	1×10^{3}	1×10^{6}
Cd-115 (a)	3×10^{0}	4×10^{-1}	1×10^{2}	1×10^{6}
Cd-115m	5×10^{-1}	5×10^{-1}	1×10^{3}	1×10^{6}
Cerium (58)				
Ce-139	7×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Ce-141	2×10^{1}	6×10^{-1}	1×10^{2}	1×10^{7}
Ce-143	9×10^{-1}	6×10^{-1}	1×10^{2}	1×10^{6}
Ce-144 (a)	2×10^{-1}	2×10^{-1}	1×10^{2} (b)	1×10^{5} (b)

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Californium (98)				
Cf-248	4×10^{1}	6×10^{-3}	1×10^{1}	1×10^{4}
Cf-249	3×10^{0}	8×10^{-4}	1×10^{0}	1×10^{3}
Cf-250	2×10^{1}	2×10^{-3}	1×10^{1}	1×10^{4}
Cf-251	7×10^{0}	7×10^{-4}	1×10^{0}	1×10^{3}
Cf-252	1×10^{-1}	3×10^{-3}	1×10^{1}	1×10^{4}
Cf-253 (a)	4×10^{1}	4×10^{-2}	1×10^{2}	1×10^{5}
Cf-254	1×10^{-3}	1×10^{-3}	1×10^{0}	1×10^{3}
Chlorine (17)				
Cl-36	1×10^{1}	6×10^{-1}	1×10^{4}	1×10^{6}
Cl-38	2×10^{-1}	2×10^{-1}	1×10^{1}	1×10^{5}
Curium (96)				
Cm-240	4×10^{1}	2×10^{-2}	1×10^{2}	1×10^{5}
Cm-241	2×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Cm-242	4×10^{1}	1×10^{-2}	1×10^{2}	1×10^{5}
Cm-243	9×10^{0}	1×10^{-3}	1×10^{0}	1×10^{4}
Cm-244	2×10^{1}	2×10^{-3}	1×10^{1}	1×10^{4}
Cm-245	9×10^{0}	9×10^{-4}	1×10^{0}	1×10^{3}
Cm-246	9×10^{0}	9×10^{-4}	1×10^{0}	1×10^{3}
Cm-247 (a)	3×10^{0}	1×10^{-3}	1×10^{0}	1×10^{4}
Cm-248	2×10^{-2}	3×10^{-4}	1×10^{0}	1×10^{3}
Cobalt (27)				
Co-55	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Co-56	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Co-57	1×10^{1}	1×10^{1}	1×10^{2}	1×10^{6}
Co-58	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Co-58m	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Co-60	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Chromium (24)				
Cr-51	3×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Caesium (55)				
Cs-129	4×10^{0}	4×10^{0}	1×10^{2}	1×10^{5}
Cs-131	3×10^{1}	3×10^{1}	1×10^{3}	1×10^{6}
Cs-132	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{5}
Cs-134	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{4}
Cs-134m	4×10^{1}	6×10^{-1}	1×10^{3}	1×10^{5}
Cs-135	4×10^{1}	1×10^{0}	1×10^{4}	1×10^{7}
Cs-136	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Cs-137 (a)	2×10^{0}	6×10^{-1}	1×10^{1} (b)	1×10^{4} (b)
Copper (29)				
Cu-64	6×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Cu-67	1×10^{1}	7×10^{-1}	1×10^{2}	1×10^{6}
Dysprosium (66)				
Dy-159	2×10^{1}	2×10^{1}	1×10^{3}	1×10^{7}
Dy-165	9×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Dy-166 (a)	9×10^{-1}	3×10^{-1}	1×10^{3}	1×10^{6}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Erbium (68)				
Er-169	4×10^{1}	1×10^{0}	1×10^{4}	1×10^{7}
Er-171	8×10^{-1}	5×10^{-1}	1×10^{2}	1×10^{6}
Europium (63)				
Eu-147	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Eu-148	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Eu-149	2×10^{1}	2×10^{1}	1×10^{2}	1×10^{7}
Eu-150(short lived)	2×10^{0}	7×10^{-1}	1×10^{3}	1×10^{6}
Eu-150(long lived)	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Eu-152	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Eu-152m	8×10^{-1}	8×10^{-1}	1×10^{2}	1×10^{6}
Eu-154	9×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Eu-155	2×10^{1}	3×10^{0}	1×10^{2}	1×10^{7}
Eu-156	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Fluorine (9)				
F-18	1×10^{0}	6×10^{-1}	1×10^{1}	1×10^{6}
Iron (26)				
Fe-52 (a)	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{6}
Fe-55	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{6}
Fe-59	9×10^{-1}	9×10^{-1}	1×10^{1}	1×10^{6}
Fe-60 (a)	4×10^{1}	2×10^{-1}	1×10^{2}	1×10^{5}
Gallium (31)				
Ga-67	7×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Ga-68	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Ga-72	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Gadolinium (64)				
Gd-146 (a)	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Gd-148	2×10^{1}	2×10^{-3}	1×10^{1}	1×10^{4}
Gd-153	1×10^{1}	9×10^{0}	1×10^{2}	1×10^{7}
Gd-159	3×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Germanium (32)				
Ge-68 (a)	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Ge-69	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Ge-71	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{8}
Ge-77	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Hafnium (72)				
Hf-172 (a)	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Hf-175	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Hf-181	2×10^{0}	5×10^{-1}	1×10^{1}	1×10^{6}
Hf-182	Unlimited	Unlimited	1×10^{2}	1×10^{6}
Mercury (80)				
Hg-194 (a)	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Hg-195m (a)	3×10^{0}	7×10^{-1}	1×10^{2}	1×10^{6}
Hg-197	2×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Hg-197m	1×10^{1}	4×10^{-1}	1×10^{2}	1×10^{6}
Hg-203	5×10^{0}	1×10^{0}	1×10^{2}	1×10^{5}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Holmium (67)				
Ho-166	4×10^{-1}	4×10^{-1}	1×10^{3}	1×10^{5}
Ho-166m	6×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Iodine (53)				
I-123	6×10^{0}	3×10^{0}	1×10^{2}	1×10^{7}
I-124	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
I-125	2×10^{1}	3×10^{0}	1×10^{3}	1×10^{6}
I-126	2×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
I-129	Unlimited	Unlimited	1×10^{2}	1×10^{5}
I-131	3×10^{0}	7×10^{-1}	1×10^{2}	1×10^{6}
I-132	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
I-133	7×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
I-134	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
I-135 (a)	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Indium (49)				
In-111	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
In-113m	4×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
In-114m (a)	1×10^{1}	5×10^{-1}	1×10^{2}	1×10^{6}
In-115m	7×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Iridium (77)				
Ir-189 (a)	1×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Ir-190	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Ir-192	1×10^{0}(c)	6×10^{-1}	1×10^{1}	1×10^{4}
Ir-193m	4×10^{1}	4×10^{0}	1×10^{4}	1×10^{7}
Ir-194	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
Potassium (19)				
K-40	9×10^{-1}	9×10^{-1}	1×10^{2}	1×10^{6}
K-42	2×10^{-1}	2×10^{-1}	1×10^{2}	1×10^{6}
K-43	7×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Krypton (36)				
Kr-79	4×10^{0}	2×10^{0}	1×10^{3}	1×10^{5}
Kr-81	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Kr-85	1×10^{1}	1×10^{1}	1×10^{5}	1×10^{4}
Kr-85m	8×10^{0}	3×10^{0}	1×10^{3}	1×10^{10}
Kr-87	2×10^{-1}	2×10^{-1}	1×10^{2}	1×10^{9}
Lanthanum (57)				
La-137	3×10^{1}	6×10^{0}	1×10^{3}	1×10^{7}
La-140	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Lutetium (71)				
Lu-172	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Lu-173	8×10^{0}	8×10^{0}	1×10^{2}	1×10^{7}
Lu-174	9×10^{0}	9×10^{0}	1×10^{2}	1×10^{7}
Lu-174m	2×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Lu-177	3×10^{1}	7×10^{-1}	1×10^{3}	1×10^{7}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Magnesium (12)				
Mg-28 (a)	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Manganese (25)				
Mn-52	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Mn-53	Unlimited	Unlimited	1×10^{4}	1×10^{9}
Mn-54	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Mn-56	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Molybdenum (42)				
Mo-93	4×10^{1}	2×10^{1}	1×10^{3}	1×10^{8}
Mo-99 (a)	1×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Nitrogen (7)				
N-13	9×10^{-1}	6×10^{-1}	1×10^{2}	1×10^{9}
Sodium (11)				
Na-22	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Na-24	2×10^{-1}	2×10^{-1}	1×10^{1}	1×10^{5}
Niobium (41)				
Nb-93m	4×10^{1}	3×10^{1}	1×10^{4}	1×10^{7}
Nb-94	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Nb-95	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Nb-97	9×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Neodymium (60)				
Nd-147	6×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Nd-149	6×10^{-1}	5×10^{-1}	1×10^{2}	1×10^{6}
Nickel (28)				
Ni-57	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Ni-59	Unlimited	Unlimited	1×10^{4}	1×10^{8}
Ni-63	4×10^{1}	3×10^{1}	1×10^{5}	1×10^{8}
Ni-65	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Neptunium (93)				
Np-235	4×10^{1}	4×10^{1}	1×10^{3}	1×10^{7}
Np-236(short-lived)	2×10^{1}	2×10^{0}	1×10^{3}	1×10^{7}
Np-236(long-lived)	9×10^{0}	2×10^{-2}	1×10^{2}	1×10^{5}
Np-237	2×10^{1}	2×10^{-3}	1×10^{0} (b)	1×10^{3} (b)
Np-239	7×10^{0}	4×10^{-1}	1×10^{2}	1×10^{7}
Osmium (76)				
Os-185	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Os-191	1×10^{1}	2×10^{0}	1×10^{2}	1×10^{7}
Os-191m	4×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Os-193	2×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Os-194 (a)	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
Phosphorus (15)				
P-32	5×10^{-1}	5×10^{-1}	1×10^{3}	1×10^{5}
P-33	4×10^{1}	1×10^{0}	1×10^{5}	1×10^{8}
Protactinium (91)				
Pa-230 (a)	2×10^{0}	7×10^{-2}	1×10^{1}	1×10^{6}
Pa-231	4×10^{0}	4×10^{-4}	1×10^{0}	1×10^{3}
Pa-233	5×10^{0}	7×10^{-1}	1×10^{2}	1×10^{7}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Lead (82)				
Pb-201	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Pb-202	4×10^{1}	2×10^{1}	1×10^{3}	1×10^{6}
Pb-203	4×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Pb-205	Unlimited	Unlimited	1×10^{4}	1×10^{7}
Pb-210 (a)	1×10^{0}	5×10^{-2}	1×10^{1} (b)	1×10^{4} (b)
Pb-212 (a)	7×10^{-1}	2×10^{-1}	1×10^{1} (b)	1×10^{5} (b)
Palladium (46)				
Pd-103 (a)	4×10^{1}	4×10^{1}	1×10^{3}	1×10^{8}
Pd-107	Unlimited	Unlimited	1×10^{5}	1×10^{8}
Pd-109	2×10^{0}	5×10^{-1}	1×10^{3}	1×10^{6}
Promethium (61)				
Pm-143	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Pm-144	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Pm-145	3×10^{1}	1×10^{1}	1×10^{3}	1×10^{7}
Pm-147	4×10^{1}	2×10^{0}	1×10^{4}	1×10^{7}
Pm-148m (a)	8×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Pm-149	2×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Pm-151	2×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Polonium (84)				
Po-210	4×10^{1}	2×10^{-2}	1×10^{1}	1×10^{4}
Praseodymium (59)				
Pr-142	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{5}
Pr-143	3×10^{0}	6×10^{-1}	1×10^{4}	1×10^{6}
Platinum (78)				
Pt-188 (a)	1×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Pt-191	4×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Pt-193	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Pt-193m	4×10^{1}	5×10^{-1}	1×10^{3}	1×10^{7}
Pt-195m	1×10^{1}	5×10^{-1}	1×10^{2}	1×10^{6}
Pt-197	2×10^{1}	6×10^{-1}	1×10^{3}	1×10^{6}
Pt-197m	1×10^{1}	6×10^{-1}	1×10^{2}	1×10^{6}
Plutonium (94)				
Pu-236	3×10^{1}	3×10^{-3}	1×10^{1}	1×10^{4}
Pu-237	2×10^{1}	2×10^{1}	1×10^{3}	1×10^{7}
Pu-238	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Pu-239	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Pu-240	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{3}
Pu-241 (a)	4×10^{1}	6×10^{-2}	1×10^{2}	1×10^{5}
Pu-242	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Pu-244 (a)	4×10^{-1}	1×10^{-3}	1×10^{0}	1×10^{4}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Radium (88)				
Ra-223 (a)	4×10^{-1}	7×10^{-3}	1×10^{2} (b)	1×10^{5} (b)
Ra-224 (a)	4×10^{-1}	2×10^{-2}	1×10^{1} (b)	1×10^{5} (b)
Ra-225 (a)	2×10^{-1}	4×10^{-3}	1×10^{2}	1×10^{5}
Ra-226 (a)	2×10^{-1}	3×10^{-3}	1×10^{1} (b)	1×10^{4} (b)
Ra-228 (a)	6×10^{-1}	2×10^{-2}	1×10^{1} (b)	1×10^{5} (b)
Rubidium (37)				
Rb-81	2×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Rb-83 (a)	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Rb-84	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Rb-86	5×10^{-1}	5×10^{-1}	1×10^{2}	1×10^{5}
Rb-87	Unlimited	Unlimited	1×10^{4}	1×10^{7}
Rb(nat)	Unlimited	Unlimited	1×10^{4}	1×10^{7}
Rhenium (75)				
Re-184	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Re-184m	3×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Re-186	2×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Re-187	Unlimited	Unlimited	1×10^{6}	1×10^{9}
Re-188	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{5}
Re-189 (a)	3×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Re(nat)	Unlimited	Unlimited	1×10^{6}	1×10^{9}
Rhodium (45)				
Rh-99	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Rh-101	4×10^{0}	3×10^{0}	1×10^{2}	1×10^{7}
Rh-102	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Rh-102m	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Rh-103m	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{8}
Rh-105	1×10^{1}	8×10^{-1}	1×10^{2}	1×10^{7}
Radon (86)				
Rn-222 (a)	3×10^{-1}	4×10^{-3}	1×10^{1} (b)	1×10^{8} (b)
Ruthenium (44)				
Ru-97	5×10^{0}	5×10^{0}	1×10^{2}	1×10^{7}
Ru-103 (a)	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Ru-105	1×10^{0}	6×10^{-1}	1×10^{1}	1×10^{6}
Ru-106 (a)	2×10^{-1}	2×10^{-1}	1×10^{2} (b)	1×10^{5} (b)
Sulphur (16)				
S-35	4×10^{1}	3×10^{0}	1×10^{5}	1×10^{8}
Antimony (51)				
Sb-122	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{4}
Sb-124	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Sb-125	2×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Sb-126	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Scandium (21)				
Sc-44	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Sc-46	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Sc-47	1×10^{1}	7×10^{-1}	1×10^{2}	1×10^{6}
Sc-48	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Selenium (34)				
Se-75	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Se-79	4×10^{1}	2×10^{0}	1×10^{4}	1×10^{7}
Silicon (14)				
Si-31	6×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Si-32	4×10^{1}	5×10^{-1}	1×10^{3}	1×10^{6}
Samarium (62)				
Sm-145	1×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Sm-147	Unlimited	Unlimited	1×10^{1}	1×10^{4}
Sm-151	4×10^{1}	1×10^{1}	1×10^{4}	1×10^{8}
Sm-153	9×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Tin (50)				
Sn-113 (a)	4×10^{0}	2×10^{0}	1×10^{3}	1×10^{7}
Sn-117m	7×10^{0}	4×10^{-1}	1×10^{2}	1×10^{6}
Sn-119m	4×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Sn-121m (a)	4×10^{1}	9×10^{-1}	1×10^{3}	1×10^{7}
Sn-123	8×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Sn-125	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{5}
Sn-126 (a)	6×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Strontium (38)				
Sr-82 (a)	2×10^{-1}	2×10^{-1}	1×10^{1}	1×10^{5}
Sr-83	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Sr-85	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Sr-85m	5×10^{0}	5×10^{0}	1×10^{2}	1×10^{7}
Sr-87m	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Sr-89	6×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Sr-90 (a)	3×10^{-1}	3×10^{-1}	1×10^{2} (b)	1×10^{4} (b)
Sr-91 (a)	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Sr-92 (a)	1×10^{0}	3×10^{-1}	1×10^{1}	1×10^{6}
Tritium (1)				
T(H-3)	4×10^{1}	4×10^{1}	1×10^{6}	1×10^{9}
Tantalum (73)				
Ta-178(long-lived)	1×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Ta-179	3×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Ta-182	9×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{4}
Terbium (65)				
Tb-149	8×10^{-1}	8×10^{-1}	1×10^{1}	1×10^{6}
Tb-157	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Tb-158	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Tb-160	1×10^{0}	6×10^{-1}	1×10^{1}	1×10^{6}
Tb-161	3×10^{1}	7×10^{-1}	1×10^{3}	1×10^{6}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Technetium (43)				
Tc-95m (a)	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Tc-96	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Tc-96m (a)	4×10^{-1}	4×10^{-1}	1×10^{3}	1×10^{7}
Tc-97	Unlimited	Unlimited	1×10^{3}	1×10^{8}
Tc-97m	4×10^{1}	1×10^{0}	1×10^{3}	1×10^{7}
Tc-98	8×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Tc-99	4×10^{1}	9×10^{-1}	1×10^{4}	1×10^{7}
Tc-99m	1×10^{1}	4×10^{0}	1×10^{2}	1×10^{7}
Tellurium (52)				
Te-121	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Te-121m	5×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Te-123m	8×10^{0}	1×10^{0}	1×10^{2}	1×10^{7}
Te-125m	2×10^{1}	9×10^{-1}	1×10^{3}	1×10^{7}
Te-127	2×10^{1}	7×10^{-1}	1×10^{3}	1×10^{6}
Te-127m (a)	2×10^{1}	5×10^{-1}	1×10^{3}	1×10^{7}
Te-129	7×10^{-1}	6×10^{-1}	1×10^{2}	1×10^{6}
Te-129m (a)	8×10^{-1}	4×10^{-1}	1×10^{3}	1×10^{6}
Te-131m (a)	7×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Te-132 (a)	5×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{7}
Thorium (90)				
Th-227	1×10^{1}	5×10^{-3}	1×10^{1}	1×10^{4}
Th-228 (a)	5×10^{-1}	1×10^{-3}	1×10^{0} (b)	1×10^{4} (b)
Th-229	5×10^{0}	5×10^{-4}	1×10^{0} (b)	1×10^{3} (b)
Th-230	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Th-231	4×10^{1}	2×10^{-2}	1×10^{3}	1×10^{7}
Th-232	Unlimited	Unlimited	1×10^{1}	1×10^{4}
Th-234 (a)	3×10^{-1}	3×10^{-1}	1×10^{3} (b)	1×10^{5} (b)
Th(nat)	Unlimited	Unlimited	1×10^{0} (b)	1×10^{3} (b)
Titanium (22)				
Ti-44 (a)	5×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Thallium (81)				
Tl-200	9×10^{-1}	9×10^{-1}	1×10^{1}	1×10^{6}
Tl-201	1×10^{1}	4×10^{0}	1×10^{2}	1×10^{6}
Tl-202	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Tl-204	1×10^{1}	7×10^{-1}	1×10^{4}	1×10^{4}
Thulium (69)				
Tm-167	7×10^{0}	8×10^{-1}	1×10^{2}	1×10^{6}
Tm-170	3×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Tm-171	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{8}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Uranium (92)				
U-230 (fast lung absorption)(a)(d)	4×10^1	1×10^{-1}	1×10^1 (b)	1×10^5 (b)
U-230 (medium lung absorption)(a)(e)	4×10^1	4×10^{-3}	1×10^1	1×10^4
U-230 (slow lung absorption) (a)(f)	3×10^1	3×10^{-3}	1×10^1	1×10^4
U-232 (fast lung absorption)(d)	4×10^1	1×10^{-2}	1×10^0 (b)	1×10^3 (b)
U-232 (medium lung absorption)(e)	4×10^1	7×10^{-3}	1×10^1	1×10^4
U-232 (slow lung absorption)(f)	1×10^1	1×10^{-3}	1×10^1	1×10^4
U-233 (fast lung absorption)(d)	4×10^1	9×10^{-2}	1×10^1	1×10^4
U-233 (medium lung absorption)(e)	4×10^1	2×10^{-2}	1×10^2	1×10^5
U-233 (slow lung absorption)(f)	4×10^1	6×10^{-3}	1×10^1	1×10^5
U-234 (fast lung absorption)(d)	4×10^1	9×10^{-2}	1×10^1	1×10^4
U-234 (medium lung absorption)(e)	4×10^1	2×10^{-2}	1×10^2	1×10^5
U-234 (slow lung absorption)(f)	4×10^1	6×10^{-3}	1×10^1	1×10^5
U-235 (all lung absorption types)(a),(d),(e),(f)	Unlimited	Unlimited	1×10^1 (b)	1×10^4 (b)
U-236 (fast lung absorption)(d)	Unlimited	Unlimited	1×10^1	1×10^4
U-236 (medium lung absorption)(e)	4×10^1	2×10^{-2}	1×10^2	1×10^5
U-236 (slow lung absorption)(f)	4×10^1	6×10^{-3}	1×10^1	1×10^4
U-238 (all lung absorption types)(d),(e),(f)	Unlimited	Unlimited	1×10^1 (b)	1×10^4 (b)
U (nat)	Unlimited	Unlimited	1×10^0 (b)	1×10^3 (b)
U (enriched to 20 % or less)(g)	Unlimited	Unlimited	1×10^0	1×10^3
U (dep)	Unlimited	Unlimited	1×10^0	1×10^3
Vanadium (23)				
V-48	4×10^{-1}	4×10^{-1}	1×10^1	1×10^5
V-49	4×10^1	4×10^1	1×10^4	1×10^7
Tungsten (74)				
W-178 (a)	9×10^0	5×10^0	1×10^1	1×10^6
W-181	3×10^1	3×10^1	1×10^3	1×10^7
W-185	4×10^1	8×10^{-1}	1×10^4	1×10^7
W-187	2×10^0	6×10^{-1}	1×10^2	1×10^6
W-188 (a)	4×10^{-1}	3×10^{-1}	1×10^2	1×10^5
Xenon (54)				
Xe-122 (a)	4×10^{-1}	4×10^{-1}	1×10^2	1×10^9
Xe-123	2×10^0	7×10^{-1}	1×10^2	1×10^9
Xe-127	4×10^0	2×10^0	1×10^3	1×10^5
Xe-131m	4×10^1	4×10^1	1×10^4	1×10^4
Xe-133	2×10^1	1×10^1	1×10^3	1×10^4
Xe-135	3×10^0	2×10^0	1×10^3	1×10^{10}

Radionuclide (atomic number)	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Yttrium (39)				
Y-87 (a)	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Y-88	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Y-90	3×10^{-1}	3×10^{-1}	1×10^{3}	1×10^{5}
Y-91	6×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Y-91m	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Y-92	2×10^{-1}	2×10^{-1}	1×10^{2}	1×10^{5}
Y-93	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
Ytterbium (70)				
Yb-169	4×10^{0}	1×10^{0}	1×10^{2}	1×10^{7}
Yb-175	3×10^{1}	9×10^{-1}	1×10^{3}	1×10^{7}
Zinc (30)				
Zn-65	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Zn-69	3×10^{0}	6×10^{-1}	1×10^{4}	1×10^{6}
Zn-69m (a)	3×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Zirconium (40)				
Zr-88	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Zr-93	Unlimited	Unlimited	1×10^{3} (b)	1×10^{7} (b)
Zr-95 (a)	2×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Zr-97 (a)	4×10^{-1}	4×10^{-1}	1×10^{1} (b)	1×10^{5} (b)

(a) A_1 and/or A_2 values for these parent radionuclides include contributions from their progeny with half-lives less than 10 days, as listed in the following:

Mg-28	Al-28
Ar-42	K-42
Ca-47	Sc-47
Ti-44	Sc-44
Fe-52	Mn-52m
Fe-60	Co-60m
Zn-69m	Zn-69
Ge-68	Ga-68
Rb-83	Kr-83m
Sr-82	Rb-82
Sr-90	Y-90
Sr-91	Y-91m
Sr-92	Y-92
Y-87	Sr-87m
Zr-95	Nb-95m
Zr-97	Nb-97m, Nb-97
Mo-99	Tc-99m
Tc-95m	Tc-95
Tc-96m	Tc-96
Ru-103	Rh-103m
Ru-106	Rh-106
Pd-103	Rh-103m
Ag-108m	Ag-108
Ag-110m	Ag-110
Cd-115	In-115m
In-114m	In-114
Sn-113	In-113m
Sn-121m	Sn-121
Sn-126	Sb-126m
Te-118	Sb-118
Te-127m	Te-127
Te-129m	Te-129
Te-131m	Te-131
Te-132	I-132
I-135	Xe-135m
Xe-122	I-122
Cs-137	Ba-137m
Ba-131	Cs-131
Ba-140	La-140
Ce-144	Pr-144m, Pr-144
Pm-148m	Pm-148
Gd-146	Eu-146
Dy-166	Ho-166
Hf-172	Lu-172
W-178	Ta-178
W-188	Re-188
Re-189	Os-189m
Os-194	Ir-194
Ir-189	Os-189m
Pt-188	Ir-188
Hg-194	Au-194
Hg-195m	Hg-195
Pb-210	Bi-210
Pb-212	Bi-212, Tl-208, Po-212

Bi-210m	Tl-206
Bi-212	Tl-208, Po-212
At-211	Po-211
Rn-222	Po-218, Pb-214, At-218, Bi-214, Po-214
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Po-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
Ra-225	Ac-225, Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
Ra-226	Rn-222, Po-218, Pb-214, At-218, Bi-214, Po-214
Ra-228	Ac-228
Ac-225	Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
Ac-227	Fr-223
Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
Th-234	Pa-234m, Pa-234
Pa-230	Ac-226, Th-226, Fr-222, Ra-222, Rn-218, Po-214
U-230	Th-226, Ra-222, Rn-218, Po-214
U-235	Th-231
Pu-241	U-237
Pu-244	U-240, Np-240m
Am-242m	Am-242, Np-238
Am-243	Np-239
Cm-247	Pu-243
Bk-249	Am-245
Cf-253	Cm-249;

(b) Parent nuclides and their progeny included in secular equilibrium are listed in the following (the activity to be taken into account is that of the parent nuclide only):

Sr-90	Y-90
Zr-93	Nb-93m
Zr-97	Nb-97
Ru-106	Rh-106
Ag-108m	Ag-108
Cs-137	Ba-137m
Ce-144	Pr-144
Ba-140	La-140
Bi-212	Tl-208 (0.36), Po-212 (0.64)
Pb-210	Bi-210, Po-210
Pb-212	Bi-212, Tl-208 (0.36), Po-212 (0.64)
Rn-222	Po-218, Pb-214, Bi-214, Po-214
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Ra-228	Ac-228
Th-228	Ra-224, Rn-220, Po-216, Pb212, Bi-212, Tl208 (0.36), Po-212 (0.64)
Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
Th-nat[1]	Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-234	Pa-234m
U-230	Th-226, Ra-222, Rn-218, Po-214
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-235	Th-231
U-238	Th-234, Pa-234m

[1] *In the case of Th-natural, the parent nuclide is Th-232, in the case of U-natural the parent nuclide is U-238.*

U-nat[1]	Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Np-237	Pa-233
Am-242m	Am-242
Am-243	Np-239;

(c) The quantity may be determined from a measurement of the rate of decay or a measurement of the dose rate at a prescribed distance from the source;

(d) These values apply only to compounds of uranium that take the chemical form of UF_6, UO_2F_2 and $UO_2(NO_3)_2$ in both normal and accident conditions of transport;

(e) These values apply only to compounds of uranium that take the chemical form of UO_3, UF_4, UCl_4 and hexavalent compounds in both normal and accident conditions of transport;

(f) These values apply to all compounds of uranium other than those specified in (d) and (e) above;

(g) These values apply to unirradiated uranium only.

2.7.2.2.2 For individual radionuclides:

(a) Which are not listed in Table 2.7.2.2.1 the determination of the basic radionuclide values referred to in 2.7.2.2.1 shall require multilateral approval. For these radionuclides, activity concentration limits for exempt material and activity limits for exempt consignments shall be calculated in accordance with the principles established in "Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards", IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014). It is permissible to use an A_2 value calculated using a dose coefficient for the appropriate lung absorption type as recommended by the International Commission on Radiological Protection, if the chemical forms of each radionuclide under both normal and accident conditions of transport are taken into consideration. Alternatively, the radionuclide values in Table 2.7.2.2.2 may be used without obtaining competent authority approval;

(b) In instruments or articles in which the radioactive material is enclosed or is included as a component part of the instrument or other manufactured article and which meet 2.7.2.4.1.3 (c), alternative basic radionuclide values to those in Table 2.7.2.2.1 for the activity limit for an exempt consignment are permitted and shall require multilateral approval. Such alternative activity limits for an exempt consignment shall be calculated in accordance with the principles set out in GSR Part 3.

Table 2.7.2.2.2: Basic radionuclide values for unknown radionuclides or mixtures

Radioactive contents	A_1 (TBq)	A_2 (TBq)	Activity concentration limit for exempt material (Bq/g)	Activity limit for exempt consignments (Bq)
Only beta or gamma emitting nuclides are known to be present	0.1	0.02	1×10^{1}	1×10^{4}
Alpha emitting nuclides but no neutron emitters are known to be present	0.2	9×10^{-5}	1×10^{-1}	1×10^{3}
Neutron emitting nuclides are known to be present or no relevant data are available	0.001	9×10^{-5}	1×10^{-1}	1×10^{3}

2.7.2.2.3 In the calculations of A_1 and A_2 for a radionuclide not in Table 2.7.2.2.1, a single radioactive decay chain in which the radionuclides are present in their naturally occurring proportions, and in which no progeny nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide, shall be considered as a single radionuclide; and the activity to be taken into account and the A_1 or A_2 value to be applied shall be those corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any progeny nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and such progeny nuclides shall be considered as mixtures of different nuclides.

2.7.2.2.4 For mixtures of radionuclides, the basic radionuclide values referred to in 2.7.2.2.1 may be determined as follows:

$$X_m = \frac{1}{\Sigma_i \frac{f(i)}{X(i)}}$$

where,

f(i) is the fraction of activity or activity concentration of radionuclide i in the mixture;

X(i) is the appropriate value of A_1 or A_2, or the activity concentration limit for exempt material or the activity limit for an exempt consignment as appropriate for the radionuclide i; and

X_m is the derived value of A_1 or A_2, or the activity concentration limit for exempt material or the activity limit for an exempt consignment in the case of a mixture.

2.7.2.2.5 When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest radionuclide value, as appropriate, for the radionuclides in each group may be used in applying the formulas in 2.7.2.2.4 and 2.7.2.4.4. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest radionuclide values for the alpha emitters or beta/gamma emitters, respectively.

2.7.2.2.6 For individual radionuclides or for mixtures of radionuclides for which relevant data are not available, the values shown in Table 2.7.2.2.2 shall be used.

2.7.2.3 *Determination of other material characteristics*

2.7.2.3.1 *Low specific activity (LSA) material*

2.7.2.3.1.1 *Reserved*.

2.7.2.3.1.2 LSA material shall be in one of three groups:

(a) LSA-I

(i) uranium and thorium ores and concentrates of such ores, and other ores containing naturally occurring radionuclides;

(ii) Natural uranium, depleted uranium, natural thorium or their compounds or mixtures, that are unirradiated and in solid or liquid form;

(iii) radioactive material for which the A_2 value is unlimited. Fissile material may be included only if excepted under 2.7.2.3.5;

(iv) other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the values for activity concentration specified in 2.7.2.2.1 to 2.7.2.2.6. Fissile material may be included only if excepted under 2.7.2.3.5;

(b) LSA-II

(i) water with tritium concentration up to 0.8 TBq/l;

(ii) other material in which the activity is distributed throughout and the estimated average specific activity does not exceed 10^{-4} A_2/g for solids and gases, and 10^{-5} A_2/g for liquids;

(c) LSA-III - Solids (e.g. consolidated wastes, activated materials), excluding powders, in which:

(i) the radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen and ceramic);

(ii) the estimated average specific activity of the solid, excluding any shielding material, does not exceed 2×10^{-3} A_2/g.

2.7.2.3.1.3 to 2.7.2.3.1.5 *Deleted.*

2.7.2.3.2 *Surface contaminated object (SCO)*

SCO is classified in one of three groups:

(a) SCO-I: A solid object on which:

(i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 0.4 Bq/cm^2 for all other alpha emitters;

(ii) the fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm^2 for all other alpha emitters; and

(iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm^2 for all other alpha emitters;

(b) SCO-II: A solid object on which either the fixed or non-fixed contamination on the surface exceeds the applicable limits specified for SCO-I in (a) above and on which:

(i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 400 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 40 Bq/cm^2 for all other alpha emitters;

(ii) the fixed contamination on the accessible surface, averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm^2 for all other alpha emitters; and

(iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm^2 for all other alpha emitters.

(c) SCO-III: A large solid object which, because of its size, cannot be transported in a type of package described in these Regulations and for which:

(i) All openings are sealed to prevent release of radioactive material during conditions defined in 4.1.9.2.4 (e);

(ii) The inside of the object is as dry as practicable;

(iii) The non-fixed contamination on the external surfaces does not exceed the limits specified in 4.1.9.1.2.

(iv) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 does not exceed 8 × 105 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8 × 104 Bq/cm^2 for all other alpha emitters.

2.7.2.3.3 *Special form radioactive material*

2.7.2.3.3.1 Special form radioactive material shall have at least one dimension not less than 5 mm. When a sealed capsule constitutes part of the special form radioactive material, the capsule shall be so manufactured that it can be opened only by destroying it. The design for special form radioactive material requires unilateral approval.

2.7.2.3.3.2 Special form radioactive material shall be of such a nature or shall be so designed that if it is subjected to the tests specified in 2.7.2.3.3.4 to 2.7.2.3.3.8, it shall meet the following requirements:

(a) It would not break or shatter under the impact, percussion and bending tests 2.7.2.3.3.5 (a), (b), (c) and 2.7.2.3.3.6 (a) as applicable;

(b) It would not melt or disperse in the applicable heat test 2.7.2.3.3.5 (d) or 2.7.2.3.3.6 (b) as applicable; and

(c) The activity in the water from the leaching tests specified in 2.7.2.3.3.7 and 2.7.2.3.3.8 would not exceed 2 kBq; or alternatively for sealed sources, the leakage rate for the volumetric leakage assessment test specified in ISO 9978:1992 “Radiation Protection – Sealed Radioactive Sources – Leakage Test Methods”, would not exceed the applicable acceptance threshold acceptable to the competent authority.

2.7.2.3.3.3 Demonstration of compliance with the performance standards in 2.7.2.3.3.2 shall be in accordance with 6.4.12.1 and 6.4.12.2.

2.7.2.3.3.4 Specimens that comprise or simulate special form radioactive material shall be subjected to the impact test, the percussion test, the bending test, and the heat test specified in 2.7.2.3.3.5 or alternative tests as authorized in 2.7.2.3.3.6. A different specimen may be used for each of the tests. Following each test, a leaching assessment or volumetric leakage test shall be performed on the specimen by a method no less sensitive than the methods given in 2.7.2.3.3.7 for indispersible solid material or 2.7.2.3.3.8 for encapsulated material.

2.7.2.3.3.5 The relevant test methods are:

(a) Impact test: The specimen shall drop onto the target from a height of 9 m. The target shall be as defined in 6.4.14;

(b) Percussion test: The specimen shall be placed on a sheet of lead which is supported by a smooth solid surface and struck by the flat face of a mild steel bar so as to cause an impact equivalent to that resulting from a free drop of 1.4 kg from a height of 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm. The lead, of hardness number 3.5 to 4.5 on the Vickers scale and not more than 25 mm thick, shall cover an area greater than that covered by the specimen. A fresh surface of lead shall be used for each impact. The bar shall strike the specimen so as to cause maximum damage;

(c) Bending test: The test shall apply only to long, slender sources with both a minimum length of 10 cm and a length to minimum width ratio of not less than 10. The specimen shall be rigidly clamped in a horizontal position so that one half of its length protrudes from the face of the clamp. The orientation of the specimen shall be such that the specimen will suffer maximum damage when its free end is struck by the flat face of a steel bar. The bar shall strike the specimen so as to cause an impact equivalent to that resulting from a free vertical drop of 1.4 kg from a height of 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm;

(d) Heat test: The specimen shall be heated in air to a temperature of 800 °C and held at that temperature for a period of 10 minutes and shall then be allowed to cool.

2.7.2.3.3.6 Specimens that comprise or simulate radioactive material enclosed in a sealed capsule may be excepted from:

(a) The tests prescribed in 2.7.2.3.3.5 (a) and (b) provided that the specimens are alternatively subjected to the impact test prescribed in ISO 2919:2012: “Radiation Protection - Sealed Radioactive Sources - General requirements and classification”:

(i) The Class 4 impact test if the mass of the special form radioactive material is less than 200 g;

(ii) The Class 5 impact test if the mass of the special form radioactive material is equal to or more than 200 g but is less than 500 g;

(b) The test prescribed in 2.7.2.3.3.5 (d) provided they are alternatively subjected to the Class 6 temperature test specified in ISO 2919:2012 “Radiation protection – Sealed radioactive sources – General requirements and classification”.

2.7.2.3.3.7 For specimens which comprise or simulate indispersible solid material, a leaching assessment shall be performed as follows:

(a) The specimen shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7 day test period the free volume of the unabsorbed and unreacted water remaining shall be at least 10 % of the volume of the solid test sample itself. The water shall have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20 °C;

(b) The water and the specimen shall then be heated to a temperature of (50 ± 5) °C and maintained at this temperature for 4 hours;

(c) The activity of the water shall then be determined;

(d) The specimen shall then be kept for at least 7 days in still air at not less than 30 °C and relative humidity not less than 90 %;

(e) The specimen shall then be immersed in water of the same specification as in (a) above and the water and the specimen heated to (50 ± 5) °C and maintained at this temperature for 4 hours;

(f) The activity of the water shall then be determined.

2.7.2.3.3.8 For specimens which comprise or simulate radioactive material enclosed in a sealed capsule, either a leaching assessment or a volumetric leakage assessment shall be performed as follows:

(a) The leaching assessment shall consist of the following steps:

(i) the specimen shall be immersed in water at ambient temperature. The water shall have an initial pH of 6-8 with a maximum conductivity of 1 mS/m at 20 °C;

(ii) the water and specimen shall then be heated to a temperature of (50 ± 5) °C and maintained at this temperature for 4 hours;

(iii) the activity of the water shall then be determined;

(iv) the specimen shall then be kept for at least 7 days in still air at not less than 30 °C and relative humidity of not less than 90 %;

(v) the process in (i), (ii) and (iii) shall be repeated;

(b) The alternative volumetric leakage assessment shall comprise any of the tests prescribed in ISO 9978:1992 “Radiation Protection – Sealed radioactive sources – Leakage test methods”, provided that they are acceptable to the competent authority.

2.7.2.3.4 *Low dispersible radioactive material*

2.7.2.3.4.1 The design for low dispersible radioactive material shall require multilateral approval. Low dispersible radioactive material shall be such that the total amount of this radioactive material in a package, taking into account the provisions of 6.4.8.14, shall meet the following requirements:

(a) The dose rate at 3 m from the unshielded radioactive material does not exceed 10 mSv/h;

(b) If subjected to the tests specified in 6.4.20.3 and 6.4.20.4, the airborne release in gaseous and particulate forms of up to 100 μm aerodynamic equivalent diameter would not exceed 100 A_2. A separate specimen may be used for each test; and

(c) If subjected to the test specified in 2.7.2.3.4.3 the activity in the water would not exceed 100 A_2. In the application of this test, the damaging effects of the tests specified in (b) above shall be taken into account.

2.7.2.3.4.2 Low dispersible material shall be tested as follows:

A specimen that comprises or simulates low dispersible radioactive material shall be subjected to the enhanced thermal test specified in 6.4.20.3 and the impact test specified in 6.4.20.4. A different specimen may be used for each of the tests. Following each test, the specimen shall be subjected to the leach test specified in 2.7.2.3.1.4. After each test it shall be determined if the applicable requirements of 2.7.2.3.4.1 have been met.

2.7.2.3.4.3 A solid material sample representing the entire contents of the package shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7-day test period the free volume of the unabsorbed and unreacted water remaining shall be at least 10 % of the volume of the solid test sample itself. The water shall have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20 °C. The total activity of the free volume of water shall be measured following the 7-day immersion of the test sample.

2.7.2.3.4.4 Demonstration of compliance with the performance standards in 2.7.2.3.4.1, 2.7.2.3.4.2 and 2.7.2.3.4.3 shall be in accordance with 6.4.12.1 and 6.4.12.2.

2.7.2.3.5 *Fissile material*

Fissile material and packages containing fissile material shall be classified under the relevant entry as "FISSILE" in accordance with Table 2.7.2.1.1 unless excepted by one of the provisions of sub-paragraphs (a) to (f) below and transported subject to the requirements of 7.1.8.4.3. All provisions apply only to material in packages that meets the requirements of 6.4.7.2 unless unpackaged material is specifically allowed in the provision.

(a) Uranium enriched in uranium-235 to a maximum of 1 % by mass, and with a total plutonium and uranium-233 content not exceeding 1 % of the mass of uranium-235, provided that the fissile nuclides are distributed essentially homogeneously throughout the material. In addition, if uranium-235 is present in metallic, oxide or carbide forms, it shall not form a lattice arrangement;

(b) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 % by mass, with a total plutonium and uranium-233 content not exceeding 0.002 % of the mass of uranium, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2;

(c) Uranium with a maximum uranium enrichment of 5 % by mass uranium-235 provided:

(i) there is no more than 3.5 g of uranium-235 per package;

(ii) the total plutonium and uranium-233 content does not exceed 1 % of the mass of uranium-235 per package;

(iii) Transport of the package is subject to the consignment limit provided in 7.1.8.4.3 (c);

(d) Fissile nuclides with a total mass not greater than 2.0 g per package provided the package is transported subject to the consignment limit provided in 7.1.8.4.3 (d);

(e) Fissile nuclides with a total mass not greater than 45 g either packaged or unpackaged subject to the requirements of 7.1.8.4.3 (e);

(f) A fissile material that meets the requirements of 7.1.8.4.3 (b), 2.7.2.3.6 and 5.1.5.2.1.

2.7.2.3.6 Fissile material excepted from classification as "FISSILE" under 2.7.2.3.5 (f) shall be subcritical without the need for accumulation control under the following conditions:

(a) The conditions of 6.4.11.1 (a);

(b) The conditions consistent with the assessment provisions stated in 6.4.11.12 (b) and 6.4.11.13 (b) for packages;

(c) The conditions specified in 6.4.11.11 (a), if transported by air.

2.7.2.4 ***Classification of packages or unpacked material***

The quantity of radioactive material in a package shall not exceed the relevant limits for the package type as specified below.

2.7.2.4.1 *Classification as excepted package*

2.7.2.4.1.1 A package may be classified as an excepted package if it meets one of the following conditions:

(a) It is an empty package having contained radioactive material;

(b) It contains instruments or articles not exceeding the activity limits specified in columns (2) and (3) of Table 2.7.2.4.1.2;

(c) It contains articles manufactured of natural uranium, depleted uranium or natural thorium;

(d) It contains radioactive material not exceeding the activity limits specified in column (4) of Table 2.7.2.4.1.2; or

(e) It contains less than 0.1 kg of uranium hexafluoride not exceeding the activity limits specified in column (4) of Table 2.7.2.4.1.2.

2.7.2.4.1.2 A package containing radioactive material may be classified as an excepted package provided that the dose rate at any point on its external surface does not exceed 5 μSv/h.

Table 2.7.2.4.1.2: Activity limits for excepted packages

Physical state of contents	Instruments or article		Materials
	Item limits [a]	Package limits [a]	Package limits [a]
(1)	(2)	(3)	(4)
Solids			
special form	10^{-2} A_1	A_1	10^{-3} A_1
other form	10^{-2} A_2	A_2	10^{-3} A_2
Liquids	10^{-3} A_2	10^{-1} A_2	10^{-4} A_2
Gases			
tritium	2×10^{-2} A_2	2×10^{-1} A_2	2×10^{-2} A_2
special form	10^{-3} A_1	10^{-2} A_1	10^{-3} A_1
other forms	10^{-3} A_2	10^{-2} A_2	10^{-3} A_2

[a] *For mixtures of radionuclides, see 2.7.2.2.4 to 2.7.2.2.6.*

2.7.2.4.1.3 Radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article may be classified under UN 2911 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - INSTRUMENTS or ARTICLES provided that:

(a) The dose rate at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1 mSv/h; and

(b) Each instrument or manufactured article bears the mark “RADIOACTIVE” on its external surface except for the following:

(i) radioluminescent time-pieces or devices;

(ii) consumer products that either have received regulatory approval in accordance with 1.5.1.4 (e) or do not individually exceed the activity limit for an exempt

consignment in Table 2.7.2.2.1 (column 5), provided such products are transported in a package that bears the mark "RADIOACTIVE" on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; and

(iii) Other instruments or articles too small to bear the mark "RADIOACTIVE", provided that they are transported in a package that bears the mark "RADIOACTIVE" on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package;

(c) The active material is completely enclosed by non-active components (a device performing the sole function of containing radioactive material shall not be considered to be an instrument or manufactured article);

(d) The limits specified in columns 2 and 3 of Table 2.7.2.4.1.2 are met for each individual item and each package, respectively;

(e) Reserved;

(f) If the package contains fissile material, one of the provisions of 2.7.2.3.5 (a) to (f) applies.

2.7.2.4.1.4 Radioactive material in forms other than as specified in 2.7.2.4.1.3 and with an activity not exceeding the limits specified in column 4 of Table 2.7.2.4.1.2, may be classified under UN 2910 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL provided that:

(a) The package retains its radioactive contents under routine conditions of transport;

(b) The package bears the mark "RADIOACTIVE" on either:

(i) An internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; or

(ii) The outside of the package, where it is impractical to mark an internal surface; and

(c) If the package contains fissile material, one of the provisions of 2.7.2.3.5 (a) to (f) applies.

2.7.2.4.1.5 Uranium hexafluoride not exceeding the limits specified in Column 4 of Table 2.7.2.4.1.2 may be classified under UN 3507 URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile-excepted provided that:

(a) The mass of uranium hexafluoride in the package is less than 0.1 kg;

(b) The conditions of 2.7.2.4.5.1 and 2.7.2.4.1.4 (a) and (b) are met.

2.7.2.4.1.6 Articles manufactured of natural uranium, depleted uranium or natural thorium and articles in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be classified under UN 2909 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM, provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

2.7.2.4.1.7 An empty packaging which had previously contained radioactive material may be classified under UN 2908 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - EMPTY PACKAGING, provided that:

(a) It is in a well-maintained condition and securely closed;

(b) The outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material;

(c) The level of internal non-fixed contamination, when averaged over any 300 cm^2, does not exceed:

(i) 400 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters; and

(ii) 40 Bq/cm^2 for all other alpha emitters;

(d) Any labels which may have been displayed on it in conformity with 5.2.2.1.12.1 are no longer visible; and

(e) If the packaging has contained fissile material, one of the provisions of 2.7.2.3.5 (a) to (f) or one of the provisions for exclusion in 2.7.1.3 applies.

2.7.2.4.2 *Classification as Low specific activity (LSA) material*

Radioactive material may only be classified as LSA material if the definition of LSA in 2.7.1.3 and the conditions of 2.7.2.3.1, 4.1.9.2 and 7.1.8.2 are met.

2.7.2.4.3 *Classification as Surface contaminated object (SCO)*

Radioactive material may be classified as SCO if the definition of SCO in 2.7.1.3 and the conditions of 2.7.2.3.2, 4.1.9.2 and 7.1.8.2 are met.

2.7.2.4.4 *Classification as Type A package*

Packages containing radioactive material may be classified as Type A packages provided that the following conditions are met:

Type A packages shall not contain activities greater than either of the following:

(a) For special form radioactive material - A_1;

(b) For all other radioactive material - A_2.

For mixtures of radionuclides whose identities and respective activities are known, the following condition shall apply to the radioactive contents of a Type A package:

$$\Sigma_i \frac{B(i)}{A_1(i)} + \Sigma_j \frac{C(j)}{A_2(j)} \leq 1$$

where B(i) is the activity of radionuclide i as special form radioactive material;

$A_1(i)$ is the A_1 value for radionuclide i;

C (j) is the activity of radionuclide j as other than special form radioactive material;

A_2 (j) is the A_2 value for radionuclide j.

2.7.2.4.5 *Classification of Uranium hexafluoride*

2.7.2.4.5.1 Uranium hexafluoride shall only be assigned to:

(a) UN No. 2977, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE;

(b) UN No. 2978, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted; or

(c) UN No. 3507, URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE less than 0.1 kg per package, non-fissile or fissile-excepted.

2.7.2.4.5.2 The contents of a package containing uranium hexafluoride shall comply with the following requirements:

(a) For UN Nos. 2977 and 2978, the mass of uranium hexafluoride shall not be different from that allowed for the package design, and for UN 3507, the mass of uranium hexafluoride shall be less than 0.1 kg;

(b) The mass of uranium hexafluoride shall not be greater than a value that would lead to an ullage smaller than 5 % at the maximum temperature of the package as specified for the plant systems where the package shall be used; and

(c) The uranium hexafluoride shall be in solid form and the internal pressure shall not be above atmospheric pressure when presented for transport.

2.7.2.4.6 *Classification as Type B(U), Type B(M) or Type C packages*

2.7.2.4.6.1 Packages not otherwise classified in 2.7.2.4 (2.7.2.4.1 to 2.7.2.4.5) shall be classified in accordance with the competent authority certificate of approval for the package issued by the country of origin of design.

2.7.2.4.6.2 The contents of a Type B(U), Type B(M) or Type C package shall be as specified in the certificate of approval.

2.7.2.4.6.3 and 2.7.2.4.6.4 *Deleted.*

2.7.2.5 *Special arrangements*

Radioactive material shall be classified as transported under special arrangement when it is intended to be transported in accordance with 1.5.4.

CHAPTER 2.8

CLASS 8 - CORROSIVE SUBSTANCES

2.8.1 Definition and general provisions

2.8.1.1 *Corrosive substances* are substances which, by chemical action, will cause irreversible damage to the skin, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport.

2.8.1.2 For substances and mixtures that are corrosive to skin, general classification provisions are provided in section 2.8.2. Skin corrosion refers to the production of irreversible damage to the skin, namely, visible necrosis through the epidermis and into the dermis occurring after exposure to a substance or mixture.

2.8.1.3 Liquids and solids which may become liquid during transport, which are judged not to be skin corrosive shall still be considered for their potential to cause corrosion to certain metal surfaces in accordance with the criteria in 2.8.3.3 (c) (ii).

2.8.2 General classification provisions

2.8.2.1 Substances and mixtures of Class 8 are divided among the three packing groups according to their degree of danger in transport:

(a) Packing group I: very dangerous substances and mixtures;

(b) Packing group II: substances and mixtures presenting medium danger;

(c) Packing group III: substances and mixtures that present minor danger.

2.8.2.2 Allocation of substances listed in the Dangerous Goods List in Chapter 3.2 to the packing groups in Class 8 has been made on the basis of experience taking into account such additional factors as inhalation risk (see 2.8.2.4) and reactivity with water (including the formation of dangerous decomposition products).

2.8.2.3 New substances and mixtures can be assigned to packing groups on the basis of the length of time of contact necessary to produce irreversible damage of intact skin tissue in accordance with the criteria in 2.8.3. Alternatively, for mixtures, the criteria in 2.8.4 can be used.

2.8.2.4 A substance or mixture meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC_{50}) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to Class 8 (see Note under 2.6.2.2.4.1).

2.8.3 Packing group assignment for substances and mixtures

2.8.3.1 Existing human and animal data including information from single or repeated exposure shall be the first line of evaluation, as they give information directly relevant to effects on the skin.

2.8.3.2 In assigning the packing group in accordance with 2.8.2.3, account shall be taken of human experience in instances of accidental exposure. In the absence of human experience, classification shall be based on data obtained from experiments in accordance with OECD Test Guidelines Nos. 404[1], 435[2], 431[3] or

[1] *OECD Guideline for the testing of chemicals No. 404 "Acute Dermal Irritation/Corrosion" 2015*

[2] *OECD Guideline for the testing of chemicals No. 435 "In Vitro Membrane Barrier Test Method for Skin Corrosion" 2015*

[3] *OECD Guideline for the testing of chemicals No. 431 "In vitro skin corrosion: reconstructed human epidermis (RHE) test method" 2016*

430[4]. A substance or mixture which is determined not to be corrosive in accordance with one of these or non-classified in accordance with OECD Test Guideline No. 439[5] may be considered not to be corrosive to skin for the purposes of these Regulations without further testing. If the test results indicate that the substance or mixture is corrosive and not assigned to packing group I, but the test method does not allow discrimination between packing groups II and III, it shall be considered to be packing group II. If the test results indicate that the substance or mixture is corrosive, but the test method does not allow discrimination between packing groups, it shall be assigned to packing group I if no other test results indicate a different packing group.

2.8.3.3 Packing groups are assigned to corrosive substances in accordance with the following criteria (see table 2.8.3.4):

(a) Packing group I is assigned to substances that cause irreversible damage of intact skin tissue within an observation period up to 60 minutes starting after the exposure time of three minutes or less;

(b) Packing group II is assigned to substances that cause irreversible damage of intact skin tissue within an observation period up to 14 days starting after the exposure time of more than three minutes but not more than 60 minutes;

(c) Packing group III is assigned to substances that:

(i) Cause irreversible damage of intact skin tissue within an observation period up to 14 days starting after the exposure time of more than 60 minutes but not more than 4 hours; or

(ii) Are judged not to cause irreversible damage of intact skin tissue but which exhibit a corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55 °C when tested on both materials. For the purposes of testing steel, type S235JR+CR (1.0037 resp. St 37-2), S275J2G3+CR (1.0144 resp. St 44-3), ISO 3574, Unified Numbering System (UNS) G10200 or SAE 1020, and for testing aluminium, non-clad, types 7075–T6 or AZ5GU-T6 shall be used. An acceptable test is prescribed in the Manual of Tests and Criteria, Part III, Section 37.

NOTE: *Where an initial test on either steel or aluminium indicates the substance being tested is corrosive the follow up test on the other metal is not required.*

Table 2.8.3.4: Table summarizing the criteria in 2.8.3.3

Packing Group	Exposure Time	Observation Period	Effect
I	≤ 3 min	≤ 60 min	Irreversible damage of intact skin
II	> 3 min ≤ 1 h	≤ 14 d	Irreversible damage of intact skin
III	> 1 h ≤ 4 h	≤ 14 d	Irreversible damage of intact skin
III	-	-	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55 ºC when tested on both materials

[4] *OECD Guideline for the testing of chemicals No. 430 "In Vitro Skin Corrosion: Transcutaneous Electrical Resistance Test Method (TER)" 2015*

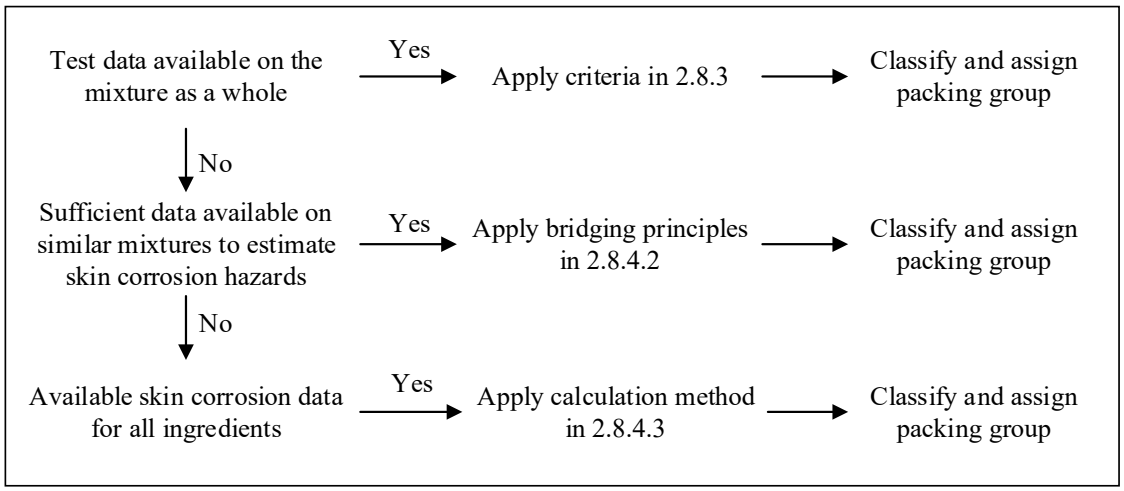
[5] *OECD Guideline for the testing of chemicals No. 439 "In Vitro Skin Irritation: Reconstructed Human Epidermis Test Method" 2015*

2.8.4 Alternative packing group assignment methods for mixtures: Step-wise approach

2.8.4.1 *General provisions*

2.8.4.1.1 For mixtures it is necessary to obtain or derive information that allows the criteria to be applied to the mixture for the purpose of classification and assignment of packing groups. The approach to classification and assignment of packing groups is tiered, and is dependent upon the amount of information available for the mixture itself, for similar mixtures and/or for its ingredients. The flow chart of Figure 2.8.4.1 below outlines the process to be followed:

Figure 2.8.4.1: Step-wise approach to classify and assign packing group of corrosive mixtures



2.8.4.2 *Bridging principles*

2.8.4.2.1 Where a mixture has not been tested to determine its skin corrosion potential, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately classify and assign a packing group for the mixture, these data will be used in accordance with the following bridging principles. This ensures that the classification process uses the available data to the greatest extent possible in characterizing the hazards of the mixture.

(a) **Dilution:** If a tested mixture is diluted with a diluent which does not meet the criteria for Class 8 and does not affect the packing group of other ingredients, then the new diluted mixture may be assigned to the same packing group as the original tested mixture.

NOTE: *in certain cases, diluting a mixture or substance may lead to an increase in the corrosive properties. If this is the case, this bridging principle cannot be used.*

(b) **Batching:** The skin corrosion potential of a tested production batch of a mixture can be assumed to be substantially equivalent to that of another untested production batch of the same commercial product when produced by or under the control of the same manufacturer, unless there is reason to believe there is significant variation such that the skin corrosion potential of the untested batch has changed. If the latter occurs, a new classification is necessary.

(c) **Concentration of mixtures of packing group I:** If a tested mixture meeting the criteria for inclusion in packing group I is concentrated, the more concentrated untested mixture may be assigned to packing group I without additional testing.

(d) **Interpolation within one packing group:** For three mixtures (A, B and C) with identical ingredients, where mixtures A and B have been tested and are in the same skin

corrosion packing group, and where untested mixture C has the same Class 8 ingredients as mixtures A and B but has concentrations of Class 8 ingredients intermediate to the concentrations in mixtures A and B, then mixture C is assumed to be in the same skin corrosion packing group as A and B.

(e) **Substantially similar mixtures:** Given the following:

(i) Two mixtures: (A+B) and (C+B);

(ii) The concentration of ingredient B is the same in both mixtures;

(iii) The concentration of ingredient A in mixture (A+B) equals the concentration of ingredient C in mixture (C+B);

(iv) Data on skin corrosion for ingredients A and C are available and substantially equivalent, i.e. they are the same skin corrosion packing group and do not affect the skin corrosion potential of B.

If mixture (A+B) or (C+B) is already classified based on test data, then the other mixture may be assigned to the same packing group.

2.8.4.3 ***Calculation method based on the classification of the substances***

2.8.4.3.1 Where a mixture has not been tested to determine its skin corrosion potential, nor is sufficient data available on similar mixtures, the corrosive properties of the substances in the mixture shall be considered to classify and assign a packing group.

Applying the calculation method is only allowed if there are no synergistic effects that make the mixture more corrosive than the sum of its substances. This restriction applies only if packing group II or III would be assigned to the mixture.

2.8.4.3.2 When using the calculation method, all Class 8 ingredients present at a concentration of ≥ 1 % shall be taken into account, or < 1 % if these ingredients are still relevant for classifying the mixture to be corrosive to skin.

2.8.4.3.3 To determine whether a mixture containing corrosive substances shall be considered a corrosive mixture and to assign a packing group, the calculation method in the flow chart in Figure 2.8.4.3 shall be applied. For this calculation method, generic concentration limits apply where 1 % is used in the first step for the assessment of the packing group I substances, and where 5 % is used for the other steps respectively.

2.8.4.3.4 When a specific concentration limit (SCL) is assigned to a substance following its entry in the Dangerous Goods List or in a Special Provision, this limit shall be used instead of the generic concentration limits (GCL).

2.8.4.3.5 For this purpose, the summation formula for each step of the calculation method shall be adapted. This means that, where applicable, the generic concentration limit shall be substituted by the specific concentration limit assigned to the substance(s) (SCLi), and the adapted formula is a weighted average of the different concentration limits assigned to the different substances in the mixture:

$$\frac{PGx_1}{GCL} + \frac{PGx_2}{SCL_2} + \cdots + \frac{PGx_i}{SCL_i} \geq 1$$

Where:

PGx_i = concentration of substance 1, 2, …, i in the mixture, assigned to packing group x (I, II or III)

GCL = generic concentration limit

SCL_i = specific concentration limit assigned to substance i

The criterion for a packing group is fulfilled when the result of the calculation is ≥ 1. The generic concentration limits to be used for the evaluation in each step of the calculation method are those found in Figure 2.8.4.3.

Examples for the application of the above formula can be found in the note below.

NOTE: *Examples for the application of the above formula*

Example 1: A mixture contains one corrosive substance in a concentration of 5 % assigned to packing group I without a specific concentration limit:

Calculation for packing group I:

$$\frac{5}{5\ (GCL)} = 1 \rightarrow$$ *assign to class 8, packing group I.*

Example 2: A mixture contains three substances corrosive to skin; two of them (A and B) have specific concentration limits; for the third one (C) the generic concentration limits applies. The rest of the mixture needs not to be taken into consideration:

Substance X in the mixture and its packing group assignment within Class 8	Concentration (conc) in the mixture in %	Specific concentration limit (SCL) for packing group I	Specific concentration limit (SCL) for packing group II	Specific concentration limit (SCL) for packing group III
A, assigned to packing group I	3	30 %	none	none
B, assigned to packing group I	2	20 %	10 %	none
C, assigned to packing group III	10	none	none	none

Calculation for packing group I:

$$\frac{3\ (conc\ A)}{30\ (SCL\ PGI)} + \frac{2\ (conc\ B)}{20\ (SCL\ PGI)} = 0.2\ < 1$$

The criterion for packing group I is not fulfilled.

Calculation for packing group II:

$$\frac{3\ (conc\ A)}{5\ (GCL\ PGII)} + \frac{2\ (conc\ B)}{10\ (SCL\ PGII)} = 0.8\ < 1$$

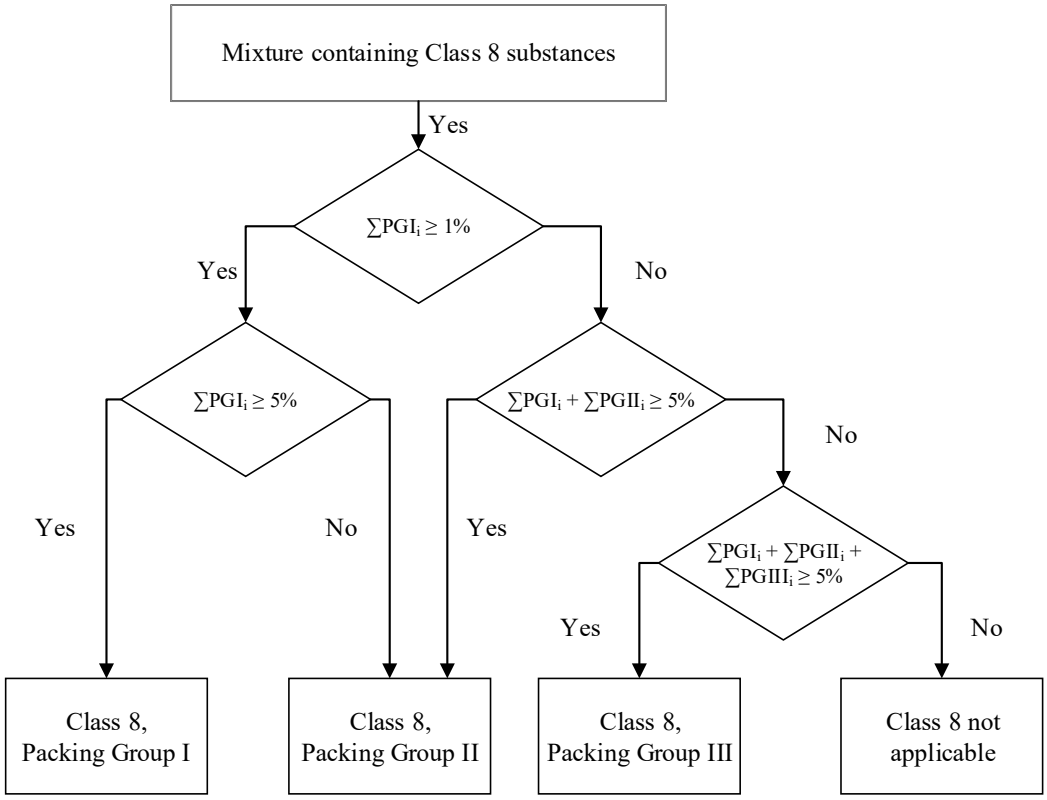
The criterion for packing group II is not fulfilled.

Calculation for packing group III:

$$\frac{3\ (conc\ A)}{5\ (GCL\ PGIII)} + \frac{2\ (conc\ B)}{5\ (GCL\ PGIII)} + \frac{10\ (conc\ C)}{5\ (GCL\ PGIII)} = 3\ \geq 1$$

The criterion for packing group III is fulfilled, the mixture shall be assigned to class 8, packing group III.

Figure 2.8.4.3: Calculation method



2.8.5 Substances not accepted for transport

Chemically unstable substances of Class 8 shall not be accepted for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.

CHAPTER 2.9

CLASS 9 – MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES, INCLUDING ENVIRONMENTALLY HAZARDOUS SUBSTANCES

2.9.1 Definitions

2.9.1.1 *Class 9 substances and articles (miscellaneous dangerous substances and articles)* are substances and articles which, during transport present a danger not covered by other classes.

2.9.1.2 *Deleted.*

2.9.2 Assignment to Class 9

The substances and articles of Class 9 are subdivided as follows:

Substances which, on inhalation as fine dust, may endanger health

2212 ASBESTOS, AMPHIBOLE (amosite, tremolite, actinolite, anthophyllite, crocidolite)
2590 ASBESTOS, CHRYSOTILE

Substances evolving flammable vapour

2211 POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour
3314 PLASTICS MOULDING COMPOUND in dough, sheet or extruded rope form evolving flammable vapour

Lithium batteries

3090 LITHIUM METAL BATTERIES (including lithium alloy batteries)
3091 LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT (including lithium alloy batteries) or
3091 LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT (including lithium alloy batteries)
3480 LITHIUM ION BATTERIES (including lithium ion polymer batteries)
3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT (including lithium ion polymer batteries) or
3481 LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)
3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT

NOTE: *See 2.9.4.*

Capacitors

3499 CAPACITOR, ELECTRIC DOUBLE LAYER (with an energy storage capacity greater than 0.3Wh)
3508 CAPACITOR, ASYMMETRIC (with an energy storage capacity greater than 0.3Wh))

Life-saving appliances

2990 LIFE-SAVING APPLIANCES, SELF-INFLATING
3072 LIFE-SAVING APPLIANCES NOT SELF-INFLATING containing dangerous goods as equipment
3268 SAFETY DEVICES, electrically initiated

Substances and articles which, in the event of fire, may form dioxins

This group of substances includes:

2315 POLYCHLORINATED BIPHENYLS, LIQUID
3432 POLYCHLORINATED BIPHENYLS, SOLID
3151 POLYHALOGENATED BIPHENYLS, LIQUID or
3151 HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUID or
3151 POLYHALOGENATED TERPHENYLS, LIQUID
3152 POLYHALOGENATED BIPHENYLS, SOLID or
3152 HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLID or
3152 POLYHALOGENATED TERPHENYLS, SOLID

Examples of articles are transformers, condensers and apparatus containing those substances.

Substances transported or offered for transport at elevated temperatures (liquid)

3257 ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flash-point (including molten metal, molten salts, etc.)

Substances transported or offered for transport at elevated temperatures (solid)

3258 ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C

Environmentally hazardous substances (solid)

3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

Environmentally hazardous substances (liquid)

3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

These designations are used for substances and mixtures which are dangerous to the aquatic environment that do not meet the classification criteria of any other class or another substance within Class 9. These designations may also be used for wastes not otherwise subject to these Regulations but which are covered under the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* and for substances designated to be environmentally hazardous substances by the competent authority of the country of origin, transit or destination which do not meet the criteria for an environmentally hazardous substance according to these Regulations or for any other hazard Class. The criteria for substances which are hazardous to the aquatic environment are given in section 2.9.3.

Genetically modified micro-organisms (GMMOs) and genetically modified organisms (GMOs)

3245 GENETICALLY MODIFIED MICRO-ORGANISMS or
3245 GENETICALLY MODIFIED ORGANISMS

GMMOs and GMOs which do not meet the definition of toxic substances (see 2.6.2) or infectious substances (see 2.6.3) shall be assigned to UN 3245.

GMMOs or GMOs are not subject to these Regulations when authorized for use by the competent authorities of the countries of origin, transit and destination.

Genetically modified live animals shall be transported under terms and conditions of the competent authorities of the countries of origin and destination.

Ammonium nitrate based fertilizers

2071 AMMONIUM NITRATE BASED FERTILIZERS

Solid ammonium nitrate based fertilizers shall be classified in accordance with the procedure as set out in the Manual of Tests and Criteria, Part III, Section 39.

Other substances or articles presenting a danger during transport, but not meeting the definitions of another class

1841 ACETALDEHYDE AMMONIA
1845 CARBON DIOXIDE, SOLID (DRY ICE)
1931 ZINC DITHIONITE (ZINC HYDROSULPHITE)
1941 DIBROMODIFLUOROMETHANE
1990 BENZALDEHYDE
2216 FISH MEAL (FISH SCRAP), STABILIZED
2807 MAGNETIZED MATERIAL
2969 CASTOR BEANS or
2969 CASTOR MEAL or
2969 CASTOR POMACE or
2969 CASTOR FLAKE
3166 VEHICLE, FLAMMABLE GAS POWERED or
3166 VEHICLE, FLAMMABLE LIQUID POWERED or
3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or
3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED
3171 BATTERY-POWERED VEHICLE or
3171 BATTERY-POWERED EQUIPMENT
3316 CHEMICAL KIT or
3316 FIRST AID KIT
3334 AVIATION REGULATED LIQUID, N.O.S.
3335 AVIATION REGULATED SOLID, N.O.S.
3359 FUMIGATED CARGO TRANSPORT UNIT
3363 DANGEROUS GOODS IN ARTICLES or
3363 DANGEROUS GOODS IN MACHINERY or
3363 DANGEROUS GOODS IN APPARATUS
3509 PACKAGINGS, DISCARDED, EMPTY, UNCLEANED
3530 ENGINE, INTERNAL COMBUSTION or
3530 MACHINERY, INTERNAL COMBUSTION
3548 ARTICLES CONTAINING MISCELLANEOUS DANGEROUS GOODS N.O.S.

2.9.3 Environmentally hazardous substances (aquatic environment)

2.9.3.1 *General definitions*

2.9.3.1.1 Environmentally hazardous substances include, inter alia, liquid or solid substances pollutant to the aquatic environment and solutions and mixtures of such substances (such as preparations and wastes).

For the purposes of this section,

Substance means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

2.9.3.1.2 The aquatic environment may be considered in terms of the aquatic organisms that live in the water, and the aquatic ecosystem of which they are part[1]. The basis, therefore, of the identification of hazard is the aquatic toxicity of the substance or mixture, although this may be modified by further information on the degradation and bioaccumulation behaviour.

[1] *This does not address aquatic pollutants for which there may be a need to consider effects beyond the aquatic environment such as the impacts on human health etc.*

2.9.3.1.3 While the following classification procedure is intended to apply to all substances and mixtures, it is recognised that in some cases, e.g. metals or poorly soluble inorganic compounds, special guidance will be necessary[2].

2.9.3.1.4 The following definitions apply for acronyms or terms used in this section:

- BCF: Bioconcentration Factor;
- BOD: Biochemical Oxygen Demand;
- COD: Chemical Oxygen Demand;
- GLP: Good Laboratory Practices;
- EC_x: the concentration associated with x % response;
- EC_{50} : the effective concentration of substance that causes 50 % of the maximum response;
- ErC_{50} : EC_{50} in terms of reduction of growth;
- K_{ow}: octanol/water partition coefficient;
- LC_{50} (50 % lethal concentration): the concentration of a substance in water which causes the death of 50 % (one half) in a group of test animals;
- $L(E)C_{50}$: LC_{50} or EC_{50};
- NOEC (No Observed Effect Concentration): the test concentration immediately below the lowest tested concentration with statistically significant adverse effect. The NOEC has no statistically significant adverse effect compared to the control;
- OECD Test Guidelines: Test guidelines published by the Organization for Economic Cooperation and Development (OECD);

2.9.3.2 ***Definitions and data requirements***

2.9.3.2.1 The basic elements for classification of environmentally hazardous substances (aquatic environment) are:

(a) Acute aquatic toxicity;

(b) Chronic aquatic toxicity;

(c) Potential for or actual bioaccumulation; and

(d) Degradation (biotic or abiotic) for organic chemicals.

2.9.3.2.2 While data from internationally harmonised test methods are preferred, in practice, data from national methods may also be used where they are considered as equivalent. In general, it has been agreed that freshwater and marine species toxicity data can be considered as equivalent data and are preferably to be derived using OECD Test Guidelines or equivalent according to the principles of Good Laboratory Practices (GLP). Where such data are not available, classification shall be based on the best available data.

2.9.3.2.3 *Acute aquatic toxicity* means the intrinsic property of a substance to be injurious to an organism in a short-term aquatic exposure to that substance.

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2 *This can be found in Annex 10 of the GHS.*

Acute (short-term) hazard, for classification purposes, means the hazard of a chemical caused by its acute toxicity to an organism during short-term aquatic exposure to that chemical.

Acute aquatic toxicity shall normally be determined using a fish 96 hour LC_{50} (OECD Test Guideline 203 or equivalent), a crustacea species 48 hour EC_{50} (OECD Test Guideline 202 or equivalent) and/or an algal species 72 or 96 hour EC_{50} (OECD Test Guideline 201 or equivalent). These species are considered as surrogate for all aquatic organisms and data on other species such as Lemna may also be considered if the test methodology is suitable.

2.9.3.2.4 *Chronic aquatic toxicity* means the intrinsic property of a substance to cause adverse effects to aquatic organisms during aquatic exposures which are determined in relation to the life-cycle of the organism.

Long-term hazard, for classification purposes, means the hazard of a chemical caused by its chronic toxicity following long-term exposure in the aquatic environment.

Chronic toxicity data are less available than acute data and the range of testing procedures less standardised. Data generated according to the OECD Test Guidelines 210 (Fish Early Life Stage) or 211 (Daphnia Reproduction) and 201 (Algal Growth Inhibition) may be accepted. Other validated and internationally accepted tests may also be used. The NOECs or other equivalent EC_x shall be used.

2.9.3.2.5 *Bioaccumulation* means net result of uptake, transformation and elimination of a substance in an organism due to all routes of exposure (i.e. air, water, sediment/soil and food).

The potential for bioaccumulation shall normally be determined by using the octanol/water partition coefficient, usually reported as a log K_{ow} determined according to OECD Test Guidelines 107, 117 or 123. While this represents a potential to bioaccumulate, an experimentally determined Bioconcentration Factor (BCF) provides a better measure and shall be used in preference when available. A BCF shall be determined according to OECD Test Guideline 305.

2.9.3.2.6 *Degradation* means the decomposition of organic molecules to smaller molecules and eventually to carbon dioxide, water and salts.

Environmental degradation may be biotic or abiotic (eg. hydrolysis) and the criteria used reflect this fact. Ready biodegradation is most easily defined using the biodegradability tests (A-F) of OECD Test Guideline 301. A pass level in these tests may be considered as indicative of rapid degradation in most environments. These are freshwater tests and thus the use of the results from OECD Test Guideline 306, which is more suitable for marine environments, has also been included. Where such data are not available, a BOD(5 days)/COD ratio ≥ 0.5 is considered as indicative of rapid degradation. Abiotic degradation such as hydrolysis, primary degradation, both abiotic and biotic, degradation in non-aquatic media and proven rapid degradation in the environment may all be considered in defining rapid degradability[3].

Substances are considered rapidly degradable in the environment if the following criteria are met:

(a) In 28-day ready biodegradation studies, the following levels of degradation are achieved:

(i) Tests based on dissolved organic carbon: 70 %;

(ii) Tests based on oxygen depletion or carbon dioxide generation: 60 % of theoretical maxima;

These levels of biodegradation shall be achieved within 10 days of the start of degradation which point is taken as the time when 10 % of the substance has been degraded, unless the substance is identified as a complex, multi-component substance with structurally similar constituents. In this case, and where there is sufficient

[3] *Special guidance on data interpretation is provided in Chapter 4.1 and Annex 9 of the GHS.*

justification, the 10-day window condition may be waived and the pass level applied at 28 days[4];

(b) In those cases where only BOD and COD data are available, when the ratio of BOD_5/COD is ≥ 0.5; or

(c) If other convincing scientific evidence is available to demonstrate that the substance or mixture can be degraded (biotically and/or abiotically) in the aquatic environment to a level above 70 % within a 28-day period.

2.9.3.3 *Substance classification categories and criteria*

2.9.3.3.1 Substances shall be classified as "environmentally hazardous substances (aquatic environment) ", if they satisfy the criteria for Acute 1, Chronic 1 or Chronic 2, according to Table 2.9.1. These criteria describe in detail the classification categories. They are diagrammatically summarized in Table 2.9.2.

Table 2.9.1: Categories for substances hazardous to the aquatic environment *(see Note 1)*

(a) Acute (short-term) aquatic hazard

Category Acute 1: *(see Note 2)*		
	96 h LC_{50} (for fish)	≤ 1 mg/l and/or
	48 h EC_{50} (for crustacea)	≤ 1 mg/l and/or
	72 or 96 h ErC_{50} (for algae or other aquatic plants)	≤ 1 mg/l *(see Note 3)*

(b) Long-term aquatic hazard *(see also Figure 2.9.1)*

(i) Non-rapidly degradable substances (see Note 4) for which there are adequate chronic toxicity data available

Category Chronic 1: (see *Note 2*)		
	Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
	Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
	Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l
Category Chronic 2:		
	Chronic NOEC or EC_x (for fish)	≤ 1 mg/l and/or
	Chronic NOEC or EC_x (for crustacea)	≤ 1 mg/l and/or
	Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 1 mg/l

[4] *See Chapter 4.1 and Annex 9, paragraph A9.4.2.2.3 of the GHS.*

(ii) Rapidly degradable substances for which there are adequate chronic toxicity data available

Category Chronic 1: *(see Note 2)*	
Chronic NOEC or EC_x (for fish)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.01 mg/l
Category Chronic 2:	
Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l

(iii) Substances for which adequate chronic toxicity data are not available

Category Chronic 1: *(see Note 2)*	
96 h LC_{50} (for fish)	≤ 1 mg/l and/or
48 h EC_{50} (for crustacea)	≤ 1 mg/l and/or
72 or 96 h ErC_{50} (for algae or other aquatic plants)	≤ 1 mg/l *(see Note 3)*
and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent the log K_{ow} ≥ 4) *(see Notes 4 and 5)*.	
Category Chronic 2:	
96 h LC_{50} (for fish)	>1 but ≤ 10 mg/l and/or
48 h EC_{50} (for crustacea)	>1 but ≤ 10 mg/l and/or
72 or 96 h ErC_{50} (for algae or other aquatic plants)	>1 but ≤ 10 mg/l *(see Note 3)*
and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent the log K_{ow} ≥ 4 *(see Notes 4 and 5)*.	

NOTE 1: *The organisms fish, crustacea and algae are tested as surrogate species covering a range of trophic levels and taxa, and the test methods are highly standardized. Data on other organisms may also be considered, however, provided they represent equivalent species and test endpoints.*

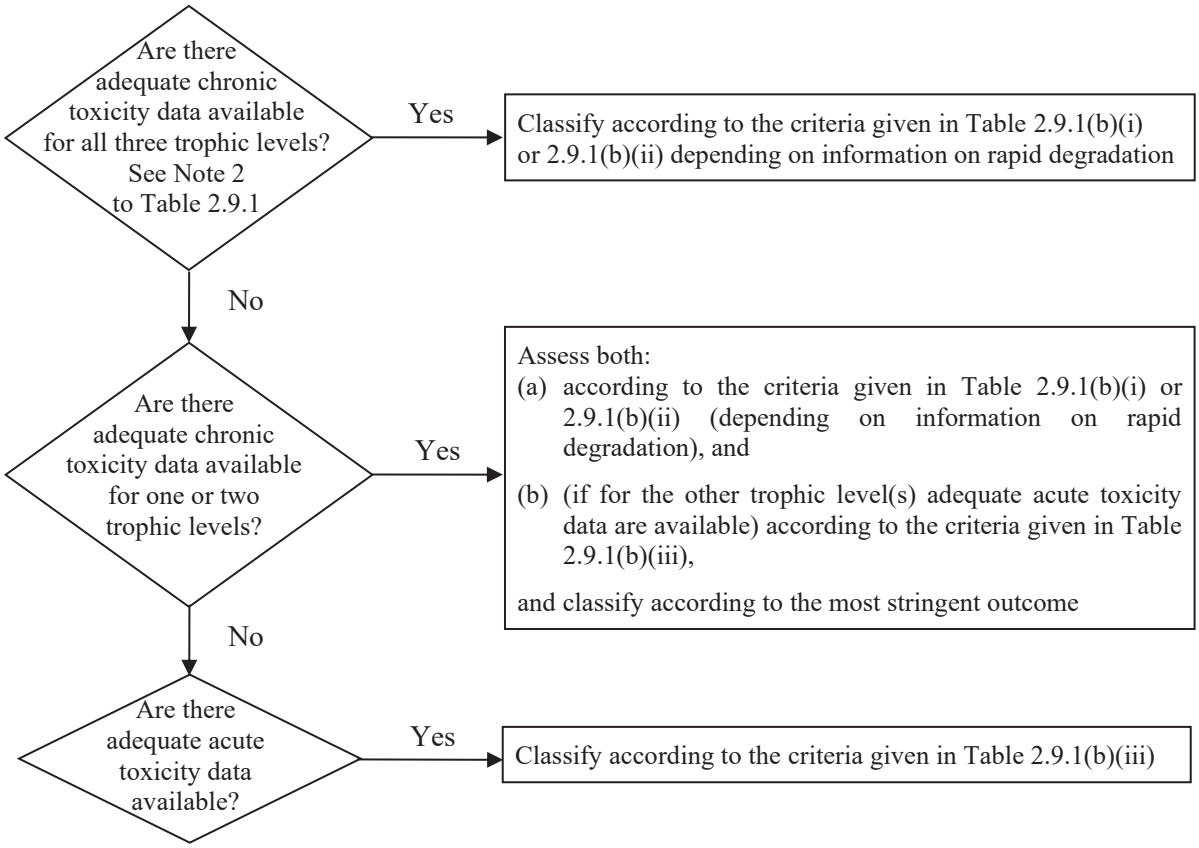
NOTE 2: *When classifying substances as Acute 1 and/or Chronic 1 it is necessary at the same time to indicate an appropriate M factor (see 2.9.3.4.6.4) to apply the summation method.*

NOTE 3: *Where the algal toxicity ErC_{50} (= EC_{50} (growth rate)) falls more than 100 times below the next most sensitive species and results in a classification based solely on this effect, consideration shall be given to whether this toxicity is representative of the toxicity to aquatic plants. Where it can be shown that this is not the case, professional judgment shall be used in deciding if classification shall be applied. Classification shall be based on the ErC_{50}. In circumstances where the basis of the EC_{50} is not specified and no ErC_{50} is recorded, classification shall be based on the lowest EC_{50} available.*

NOTE 4: *Lack of rapid degradability is based on either a lack of ready biodegradability or other evidence of lack of rapid degradation. When no useful data on degradability are available, either experimentally determined or estimated data, the substance shall be regarded as not rapidly degradable.*

NOTE 5: *Potential to bioaccumulate, based on an experimentally derived BCF ≥ 500 or, if absent, a log K_{ow} ≥ 4 provided log K_{ow} is an appropriate descriptor for the bioaccumulation potential of the substance. Measured log K_{ow} values take precedence over estimated values and measured BCF values take precedence over log K_{ow} values.*

Figure 2.9.1: Categories for substances long-term hazardous to the aquatic environment



2.9.3.3.2 The classification scheme in Table 2.9.2 below summarizes the classification criteria for substances.

Table 2.9.2: Classification scheme for substances hazardous to the aquatic environment

Classification categories			
Acute hazard (*see Note 1*)	**Long-term hazard** (*see Note 2*)		
	Adequate chronic toxicity data available		**Adequate chronic toxicity data not available** (*see Note 1*)
	Non-rapidly degradable substances (*see Note 3*)	**Rapidly degradable substances** (*see Note 3*)	
Category: Acute 1	**Category: Chronic 1**	**Category: Chronic 1**	**Category: Chronic 1**
$L(E)C_{50} \leq 1.00$	NOEC or $EC_x \leq 0.1$	NOEC or $EC_x \leq 0.01$	$L(E)C_{50} \leq 1.00$ and lack of rapid degradability and/or BCF ≥ 500 or, if absent log $K_{ow} \geq 4$
	Category: Chronic 2	**Category: Chronic 2**	**Category: Chronic 2**
	$0.1 <$ NOEC or $EC_x \leq 1$	$0.01 <$ NOEC or $EC_x \leq 0.1$	$1.00 < L(E)C_{50} \leq 10.0$ and lack of rapid degradability and/or BCF ≥ 500 or, if absent log $K_{ow} \geq 4$

NOTE 1: *Acute toxicity band based on L(E)C_{50} values in mg/l for fish, crustacea and/or algae or other aquatic plants (or Quantitative Structure Activity Relationships (QSAR) estimation if no experimental data[5]).*

NOTE 2: *Substances are classified in the various chronic categories unless there are adequate chronic toxicity data available for all three trophic levels above the water solubility or above 1 mg/l. ("Adequate" means that the data sufficiently cover the endpoint of concern. Generally this would mean measured test data, but in order to avoid unnecessary testing it can on a case by case basis also be estimated data, e.g. (Q)SAR, or for obvious cases expert judgment).*

NOTE 3: *Chronic toxicity band based on NOEC or equivalent EC_x values in mg/l for fish or crustacea or other recognized measures for chronic toxicity.*

2.9.3.4 ***Mixture classification categories and criteria***

2.9.3.4.1 The classification system for mixtures covers the classification categories which are used for substances, meaning categories Acute 1 and Chronic 1 and 2. In order to make use of all available data for purposes of classifying the aquatic environmental hazards of the mixture, the following assumption is made and is applied where appropriate:

> The "relevant ingredients" of a mixture are those which are present in a concentration equal to or greater than 0.1 % (by mass) for ingredients classified as Acute and/or Chronic 1 and equal to or greater than 1 % for other ingredients, unless there is a presumption (e.g. in the case of highly toxic ingredients) that an ingredient present at less than 0.1 % can still be relevant for classifying the mixture for aquatic environmental hazards.

2.9.3.4.2 The approach for classification of aquatic environmental hazards is tiered, and is dependent upon the type of information available for the mixture itself and for its ingredients. Elements of the tiered approach include:

(a) Classification based on tested mixtures;

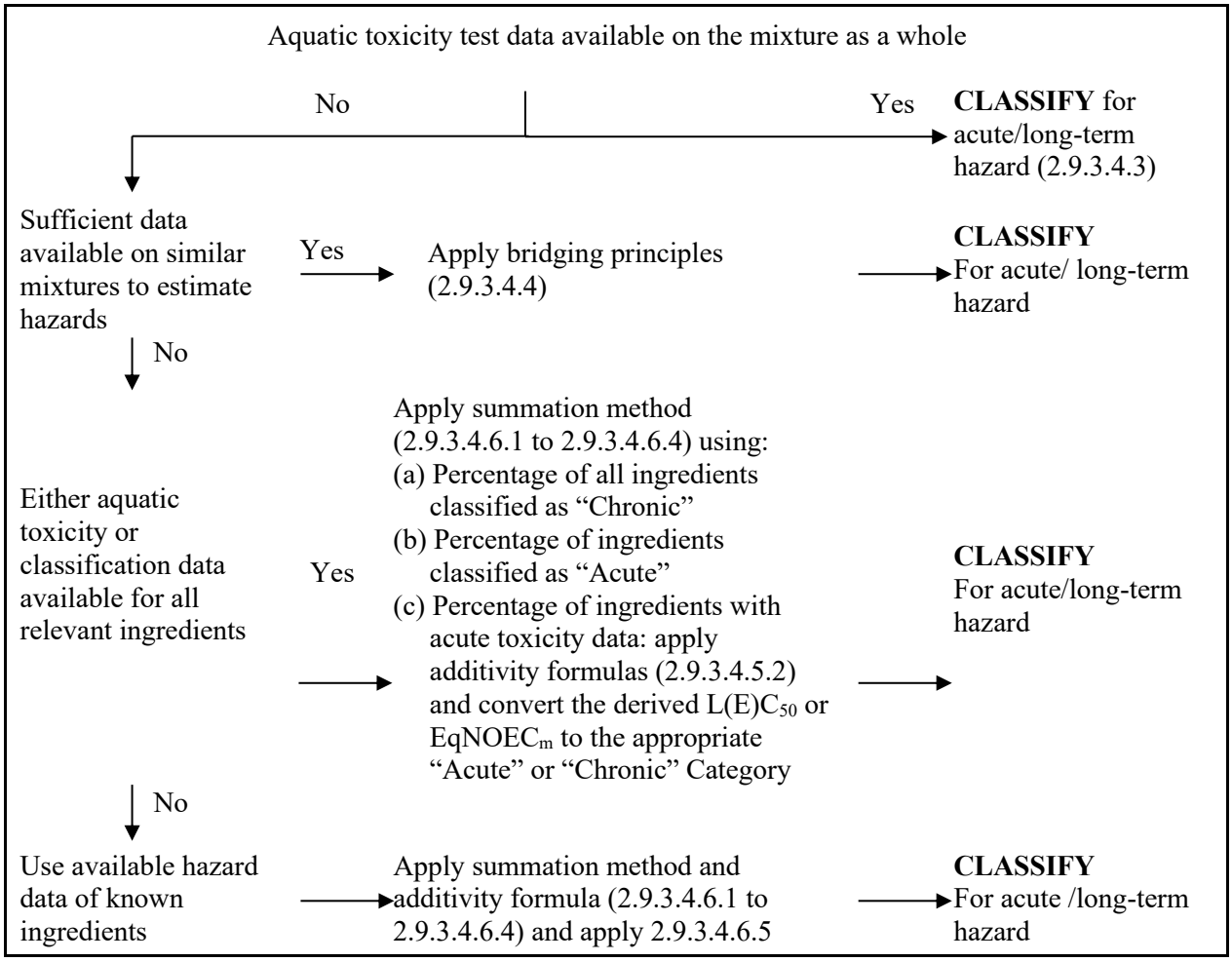
(b) Classification based on bridging principles;

(c) The use of "summation of classified ingredients" and /or an "additivity formula".

Figure 2.9.2 below outlines the process to be followed.

[5] *Special guidance is provided in Chapter 4.1, paragraph 4.1.2.13 and Annex 9, Section A9.6 of the GHS.*

Figure 2.9.2: Tiered approach to classification of mixtures for acute and long-term aquatic environmental hazards



2.9.3.4.3 *Classification of mixtures when toxicity data are available for the complete mixture*

2.9.3.4.3.1 When the mixture as a whole has been tested to determine its aquatic toxicity, this information shall be used for classifying the mixture according to the criteria that have been agreed for substances. The classification is normally based on the data for fish, crustacea and algae/plants (see 2.9.3.2.3 and 2.9.3.2.4). When adequate acute or chronic data for the mixture as a whole are lacking, "bridging principles" or "summation method" shall be applied (see 2.9.3.4.4 to 2.9.3.4.6).

2.9.3.4.3.2 The long-term hazard classification of mixtures requires additional information on degradability and in certain cases bioaccumulation. There are no degradability and bioaccumulation data for mixtures as a whole. Degradability and bioaccumulation tests for mixtures are not used as they are usually difficult to interpret, and such tests may be meaningful only for single substances.

2.9.3.4.3.3 Classification for category Acute 1

(a) When there are adequate acute toxicity test data (LC_{50} or EC_{50}) available for the mixture as a whole showing $L(E)C_{50} \leq 1$ mg/l:

Classify the mixture as Acute 1 in accordance with Table 2.9.1 (a);

(b) When there are acute toxicity test data ($LC_{50}(s)$ or $EC_{50}(s)$) available for the mixture as a whole showing $L(E)C_{50}(s) > 1$ mg/l, or above the water solubility:

No need to classify for acute hazard under these Regulations.

2.9.3.4.3.4 Classification for categories Chronic 1 and 2

(a) When there are adequate chronic toxicity data (EC_x or NOEC) available for the mixture as a whole showing EC_x or NOEC of the tested mixture ≤ 1 mg/l:

(i) classify the mixture as Chronic 1 or 2 in accordance with Table 2.9.1 (b) (ii) (rapidly degradable) if the available information allows the conclusion that all relevant ingredients of the mixture are rapidly degradable;

NOTE: *In this situation, when ECx or NOEC of the tested mixture > 0.1 mg/l, there is no need to classify for long-term hazard under these Regulations.*

(ii) classify the mixture as Chronic 1 or 2 in all other cases in accordance with Table 2.9.1 (b) (i) (non-rapidly degradable);

(b) When there are adequate chronic toxicity data (EC_x or NOEC) available for the mixture as a whole showing EC_x(s) or NOEC(s) of the tested mixture > 1 mg/l or above the water solubility:

No need to classify for long-term hazard under these Regulations.

2.9.3.4.4 *Classification of mixtures when toxicity data are not available for the complete mixture: bridging principles*

2.9.3.4.4.1 Where the mixture itself has not been tested to determine its aquatic environmental hazard, but there are sufficient data on the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data shall be used in accordance with the following agreed bridging rules. This ensures that the classification process uses the available data to the greatest extent possible in characterizing the hazards of the mixture without the necessity for additional testing in animals.

2.9.3.4.4.2 Dilution

2.9.3.4.4.2.1 Where a new mixture is formed by diluting a tested mixture or a substance with a diluent which has an equivalent or lower aquatic hazard classification than the least toxic original ingredient and which is not expected to affect the aquatic hazards of other ingredients, then the resulting mixture shall be classified as equivalent to the original tested mixture or substance. Alternatively, the method explained in 2.9.3.4.5 may be applied.

2.9.3.4.4.2.2 If a mixture is formed by diluting another classified mixture or a substance with water or other totally non-toxic material, the toxicity of the mixture shall be calculated from the original mixture or substance.

2.9.3.4.4.3 Batching

2.9.3.4.4.3.1 The aquatic hazard classification of a tested production batch of a mixture shall be assumed to be substantially equivalent to that of another untested production batch of the same commercial product when produced by or under the control of the same manufacturer, unless there is reason to believe there is significant variation such that the aquatic hazard classification of the untested batch has changed. If the latter occurs, new classification is necessary.

2.9.3.4.4.4 Concentration of mixtures which are classified with the most severe classification categories (Chronic 1 and Acute 1)

2.9.3.4.4.4.1 If a tested mixture is classified as Chronic 1 and/or Acute 1, and the ingredients of the mixture which are classified as Chronic 1 and/or Acute 1 are further concentrated, the more concentrated untested mixture shall be classified with the same classification category as the original tested mixture without additional testing.

2.9.3.4.4.5 Interpolation within one toxicity category

2.9.3.4.4.5.1 For three mixtures (A, B and C) with identical ingredients, where mixtures A and B have been tested and are in the same toxicity category, and where untested mixture C has the same toxicologically active ingredients as mixtures A and B but has concentrations of toxicologically active ingredients intermediate to the concentrations in mixtures A and B, then mixture C is assumed to be in the same category as A and B.

2.9.3.4.4.6 Substantially similar mixtures

2.9.3.4.4.6.1 Given the following:

(a) Two mixtures:

(i) A + B

(ii) C + B;

(b) The concentration of ingredient B is essentially the same in both mixtures;

(c) The concentration of ingredient A in mixture (i) equals that of ingredient C in mixture (ii);

(d) Data on aquatic hazards for A and C are available and are substantially equivalent, i.e. they are in the same hazard category and are not expected to affect the aquatic toxicity of B.

If mixture (i) or (ii) is already classified based on test data, then the other mixture can be assigned the same hazard category.

2.9.3.4.5 *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

2.9.3.4.5.1 The classification of a mixture shall be based on summation of the concentrations of its classified ingredients. The percentage of ingredients classified as “Acute” or “Chronic” will feed straight into the summation method. Details of the summation method are described in 2.9.3.4.6.1 to 2.9.3.4.6.4.1.

2.9.3.4.5.2 Mixtures may be made of a combination of both ingredients that are classified (as Acute 1 and/or Chronic 1, 2) and those for which adequate toxicity test data are available. When adequate toxicity data are available for more than one ingredient in the mixture, the combined toxicity of those ingredients shall be calculated using the following additivity formulas (a) or (b), depending on the nature of the toxicity data:

(a) Based on acute aquatic toxicity:

$$\frac{\sum C_i}{L(E)C_{50m}} = \sum_n \frac{C_i}{L(E)C_{50i}}$$

where:

C_i = concentration of ingredient i (mass percentage);
$L(E)C_{50i}$ = LC_{50} or EC_{50} for ingredient i (mg/l);
n = number of ingredients, and i is running from 1 to n;
$L(E)C_{50m}$ = $L(E)C_{50}$ of the part of the mixture with test data

The calculated toxicity shall be used to assign that portion of the mixture an acute hazard category which is then subsequently used in applying the summation method;

(b) Based on chronic aquatic toxicity:

$$\frac{\sum Ci + \sum Cj}{EqNOEC_m} = \sum_n \frac{Ci}{NOECi} + \sum_n \frac{Cj}{0.1 \times NOECj}$$

where:

C_i	=	concentration of ingredient i (mass percentage) covering the rapidly degradable ingredients;
C_j	=	concentration of ingredient j (mass percentage) covering the non-rapidly degradable ingredients;
$NOEC_i$	=	NOEC (or other recognized measures for chronic toxicity) for ingredient i covering the rapidly degradable ingredients, in mg/l;
$NOEC_j$	=	NOEC (or other recognized measures for chronic toxicity) for ingredient j covering the non-rapidly degradable ingredients, in mg/l;
n	=	number of ingredients, and i and j are running from 1 to n;
$EqNOEC_m$	=	equivalent NOEC of the part of the mixture with test data;

The equivalent toxicity thus reflects the fact that non-rapidly degrading substances are classified one hazard category level more “severe” than rapidly degrading substances.

The calculated equivalent toxicity shall be used to assign that portion of the mixture a long-term hazard category, in accordance with the criteria for rapidly degradable substances (Table 2.9.1 (b) (ii)), which is then subsequently used in applying the summation method.

2.9.3.4.5.3 When applying the additivity formula for part of the mixture, it is preferable to calculate the toxicity of this part of the mixture using for each ingredient toxicity values that relate to the same taxonomic group (i.e. fish, crustacea or algae) and then to use the highest toxicity (lowest value) obtained (i.e. use the most sensitive of the three groups). However, when toxicity data for each ingredient are not available in the same taxonomic group, the toxicity value of each ingredient shall be selected in the same manner that toxicity values are selected for the classification of substances, i.e. the higher toxicity (from the most sensitive test organism) is used. The calculated acute and chronic toxicity shall then be used to classify this part of the mixture as Acute 1 and/or Chronic 1 or 2 using the same criteria described for substances.

2.9.3.4.5.4 If a mixture is classified in more than one way, the method yielding the more conservative result shall be used.

2.9.3.4.6 *Summation method*

2.9.3.4.6.1 Classification procedure

2.9.3.4.6.1.1 In general a more severe classification for mixtures overrides a less severe classification, e.g. a classification with Chronic 1 overrides a classification with Chronic 2. As a consequence the classification procedure is already completed if the results of the classification is Chronic 1. A more severe classification than Chronic 1 is not possible; therefore, it is not necessary to pursue the classification procedure further.

2.9.3.4.6.2 Classification for category Acute 1

2.9.3.4.6.2.1 First, all ingredients classified as Acute 1 are considered. If the sum of the concentrations (in %) of these ingredients is greater than or equal to 25 % the whole mixture shall be classified as Acute 1. If the result of the calculation is a classification of the mixture as Acute 1, the classification process is completed.

2.9.3.4.6.2.2 The classification of mixtures for acute hazards based on this summation of the concentrations of classified ingredients is summarized in Table 2.9.3 below.

Table 2.9.3: Classification of a mixture for acute hazards based on summation of the concentrations of classified ingredients

Sum of the concentrations (in %) of ingredients classified as:	Mixture classified as:
Acute 1 × M [a] ≥ 25 %	Acute 1

[a] *For explanation of the M factor, see 2.9.3.4.6.4.*

2.9.3.4.6.3 Classification for categories Chronic 1 and 2

2.9.3.4.6.3.1 First, all ingredients classified as Chronic 1 are considered. If the sum of the concentrations (in %) of these ingredients is greater than or equal to 25 % the mixture shall be classified as Chronic 1. If the result of the calculation is a classification of the mixture as Chronic 1 the classification procedure is completed.

2.9.3.4.6.3.2 In cases where the mixture is not classified as Chronic 1, classification of the mixture as Chronic 2 is considered. A mixture shall be classified as Chronic 2 if 10 times the sum of the concentrations (in %) of all ingredients classified as Chronic 1 plus the sum of the concentrations (in %) of all ingredients classified as Chronic 2 is greater than or equal to 25 %. If the result of the calculation is classification of the mixture as Chronic 2, the classification process is completed.

2.9.3.4.6.3.3 The classification of mixtures for long-term hazards based on this summation of the concentrations of classified ingredients is summarized in Table 2.9.4 below.

Table 2.9.4: Classification of a mixture for long-term hazards based on summation of the concentrations of classified ingredients

Sum of the concentrations (in %) of ingredients classified as:		Mixture classified as:
Chronic 1 × M [a]	≥ 25 %	Chronic 1
(M × 10 × Chronic 1) + Chronic 2	≥ 25 %	Chronic 2

[a] *For explanation of the M factor, see 2.9.3.4.6.4.*

2.9.3.4.6.4 Mixtures with highly toxic ingredients

2.9.3.4.6.4.1 Acute 1 or Chronic 1 ingredients with acute toxicities well below 1 mg/l and/or chronic toxicities well below 0.1 mg/l (if non-rapidly degradable) and 0.01 mg/l (if rapidly degradable) may influence the toxicity of the mixture and are given increased weight in applying the summation method. When a mixture contains ingredients classified as Acute 1 or Chronic 1, the tiered approach described in 2.9.3.4.6.2 and 2.9.3.4.6.3 shall be applied using a weighted sum by multiplying the concentrations of Acute 1 and Chronic 1 ingredients by a factor, instead of merely adding up the percentages. This means that the concentration of "Acute 1" in the left column of Table 2.9.3 and the concentration of "Chronic 1" in the left column of Table 2.9.4 are multiplied by the appropriate multiplying factor. The multiplying factors to be applied to these ingredients are defined using the toxicity value, as summarized in Table 2.9.5 below. Therefore, in order to classify a mixture containing Acute 1 and/or Chronic 1 ingredients, the classifier needs to be informed of the value of the M factor in order to apply the summation method. Alternatively, the additivity formula (2.9.3.4.5.2) may be used when toxicity data are available for all highly toxic ingredients in the mixture and there is convincing evidence that all other ingredients, including those for which specific acute and/or chronic toxicity data are not available, are of low or no toxicity and do not significantly contribute to the environmental hazard of the mixture.

Table 2.9.5: Multiplying factors for highly toxic ingredients of mixtures

Acute toxicity	M factor	Chronic toxicity	M factor	
$L(E)C_{50}$ value		**NOEC value**	**NRD [a] ingredients**	**RD [b] ingredients**
$0.1 < L(E)C_{50} \leq 1$	1	$0.01 < NOEC \leq 0.1$	1	-
$0.01 < L(E)C_{50} \leq 0.1$	10	$0.001 < NOEC \leq 0.01$	10	1
$0.001 < L(E)C_{50} \leq 0.01$	100	$0.0001 < NOEC \leq 0.001$	100	10
$0.0001 < L(E)C_{50} \leq 0.001$	1 000	$0.00001 < NOEC \leq 0.0001$	1 000	100
$0.00001 < L(E)C_{50} \leq 0.0001$	10 000	$0.000001 < NOEC \leq 0.00001$	10 000	1 000
(continue in factor 10 intervals)		(continue in factor 10 intervals)		

[a] *Non-rapidly degradable.*
[b] *Rapidly degradable.*

2.9.3.4.6.5 Classification of mixtures with ingredients without any useable information

2.9.3.4.6.5.1 In the event that no useable information on acute and/or chronic aquatic toxicity is available for one or more relevant ingredients, it is concluded that the mixture cannot be attributed (a) definitive hazard category(ies). In this situation the mixture shall be classified based on the known ingredients only.

2.9.4 Lithium batteries

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form shall be assigned to UN Nos. 3090, 3091, 3480 or 3481 as appropriate. They may be transported under these entries if they meet the following provisions:

(a) Each cell or battery is of the type proved to meet the requirements of each test of the *Manual of Tests and Criteria*, Part III, sub-section 38.3;

Cells and batteries manufactured according to a type meeting the requirements of sub-section 38.3 of the Manual of Tests and Criteria, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in these Regulations.

Cell and battery types only meeting the requirements of the Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before 1 July 2003 may continue to be transported if all other applicable requirements are fulfilled.

NOTE: *Batteries shall be of a type proved to meet the testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3, irrespective of whether the cells of which they are composed are of a tested type.*

(b) Each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally incident to transport;

(c) Each cell and battery is equipped with an effective means of preventing external short circuits;

(d) Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);

(e) Cells and batteries shall be manufactured under a quality management programme that includes:

(i) A description of the organizational structure and responsibilities of personnel with regard to design and product quality;

(ii) The relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;

(iii) Process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;

(iv) Quality records, such as inspection reports, test data, calibration data and certificates. Test data shall be kept and made available to the competent authority upon request;

(v) Management reviews to ensure the effective operation of the quality management programme;

(vi) A process for control of documents and their revision;

(vii) A means for control of cells or batteries that are not conforming to the type tested as mentioned in (a) above;

(viii) Training programmes and qualification procedures for relevant personnel; and

(ix) Procedures to ensure that there is no damage to the final product.

NOTE: *In house quality management programmes may be accepted. Third party certification is not required, but the procedures listed in (i) to (ix) above shall be properly recorded and traceable. A copy of the quality management programme shall be made available to the competent authority upon request.*

(f) Lithium batteries, containing both primary lithium metal cells and rechargeable lithium ion cells, that are not designed to be externally charged (see special provision 387 of Chapter 3.3) shall meet the following conditions:

(i) The rechargeable lithium ion cells can only be charged from the primary lithium metal cells;

(ii) Overcharge of the rechargeable lithium ion cells is precluded by design;

(iii) The battery has been tested as a lithium primary battery;

(iv) Component cells of the battery shall be of a type proved to meet the respective testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3.

(g) Except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of cells or batteries manufactured after 30 June 2003 shall make available the test summary as specified in the Manual of Tests and Criteria, Part III, sub-section 38.3, paragraph 38.3.5.

PART 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND EXCEPTIONS

CHAPTER 3.1

GENERAL

3.1.1 Scope and general provisions

3.1.1.1 The Dangerous Goods List in this Chapter lists the dangerous goods most commonly carried but is not exhaustive. It is intended that the list cover, as far as practicable, all dangerous substances of commercial importance.

3.1.1.2 Where a substance or article is specifically listed by name in the Dangerous Goods List, it shall be transported in accordance with the provisions in the List which are appropriate for that substance or article. A "generic" or "not otherwise specified" entry may be used to permit the transport of substances or articles which do not appear specifically by name in the Dangerous Goods List. Such a substance or article may be transported only after its dangerous properties have been determined. The substance or article shall then be classified according to the class definitions and test criteria and the name in the Dangerous Goods List which most appropriately describes the substance or article shall be used. The classification shall be made by the appropriate competent authority when so required or may otherwise be made by the consignor. Once the class of the substance or article has been so established, all conditions for dispatch and transport, as provided in these Regulations shall be met. Any substance or article having or suspected of having explosive characteristics shall first be considered for inclusion in Class 1. Some collective entries may be of the "generic" or "not otherwise specified" type provided that the regulations contain provisions ensuring safety, both by excluding extremely dangerous goods from normal transport and by covering all subsidiary hazards inherent in some goods.

3.1.1.3 The Dangerous Goods List does not include goods which are so dangerous that their transport, except with special authorization, is prohibited. Such goods are not listed because the transport of some goods may be prohibited for some modes of transport and allowed in others and, in addition, because it would be impossible to draw up an exhaustive list. Moreover, any such list would soon cease to be exhaustive because of the frequent introduction of new substances; and the absence of a substance from such a list might give the mistaken impression that that substance could be carried without special restrictions. Inherent instability in goods may take different dangerous forms, for example, explosion, polymerization, with intense evolution of heat, or emission of toxic gases. In respect of most substances, such tendencies can be controlled by correct packing, dilution, stabilization, addition of an inhibitor, refrigeration or other precautions.

3.1.1.4 Where precautionary measures are laid down in the Dangerous Goods List in respect of a given substance or article (e.g. that it shall be "stabilized" or "with x % water or phlegmatizer") such substance or article may not normally be carried when these measures have not been taken, unless the item in question is listed elsewhere (e.g. Class 1) without any indication of, or with different, precautionary measures.

3.1.2 Proper shipping name

NOTE: *For proper shipping names to be used for the transport of samples, see 2.0.4.*

3.1.2.1 The proper shipping name is that portion of the entry most accurately describing the goods in the Dangerous Goods List, which is shown in upper case characters (plus any numbers, Greek letters, "sec", "tert", and the letters m, n, o, p, which form an integral part of the name). An alternative proper shipping name may be shown in brackets following the main proper shipping name [e.g., ETHANOL (ETHYL ALCOHOL)]. Portions of an entry appearing in lower case need not be considered as part of the proper shipping name but may be used.

3.1.2.2 When a combination of several distinct proper shipping names are listed under a single UN number, and these are separated by "and" or "or" in lower case or are punctuated by commas, only the most appropriate shall be shown in the transport document and package marks. Examples illustrating the selection of the proper shipping name for such entries are:

(a) UN 1057 LIGHTERS or LIGHTER REFILLS - The proper shipping name is the most appropriate of the following possible combinations:

LIGHTERS
LIGHTER REFILLS;

(b) UN 2793 FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS in a form liable to self-heating. The proper shipping name is the most appropriate of the following combinations:

FERROUS METAL BORINGS
FERROUS METAL SHAVINGS
FERROUS METAL TURNINGS
FERROUS METAL CUTTINGS

3.1.2.3 Proper shipping names may be used in the singular or plural as appropriate. In addition, when qualifying words are used as part of the proper shipping name, their sequence on documentation or package marks is optional. For instance, "DIMETHYLAMINE AQUEOUS SOLUTION" may alternatively be shown "AQUEOUS SOLUTION OF DIMETHYLAMINE". Commercial or military names for goods of Class 1 which contain the proper shipping name supplemented by additional descriptive text may be used.

3.1.2.4 Many substances have an entry for both the liquid and solid state (see definitions for liquid and solid in 1.2.1), or for the solid and solution. These are allocated separate UN numbers which are not necessarily adjacent to each other. Details are provided in the alphabetical index, e.g.:

NITROXYLENES, LIQUID	6.1	1665
NITROXYLENES, SOLID	6.1	3447

3.1.2.5 Unless it is already included in capital letters in the name indicated in the Dangerous Goods List, the qualifying word "MOLTEN" shall be added as part of the proper shipping name when a substance, which is a solid in accordance with the definition in 1.2.1, is offered for transport in the molten state (e.g. ALKYLPHENOL, SOLID, N.O.S., MOLTEN).

3.1.2.6 Except for self-reactive substances and organic peroxides and unless it is already included in capital letters in the name indicated in the Dangerous Goods List, the word STABILIZED shall be added as part of the proper shipping name of a substance which, without stabilization, would be forbidden from transport in accordance with 1.1.2 due to it being liable to dangerously react under conditions normally encountered in transport (e.g.: "TOXIC LIQUID, ORGANIC, N.O.S., STABILIZED").

When temperature control is used to stabilize such substances to prevent the development of any dangerous excess pressure or the evolution of excessive heat, or when chemical stabilization is used in combination with temperature control, then:

(a) For liquids and solids where the SAPT (measured without or with inhibitor, when chemical stabilization is applied) is less than or equal to that prescribed in 2.4.2.5.2, special provision 386 of Chapter 3.3 and the provisions of 7.1.5 apply;

(b) Unless it is already included in capital letters in the name indicated in the Dangerous Goods List, the words "TEMPERATURE CONTROLLED" shall be added as part of the proper shipping name;

(c) For gases: the conditions of transport shall be approved by the competent authority.

3.1.2.7 Hydrates may be transported under the proper shipping name for the anhydrous substance.

3.1.2.8 ***Generic or "not otherwise specified" (N.O.S.) names***

3.1.2.8.1 Generic and "not otherwise specified" proper shipping names that are assigned to special provision 274 or 318 in Column 6 of the Dangerous Goods List shall be supplemented with the technical or

chemical group names unless a national law or international convention prohibits its disclosure if it is a controlled substance. For explosives of Class 1, the dangerous goods description may be supplemented by additional descriptive text to indicate commercial or military names. Technical and chemical group names shall be entered in brackets immediately following the proper shipping name. An appropriate modifier, such as "contains" or "containing" or other qualifying words such as "mixture", "solution", etc. and the percentage of the technical constituent may also be used. For example: "UN 1993 Flammable liquid, n.o.s. (contains xylene and benzene), 3, PG II".

3.1.2.8.1.1 The technical name shall be a recognized chemical or biological name, or other name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose. In the case of pesticides, only ISO common name(s), other name(s) in the World Health Organisation (WHO) Recommended Classification of Pesticides by Hazard and Guidelines to Classification, or the name(s) of the active substance(s) may be used.

3.1.2.8.1.2 When a mixture of dangerous goods or articles containing dangerous goods are described by one of the "N.O.S." or "generic" entries to which special provision 274 has been allocated in the Dangerous Goods List, not more than the two constituents which most predominantly contribute to the hazard or hazards of the mixture or of the articles need to be shown, excluding controlled substances when their disclosure is prohibited by national law or international convention. If a package containing a mixture is labelled with any subsidiary hazard label, one of the two technical names shown in brackets shall be the name of the constituent which compels the use of the subsidiary hazard label.

3.1.2.8.1.3 Examples illustrating the selection of the proper shipping name supplemented with the technical name of goods for such N.O.S. entries are:

UN 2902	PESTICIDE, LIQUID, TOXIC, N.O.S. (drazoxolon).
UN 3394	ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE (trimethylgallium)
UN 3540	ARTICLES CONTAINING FLAMMABLE LIQUIDS N.O.S. (pyrrolidine)

3.1.3 Mixtures or solutions

NOTE: *Where a substance is specifically listed by name in the Dangerous Goods List, it shall be identified in transport by the proper shipping name in the Dangerous Goods List. Such substances may contain technical impurities (for example those deriving from the production process) or additives for stability or other purposes that do not affect its classification. However, a substance listed by name containing technical impurities or additives for stability or other purposes affecting its classification shall be considered a mixture or solution (see 2.0.2.2 and 2.0.2.5).*

3.1.3.1 A mixture or solution is not subject to these Regulations if the characteristics, properties, form or physical state of the mixture or solution are such that it does not meet the criteria, including human experience criteria, for inclusion in any class.

3.1.3.2 A mixture or solution meeting the classification criteria of these Regulations composed of a single predominant substance identified by name in the Dangerous Goods List and one or more substances not subject to these Regulations and/or traces of one or more substances identified by name in the Dangerous Goods List, shall be assigned the UN number and proper shipping name of the predominant substance named in the Dangerous Goods List unless:

(a) The mixture or solution is identified by name in the Dangerous Goods List;

(b) The name and description of the substance named in the Dangerous Goods List specifically indicate that they apply only to the pure substance;

(c) The hazard class or division, subsidiary hazard(s), packing group, or physical state of the mixture or solution is different from that of the substance named in the Dangerous Goods List; or

(d) The hazard characteristics and properties of the mixture or solution necessitate emergency response measures that are different from those required for the substance identified by name in the Dangerous Goods List.

3.1.3.2.1 Qualifying words such as “MIXTURE” or “SOLUTION”, as appropriate, shall be added as part of the proper shipping name, for example, “ACETONE SOLUTION”. In addition, the concentration of the mixture or solution may also be indicated after the basic description of the mixture or solution, for example, “ACETONE 75 % SOLUTION”.

3.1.3.3 A mixture or solution meeting the classification criteria of these Regulations that is not identified by name in the Dangerous Goods List and that is composed of two or more dangerous goods shall be assigned to an entry that has the proper shipping name, description, hazard class or division, subsidiary hazard(s) and packing group that most precisely describe the mixture or solution.

CHAPTER 3.2

DANGEROUS GOODS LIST

3.2.1 Structure of the dangerous goods list

The Dangerous Goods List is divided into 11 columns as follows:

Column 1 "UN No." - this column contains the serial number assigned to the article or substance under the United Nations system.

Column 2 "Name and description" - this column contains the proper shipping names in uppercase characters, which may be followed by additional descriptive text presented in lowercase characters (see 3.1.2). An explanation of some of the terms used appears in Appendix B. Proper shipping names may be shown in the plural where isomers of similar classification exist. Hydrates may be included under the proper shipping name for the anhydrous substance, as appropriate.

Unless otherwise indicated for an entry in the dangerous goods list, the word "solution" in a proper shipping name means one or more named dangerous goods dissolved in a liquid that is not otherwise subject to these Regulations.

Column 3 "Class or division" - this column contains the class or division and in the case of Class 1, the compatibility group assigned to the article or substance according to the classification system described in Chapter 2.1.

Column 4 "Subsidiary hazard" - this column contains the class or division number of any important subsidiary hazards which have been identified by applying the classification system described in Part 2.

Column 5 "UN packing group" - this column contains the UN packing group number (i.e. I, II or III) assigned to the article or substance. If more than one packing group is indicated for the entry, the packing group of the substance or formulation to be transported shall be determined, based on its properties, through application of the hazard grouping criteria as provided in Part 2.

Column 6 "Special provisions" - this column contains a number referring to any special provision(s) indicated in 3.3.1 that are relevant to the article or substance. Special provisions apply to all the packing groups permitted for a particular substance or article unless the wording makes it otherwise apparent.

Column 7a "Limited Quantities" - this column provides the maximum quantity per inner packaging or article for transporting dangerous goods as limited quantities in accordance with Chapter 3.4.

Column 7b "Excepted Quantities" - this column provides an alphanumeric code described in sub-section 3.5.1.2 which indicates the maximum quantity per inner and outer packaging for transporting dangerous goods as excepted quantities in accordance with Chapter 3.5.

Column 8 "Packing instruction" - This column contains alphanumeric codes which refer to the relevant packing instructions specified in section 4.1.4. The packing instructions indicate the packaging (including IBCs and large packagings), which may be used for the transport of substances and articles.

A code including the letter "P" refers to packing instructions for the use of packagings described in Chapters 6.1, 6.2 or 6.3.

A code including the letters "IBC" refers to packing instructions for the use of IBCs described in Chapter 6.5.

A code including the letters “LP” refers to packing instructions for the use of large packagings described in Chapter 6.6.

When a particular code is not provided, it means the substance is not authorized in the type of packaging that may be used according to the packing instructions bearing that code.

When N/A is included in the column it means that the substance or article need not be packaged.

The packing instructions are listed in numerical order in section 4.1.4 as follows:

Sub-section 4.1.4.1: Packing instructions concerning the use of packagings (except IBCs and large packagings) (P);

Sub-section 4.1.4.2: Packing instructions concerning the use of IBCs (IBC);

Sub-section 4.1.4.3: Packing instructions concerning the use of large packagings (LP).

Column 9 “Special packing provisions” - this column contains alphanumeric codes which refer to the relevant special packing provisions specified in section 4.1.4. The special packing provisions indicate the special provisions for packaging (including IBCs and large packagings).

A special packing provision including the letters “PP” refers to special packing provision applicable to the use of packing instructions bearing the Code “P” in 4.1.4.1.

A special packing provision including the letter “B” refers to special packing provision applicable to the use of packing instructions bearing the code “IBC” in 4.1.4.2.

A special provision including the letter “L” refers to special packing provision applicable to packing instructions bearing the code “LP” in 4.1.4.3.

Column 10 “Portable tank and bulk containers/Instructions” - this column contains a number preceded by the letter “T” which refers to the relevant instruction in 4.2.5 specifying the tank type(s) required for the transport of the substance in portable tanks.

A code including the letters “BK” refers to types of bulk containers used for the transport of bulk goods described in Chapter 6.8.

The gases authorized for transport in MEGCs are indicated in the column “MEGC” in Tables 1 and 2 of packing instruction P200 in 4.1.4.1.

Column 11 “Portable tank and bulk containers/Special provisions” - this column contains a number preceded by the letters “TP” referring to any special provisions indicated in 4.2.5.3 that apply to the transport of the substance in portable tanks.

3.2.2 Abbreviations and symbols

The following abbreviations or symbols are used in the Dangerous Goods List and have the meanings shown:

Abbreviation	Column	Meaning
N.O.S.	2	Not otherwise specified.
†	2	Entry for which there is an explanation in Appendix B.

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0004	AMMONIUM PICRATE dry or wetted with less than 10 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)	PP26		
0005	CARTRIDGES FOR WEAPONS with bursting charge†	1.1F				0	E0	P130 LP101			
0006	CARTRIDGES FOR WEAPONS with bursting charge†	1.1E				0	E0	P130 LP101	PP67 L1		
0007	CARTRIDGES FOR WEAPONS with bursting charge†	1.2F				0	E0	P130 LP101			
0009	AMMUNITION, INCENDIARY with or without burster, expelling charge or propelling charge†	1.2G				0	E0	P130 LP101	PP67 L1		
0010	AMMUNITION, INCENDIARY with or without burster, expelling charge or propelling charge†	1.3G				0	E0	P130 LP101	PP67 L1		
0012	CARTRIDGES FOR WEAPONS, INERT PROJECTILE or CARTRIDGES, SMALL ARMS†	1.4S			364	5 kg	E0	P130 LP101			
0014	CARTRIDGES FOR WEAPONS, BLANK or CARTRIDGES, SMALL ARMS, BLANK or CARTRIDGES FOR TOOLS, BLANK†	1.4S			364	5 kg	E0	P130 LP101			
0015	AMMUNITION, SMOKE with or without burster, expelling charge or propelling charge†	1.2G			204	0	E0	P130 LP101	PP67 L1		
0016	AMMUNITION, SMOKE with or without burster, expelling charge or propelling charge†	1.3G			204	0	E0	P130 LP101	PP67 L1		
0018	AMMUNITION, TEAR-PRODUCING with burster, expelling charge or propelling charge†	1.2G	6.1 8			0	E0	P130 LP101	PP67 L1		
0019	AMMUNITION, TEAR-PRODUCING with burster, expelling charge or propelling charge†	1.3G	6.1 8			0	E0	P130 LP101	PP67 L1		
0020	AMMUNITION, TOXIC with burster, expelling charge or propelling charge†	1.2K	6.1		274	0	E0	P101			
0021	AMMUNITION, TOXIC with burster, expelling charge or propelling charge†	1.3K	6.1		274	0	E0	P101			
0027	BLACK POWDER (GUNPOWDER), granular or as a meal†	1.1D				0	E0	P113	PP50		
0028	BLACK POWDER (GUNPOWDER), COMPRESSED or BLACK POWDER (GUNPOWDER), IN PELLETS†	1.1D				0	E0	P113	PP51		
0029	DETONATORS, NON-ELECTRIC for blasting†	1.1B				0	E0	P131	PP68		
0030	DETONATORS, ELECTRIC for blasting†	1.1B				0	E0	P131			
0033	BOMBS with bursting charge†	1.1F				0	E0	P130 LP101			
0034	BOMBS with bursting charge†	1.1D				0	E0	P130 LP101	PP67 L1		
0035	BOMBS with bursting charge†	1.2D				0	E0	P130 LP101	PP67 L1		

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0037	BOMBS, PHOTO-FLASH†	1.1F				0	E0	P130 LP101			
0038	BOMBS, PHOTO-FLASH†	1.1D				0	E0	P130 LP101	PP67 L1		
0039	BOMBS, PHOTO-FLASH†	1.2G				0	E0	P130 LP101	PP67 L1		
0042	BOOSTERS without detonator†	1.1D				0	E0	P132(a) P132(b)			
0043	BURSTERS, explosive†	1.1D				0	E0	P133	PP69		
0044	PRIMERS, CAP TYPE†	1.4S				0	E0	P133			
0048	CHARGES, DEMOLITION†	1.1D				0	E0	P130 LP101	PP67 L1		
0049	CARTRIDGES, FLASH†	1.1G				0	E0	P135			
0050	CARTRIDGES, FLASH†	1.3G				0	E0	P135			
0054	CARTRIDGES, SIGNAL†	1.3G				0	E0	P135			
0055	CASES, CARTRIDGE, EMPTY, WITH PRIMER†	1.4S			364	5 kg	E0	P136			
0056	CHARGES, DEPTH†	1.1D				0	E0	P130 LP101	PP67 L1		
0059	CHARGES, SHAPED without detonator†	1.1D				0	E0	P137	PP70		
0060	CHARGES, SUPPLEMENTARY, EXPLOSIVE†	1.1D				0	E0	P132(a) P132(b)			
0065	CORD, DETONATING, flexible†	1.1D				0	E0	P139	PP71 PP72		
0066	CORD, IGNITER†	1.4G				0	E0	P140			
0070	CUTTERS, CABLE, EXPLOSIVE†	1.4S				0	E0	P134 LP102			
0072	CYCLOTRIMETHYLENE-TRINITRAMINE (CYCLONITE; HEXOGEN; RDX), WETTED with not less than 15 % water, by mass†	1.1D			266	0	E0	P112(a)	PP45		
0073	DETONATORS FOR AMMUNITION†	1.1B				0	E0	P133			
0074	DIAZODINITROPHENOL, WETTED with not less than 40 % water, or mixture of alcohol and water, by mass†	1.1A			266	0	E0	P110(a) P110(b)	PP42		
0075	DIETHYLENEGLYCOL DINITRATE, DESENSITIZED with not less than 25 % non-volatile, water-insoluble phlegmatizer, by mass†	1.1D			266	0	E0	P115	PP53 PP54 PP57 PP58		
0076	DINITROPHENOL, dry or wetted with less than 15 % water, by mass†	1.1D	6.1			0	E0	P112(a) P112(b) P112(c)	PP26		
0077	DINITROPHENOLATES, alkali metals, dry or wetted with less than 15 % water, by mass†	1.3C	6.1			0	E0	P114(a) P114(b)	PP26		
0078	DINITRORESORCINOL, dry or wetted with less than 15 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)	PP26		
0079	HEXANITRODIPHENYLAMINE (DIPICRYLAMINE; HEXYL)†	1.1D				0	E0	P112(b) P112(c)			
0081	EXPLOSIVE, BLASTING, TYPE A†	1.1D				0	E0	P116	PP63 PP66		

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0082	EXPLOSIVE, BLASTING, TYPE B†	1.1D				0	E0	P116 IBC100	PP61 PP62 B9		
0083	EXPLOSIVE, BLASTING, TYPE C†	1.1D			267	0	E0	P116			
0084	EXPLOSIVE, BLASTING, TYPE D†	1.1D				0	E0	P116			
0092	FLARES, SURFACE†	1.3G				0	E0	P135			
0093	FLARES, AERIAL†	1.3G				0	E0	P135			
0094	FLASH POWDER†	1.1G				0	E0	P113	PP49		
0099	FRACTURING DEVICES, EXPLOSIVE without detonator, for oil wells	1.1D				0	E0	P134 LP102			
0101	FUSE, NON-DETONATING†	1.3G				0	E0	P140	PP74 PP75		
0102	CORD (FUSE), DETONATING, metal clad†	1.2D				0	E0	P139	PP71		
0103	FUSE, IGNITER, tubular, metal clad†	1.4G				0	E0	P140			
0104	CORD (FUSE), DETONATING, MILD EFFECT, metal clad†	1.4D				0	E0	P139	PP71		
0105	FUSE, SAFETY†	1.4S				0	E0	P140	PP73		
0106	FUZES, DETONATING†	1.1B				0	E0	P141			
0107	FUZES, DETONATING†	1.2B				0	E0	P141			
0110	GRENADES, PRACTICE, hand or rifle†	1.4S				0	E0	P141			
0113	GUANYL NITROSAMINO-GUANYLIDENE HYDRAZINE, WETTED with not less than 30 % water, by mass†	1.1A			266	0	E0	P110(a) P110(b)	PP42		
0114	GUANYL NITROSAMINO-GUANYLTETRAZENE (TETRAZENE), WETTED with not less than 30 % water, or mixture of alcohol and water, by mass†	1.1A			266	0	E0	P110(a) P110(b)	PP42		
0118	HEXOLITE (HEXOTOL), dry or wetted with less than 15 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0121	IGNITERS†	1.1G				0	E0	P142			
0124	JET PERFORATING GUNS, CHARGED, oil well, without detonator†	1.1D				0	E0	P101			
0129	LEAD AZIDE, WETTED with not less than 20 % water, or mixture of alcohol and water, by mass†	1.1A			266	0	E0	P110(a) P110(b)	PP42		
0130	LEAD STYPHNATE (LEAD TRINITRORESORCINATE), WETTED with not less than 20 % water, or mixture of alcohol and water, by mass†	1.1A			266	0	E0	P110(a) P110(b)	PP42		
0131	LIGHTERS, FUSE†	1.4S				0	E0	P142			
0132	DEFLAGRATING METAL SALTS OF AROMATIC NITRODERIVATIVES, N.O.S.†	1.3C				0	E0	P114(a) P114(b)	PP26		
0133	MANNITOL HEXANITRATE (NITROMANNITE), WETTED with not less than 40 % water, or mixture of alcohol and water, by mass†	1.1D			266	0	E0	P112(a)			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0135	MERCURY FULMINATE, WETTED with not less than 20 % water, or mixture of alcohol and water, by mass†	1.1A			266	0	E0	P110(a) P110(b)	PP42		
0136	MINES with bursting charge†	1.1F				0	E0	P130 LP101			
0137	MINES with bursting charge†	1.1D				0	E0	P130 LP101	PP67 L1		
0138	MINES with bursting charge†	1.2D				0	E0	P130 LP101	PP67 L1		
0143	NITROGLYCERIN, DESENSITIZED with not less than 40 % non-volatile water-insoluble phlegmatizer, by mass†	1.1D	6.1		266 271	0	E0	P115	PP53 PP54 PP57 PP58		
0144	NITROGLYCERIN SOLUTION IN ALCOHOL with more than 1 % but not more than 10 % nitroglycerin†	1.1D			358	0	E0	P115	PP45 PP55 PP56 PP59 PP60		
0146	NITROSTARCH, dry or wetted with less than 20 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0147	NITRO UREA†	1.1D				0	E0	P112(b)			
0150	PENTAERYTHRITE TETRANITRATE (PENTAERYTHRITOL TETRANITRATE; PETN), WETTED with not less than 25 % water, by mass, or PENTAERYTHRITE TETRANITRATE (PENTAERYTHRITOL TETRANITRATE; PETN), DESENSITIZED with not less than 15 % phlegmatizer, by mass†	1.1D			266	0	E0	P112(a) P112(b)			
0151	PENTOLITE, dry or wetted with less than 15 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0153	TRINITROANILINE (PICRAMIDE)†	1.1D				0	E0	P112(b) P112(c)			
0154	TRINITROPHENOL (PICRIC ACID), dry or wetted with less than 30 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)	PP26		
0155	TRINITROCHLOROBENZENE (PICRYL CHLORIDE)†	1.1D				0	E0	P112(b) P112(c)			
0159	POWDER CAKE (POWDER PASTE), WETTED with not less than 25 % water, by mass†	1.3C			266	0	E0	P111	PP43		
0160	POWDER, SMOKELESS†	1.1C				0	E0	P114(b)	PP50 PP52		
0161	POWDER, SMOKELESS†	1.3C				0	E0	P114(b)	PP50 PP52		
0167	PROJECTILES with bursting charge†	1.1F				0	E0	P130 LP101			
0168	PROJECTILES with bursting charge†	1.1D				0	E0	P130 LP101	PP67 L1		
0169	PROJECTILES with bursting charge†	1.2D				0	E0	P130 LP101	PP67 L1		
0171	AMMUNITION, ILLUMINATING with or without burster, expelling charge or propelling charge†	1.2G				0	E0	P130 LP101	PP67 L1		

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0173	RELEASE DEVICES, EXPLOSIVE†	1.4S				0	E0	P134 LP102			
0174	RIVETS, EXPLOSIVE	1.4S				0	E0	P134 LP102			
0180	ROCKETS with bursting charge†	1.1F				0	E0	P130 LP101			
0181	ROCKETS with bursting charge†	1.1E				0	E0	P130 LP101	PP67 L1		
0182	ROCKETS with bursting charge†	1.2E				0	E0	P130 LP101	PP67 L1		
0183	ROCKETS with inert head†	1.3C				0	E0	P130 LP101	PP67 L1		
0186	ROCKET MOTORS†	1.3C				0	E0	P130 LP101	PP67 L1		
0190	SAMPLES, EXPLOSIVE, other than initiating explosive†				16 274		E0	P101			
0191	SIGNAL DEVICES, HAND†	1.4G				0	E0	P135			
0192	SIGNALS, RAILWAY TRACK, EXPLOSIVE†	1.1G				0	E0	P135			
0193	SIGNALS, RAILWAY TRACK, EXPLOSIVE†	1.4S				0	E0	P135			
0194	SIGNALS, DISTRESS, ship†	1.1G				0	E0	P135			
0195	SIGNALS, DISTRESS, ship†	1.3G				0	E0	P135			
0196	SIGNALS, SMOKE†	1.1G				0	E0	P135			
0197	SIGNALS, SMOKE†	1.4G				0	E0	P135			
0204	SOUNDING DEVICES, EXPLOSIVE†	1.2F				0	E0	P134 LP102			
0207	TETRANITROANILINE†	1.1D				0	E0	P112(b) P112(c)			
0208	TRINITROPHENYLMETHYL-NITRAMINE (TETRYL)†	1.1D				0	E0	P112(b) P112(c)			
0209	TRINITROTOLUENE (TNT), dry or wetted with less than 30 % water, by mass†	1.1D				0	E0	P112(b) P112(c)	PP46		
0212	TRACERS FOR AMMUNITION†	1.3G				0	E0	P133	PP69		
0213	TRINITROANISOLE†	1.1D				0	E0	P112(b) P112(c)			
0214	TRINITROBENZENE, dry or wetted with less than 30 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0215	TRINITROBENZOIC ACID, dry or wetted with less than 30 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0216	TRINITRO-m-CRESOL†	1.1D				0	E0	P112(b) P112(c)	PP26		
0217	TRINITRONAPHTHALENE†	1.1D				0	E0	P112(b) P112(c)			
0218	TRINITROPHENETOLE†	1.1D				0	E0	P112(b) P112(c)			
0219	TRINITRORESORCINOL (STYPHNIC ACID), dry or wetted with less than 20 % water, or mixture of alcohol and water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)	PP26		
0220	UREA NITRATE, dry or wetted with less than 20 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0221	WARHEADS, TORPEDO with bursting charge†	1.1D				0	E0	P130 LP101	PP67 L1		
0222	AMMONIUM NITRATE	1.1D			370	0	E0	P112(b) P112(c) IBC100	PP47 B2, B3, B17		
0224	BARIUM AZIDE, dry or wetted with less than 50 % water, by mass†	1.1A	6.1			0	E0	P110(a) P110(b)	PP42		
0225	BOOSTERS WITH DETONATOR†	1.1B				0	E0	P133	PP69		
0226	CYCLOTETRAMETHYLENE-TETRANITRAMINE (HMX; OCTOGEN), WETTED with not less than 15 % water, by mass†	1.1D			266	0	E0	P112(a)	PP45		
0234	SODIUM DINITRO-o-CRESOLATE, dry or wetted with less than 15 % water, by mass†	1.3C				0	E0	P114(a) P114(b)	PP26		
0235	SODIUM PICRAMATE, dry or wetted with less than 20 % water, by mass†	1.3C				0	E0	P114(a) P114(b)	PP26		
0236	ZIRCONIUM PICRAMATE, dry or wetted with less than 20 % water, by mass†	1.3C				0	E0	P114(a) P114(b)	PP26		
0237	CHARGES, SHAPED, FLEXIBLE, LINEAR†	1.4D				0	E0	P138			
0238	ROCKETS, LINE-THROWING†	1.2G				0	E0	P130 LP101			
0240	ROCKETS, LINE-THROWING†	1.3G				0	E0	P130 LP101			
0241	EXPLOSIVE, BLASTING, TYPE E†	1.1D				0	E0	P116 IBC100	PP61 PP62 B10		
0242	CHARGES, PROPELLING, FOR CANNON†	1.3C				0	E0	P130 LP101			
0243	AMMUNITION, INCENDIARY, WHITE PHOSPHORUS with burster, expelling charge or propelling charge†	1.2H				0	E0	P130 LP101	PP67 L1		
0244	AMMUNITION, INCENDIARY, WHITE PHOSPHORUS with burster, expelling charge or propelling charge†	1.3H				0	E0	P130 LP101	PP67 L1		
0245	AMMUNITION, SMOKE, WHITE PHOSPHORUS with burster, expelling charge or propelling charge†	1.2H				0	E0	P130 LP101	PP67 L1		
0246	AMMUNITION, SMOKE, WHITE PHOSPHORUS with burster, expelling charge or propelling charge†	1.3H				0	E0	P130 LP101	PP67 L1		
0247	AMMUNITION, INCENDIARY, liquid or gel, with burster, expelling charge or propelling charge†	1.3J				0	E0	P101			
0248	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge†	1.2L			274	0	E0	P144	PP77		
0249	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge†	1.3L			274	0	E0	P144	PP77		

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0250	ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without expelling charge†	1.3L				0	E0	P101			
0254	AMMUNITION, ILLUMINATING with or without burster, expelling charge or propelling charge†	1.3G				0	E0	P130 LP101	PP67 L1		
0255	DETONATORS, ELECTRIC for blasting†	1.4B				0	E0	P131			
0257	FUZES, DETONATING†	1.4B				0	E0	P141			
0266	OCTOLITE (OCTOL), dry or wetted with less than 15 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0267	DETONATORS, NON-ELECTRIC for blasting†	1.4B				0	E0	P131	PP68		
0268	BOOSTERS WITH DETONATOR†	1.2B				0	E0	P133	PP69		
0271	CHARGES, PROPELLING†	1.1C				0	E0	P143	PP76		
0272	CHARGES, PROPELLING†	1.3C				0	E0	P143	PP76		
0275	CARTRIDGES, POWER DEVICE†	1.3C				0	E0	P134 LP102			
0276	CARTRIDGES, POWER DEVICE†	1.4C				0	E0	P134 LP102			
0277	CARTRIDGES, OIL WELL†	1.3C				0	E0	P134 LP102			
0278	CARTRIDGES, OIL WELL†	1.4C				0	E0	P134 LP102			
0279	CHARGES, PROPELLING, FOR CANNON†	1.1C				0	E0	P130 LP101			
0280	ROCKET MOTORS†	1.1C				0	E0	P130 LP101	PP67 L1		
0281	ROCKET MOTORS†	1.2C				0	E0	P130 LP101	PP67 L1		
0282	NITROGUANIDINE (PICRITE), dry or wetted with less than 20 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0283	BOOSTERS without detonator†	1.2D				0	E0	P132(a) P132(b)			
0284	GRENADES, hand or rifle, with bursting charge†	1.1D				0	E0	P141			
0285	GRENADES, hand or rifle, with bursting charge†	1.2D				0	E0	P141			
0286	WARHEADS, ROCKET with bursting charge†	1.1D				0	E0	P130 LP101	PP67 L1		
0287	WARHEADS, ROCKET with bursting charge†	1.2D				0	E0	P130 LP101	PP67 L1		
0288	CHARGES, SHAPED, FLEXIBLE, LINEAR†	1.1D				0	E0	P138			
0289	CORD, DETONATING, flexible†	1.4D				0	E0	P139	PP71 PP72		
0290	CORD (FUSE), DETONATING, metal clad†	1.1D				0	E0	P139	PP71		
0291	BOMBS with bursting charge†	1.2F				0	E0	P130 LP101			
0292	GRENADES, hand or rifle, with bursting charge†	1.1F				0	E0	P141			
0293	GRENADES, hand or rifle, with bursting charge†	1.2F				0	E0	P141			
0294	MINES with bursting charge†	1.2F				0	E0	P130 LP101			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0295	ROCKETS with bursting charge†	1.2F				0	E0	P130 LP101			
0296	SOUNDING DEVICES, EXPLOSIVE†	1.1F				0	E0	P134 LP102			
0297	AMMUNITION, ILLUMINATING with or without burster, expelling charge or propelling charge†	1.4G				0	E0	P130 LP101	PP67 L1		
0299	BOMBS, PHOTO-FLASH†	1.3G				0	E0	P130 LP101	PP67 L1		
0300	AMMUNITION, INCENDIARY with or without burster, expelling charge or propelling charge†	1.4G				0	E0	P130 LP101	PP67 L1		
0301	AMMUNITION, TEAR-PRODUCING with burster, expelling charge or propelling charge†	1.4G	6.1 8			0	E0	P130 LP101	PP67 L1		
0303	AMMUNITION, SMOKE with or without burster, expelling charge or propelling charge†	1.4G			204	0	E0	P130 LP101	PP67 L1		
0305	FLASH POWDER†	1.3G				0	E0	P113	PP49		
0306	TRACERS FOR AMMUNITION†	1.4G				0	E0	P133	PP69		
0312	CARTRIDGES, SIGNAL†	1.4G				0	E0	P135			
0313	SIGNALS, SMOKE†	1.2G				0	E0	P135			
0314	IGNITERS†	1.2G				0	E0	P142			
0315	IGNITERS†	1.3G				0	E0	P142			
0316	FUZES, IGNITING†	1.3G				0	E0	P141			
0317	FUZES, IGNITING†	1.4G				0	E0	P141			
0318	GRENADES, PRACTICE, hand or rifle†	1.3G				0	E0	P141			
0319	PRIMERS, TUBULAR†	1.3G				0	E0	P133			
0320	PRIMERS, TUBULAR†	1.4G				0	E0	P133			
0321	CARTRIDGES FOR WEAPONS with bursting charge†	1.2E				0	E0	P130 LP101	PP67 L1		
0322	ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without expelling charge†	1.2L				0	E0	P101			
0323	CARTRIDGES, POWER DEVICE†	1.4S			347	0	E0	P134 LP102			
0324	PROJECTILES with bursting charge†	1.2F				0	E0	P130 LP101			
0325	IGNITERS†	1.4G				0	E0	P142			
0326	CARTRIDGES FOR WEAPONS, BLANK†	1.1C				0	E0	P130 LP101			
0327	CARTRIDGES FOR WEAPONS, BLANK or CARTRIDGES, SMALL ARMS, BLANK†	1.3C				0	E0	P130 LP101			
0328	CARTRIDGES FOR WEAPONS, INERT PROJECTILE†	1.2C				0	E0	P130 LP101	PP67 L1		
0329	TORPEDOES with bursting charge†	1.1E				0	E0	P130 LP101	PP67 L1		
0330	TORPEDOES with bursting charge†	1.1F				0	E0	P130 LP101			
0331	EXPLOSIVE, BLASTING, TYPE B† (AGENT, BLASTING, TYPE B)	1.5D				0	E0	P116 IBC100	PP61 PP62 PP64	T1	TP1 TP17 TP32

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0332	EXPLOSIVE, BLASTING, TYPE E† (AGENT, BLASTING, TYPE E)	1.5D				0	E0	P116 IBC100	PP61 PP62	T1	TP1 TP17 TP32
0333	FIREWORKS†	1.1G				0	E0	P135			
0334	FIREWORKS†	1.2G				0	E0	P135			
0335	FIREWORKS†	1.3G				0	E0	P135			
0336	FIREWORKS†	1.4G				0	E0	P135			
0337	FIREWORKS†	1.4S				0	E0	P135			
0338	CARTRIDGES FOR WEAPONS, BLANK or CARTRIDGES, SMALL ARMS, BLANK†	1.4C				0	E0	P130 LP101			
0339	CARTRIDGES FOR WEAPONS, INERT PROJECTILE or CARTRIDGES, SMALL ARMS†	1.4C				0	E0	P130 LP101			
0340	NITROCELLULOSE, dry or wetted with less than 25 % water (or alcohol), by mass†	1.1D			393	0	E0	P112(a) P112(b)			
0341	NITROCELLULOSE, unmodified or plasticized with less than 18 % plasticizing substance, by mass†	1.1D			393	0	E0	P112(b)			
0342	NITROCELLULOSE, WETTED with not less than 25 % alcohol, by mass†	1.3C			105 393	0	E0	P114(a)	PP43		
0343	NITROCELLULOSE, PLASTICIZED with not less than 18 % plasticizing substance, by mass†	1.3C			105 393	0	E0	P111			
0344	PROJECTILES with bursting charge†	1.4D				0	E0	P130 LP101	PP67 L1		
0345	PROJECTILES, inert with tracer†	1.4S				0	E0	P130 LP101	PP67 L1		
0346	PROJECTILES with burster or expelling charge†	1.2D				0	E0	P130 LP101	PP67 L1		
0347	PROJECTILES with burster or expelling charge†	1.4D				0	E0	P130 LP101	PP67 L1		
0348	CARTRIDGES FOR WEAPONS with bursting charge†	1.4F				0	E0	P130 LP101			
0349	ARTICLES, EXPLOSIVE, N.O.S.	1.4S			178 274 347	0	E0	P101			
0350	ARTICLES, EXPLOSIVE, N.O.S.	1.4B			178 274	0	E0	P101			
0351	ARTICLES, EXPLOSIVE, N.O.S.	1.4C			178 274	0	E0	P101			
0352	ARTICLES, EXPLOSIVE, N.O.S.	1.4D			178 274	0	E0	P101			
0353	ARTICLES, EXPLOSIVE, N.O.S.	1.4G			178 274	0	E0	P101			
0354	ARTICLES, EXPLOSIVE, N.O.S.	1.1L			178 274	0	E0	P101			
0355	ARTICLES, EXPLOSIVE, N.O.S.	1.2L			178 274	0	E0	P101			
0356	ARTICLES, EXPLOSIVE, N.O.S.	1.3L			178 274	0	E0	P101			
0357	SUBSTANCES, EXPLOSIVE, N.O.S.	1.1L			178 274	0	E0	P101			
0358	SUBSTANCES, EXPLOSIVE, N.O.S.	1.2L			178 274	0	E0	P101			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0359	SUBSTANCES, EXPLOSIVE, N.O.S.	1.3L			178 274	0	E0	P101			
0360	DETONATOR ASSEMBLIES, NON-ELECTRIC for blasting†	1.1B				0	E0	P131			
0361	DETONATOR ASSEMBLIES, NON-ELECTRIC for blasting†	1.4B				0	E0	P131			
0362	AMMUNITION, PRACTICE†	1.4G				0	E0	P130 LP101	PP67 L1		
0363	AMMUNITION, PROOF†	1.4G				0	E0	P130 LP101	PP67 L1		
0364	DETONATORS FOR AMMUNITION†	1.2B				0	E0	P133			
0365	DETONATORS FOR AMMUNITION†	1.4B				0	E0	P133			
0366	DETONATORS FOR AMMUNITION†	1.4S			347	0	E0	P133			
0367	FUZES, DETONATING†	1.4S			347	0	E0	P141			
0368	FUZES, IGNITING†	1.4S				0	E0	P141			
0369	WARHEADS, ROCKET with bursting charge†	1.1F				0	E0	P130 LP101			
0370	WARHEADS, ROCKET with burster or expelling charge†	1.4D				0	E0	P130 LP101	PP67 L1		
0371	WARHEADS, ROCKET with burster or expelling charge†	1.4F				0	E0	P130 LP101			
0372	GRENADES, PRACTICE, hand or rifle†	1.2G				0	E0	P141			
0373	SIGNAL DEVICES, HAND†	1.4S				0	E0	P135			
0374	SOUNDING DEVICES, EXPLOSIVE†	1.1D				0	E0	P134 LP102			
0375	SOUNDING DEVICES, EXPLOSIVE†	1.2D				0	E0	P134 LP102			
0376	PRIMERS, TUBULAR†	1.4S				0	E0	P133			
0377	PRIMERS, CAP TYPE†	1.1B				0	E0	P133			
0378	PRIMERS, CAP TYPE†	1.4B				0	E0	P133			
0379	CASES, CARTRIDGE, EMPTY, WITH PRIMER†	1.4C				0	E0	P136			
0380	ARTICLES, PYROPHORIC†	1.2L				0	E0	P101			
0381	CARTRIDGES, POWER DEVICE†	1.2C				0	E0	P134 LP102			
0382	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.†	1.2B			178 274	0	E0	P101			
0383	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.†	1.4B			178 274	0	E0	P101			
0384	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.†	1.4S			178 274 347	0	E0	P101			
0385	5-NITROBENZOTRIAZOL†	1.1D				0	E0	P112(b) P112(c)			
0386	TRINITROBENZENE-SULPHONIC ACID†	1.1D				0	E0	P112(b) P112(c)	PP26		
0387	TRINITROFLUORENONE†	1.1D				0	E0	P112(b) P112(c)			
0388	TRINITROTOLUENE (TNT) AND TRINITROBENZENE MIXTURE or TRINITROTOLUENE (TNT) AND HEXANITROSTILBENE MIXTURE†	1.1D				0	E0	P112(b) P112(c)			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0389	TRINITROTOLUENE (TNT) MIXTURE CONTAINING TRINITROBENZENE AND HEXANITROSTILBENE†	1.1D				0	E0	P112(b) P112(c)			
0390	TRITONAL†	1.1D				0	E0	P112(b) P112(c)			
0391	CYCLOTRIMETHYLENE-TRINITRAMINE (CYCLONITE; HEXOGEN; RDX) AND CYCLOTETRAMETHYLENE-TETRANITRAMINE (HMX; OCTOGEN) MIXTURE, WETTED with not less than 15 % water, by mass or CYCLOTRIMETHYLENE-TRINITRAMINE (CYCLONITE; HEXOGEN; RDX) AND CYCLOTETRAMETHYLENE-TETRANITRAMINE (HMX; OCTOGEN) MIXTURE, DESENSITIZED with not less than 10 % phlegmatizer, by mass†	1.1D			266	0	E0	P112(a) P112(b)			
0392	HEXANITROSTILBENE†	1.1D				0	E0	P112(b) P112(c)			
0393	HEXOTONAL†	1.1D				0	E0	P112(b)			
0394	TRINITRORESORCINOL (STYPHNIC ACID), WETTED with not less than 20 % water, or mixture of alcohol and water, by mass†	1.1D				0	E0	P112(a)	PP26		
0395	ROCKET MOTORS, LIQUID FUELLED†	1.2J				0	E0	P101			
0396	ROCKET MOTORS, LIQUID FUELLED†	1.3J				0	E0	P101			
0397	ROCKETS, LIQUID FUELLED with bursting charge†	1.1J				0	E0	P101			
0398	ROCKETS, LIQUID FUELLED with bursting charge†	1.2J				0	E0	P101			
0399	BOMBS WITH FLAMMABLE LIQUID with bursting charge†	1.1J				0	E0	P101			
0400	BOMBS WITH FLAMMABLE LIQUID with bursting charge†	1.2J				0	E0	P101			
0401	DIPICRYL SULPHIDE, dry or wetted with less than 10 % water, by mass†	1.1D				0	E0	P112(a) P112(b) P112(c)			
0402	AMMONIUM PERCHLORATE†	1.1D			152	0	E0	P112(b) P112(c)			
0403	FLARES, AERIAL†	1.4G				0	E0	P135			
0404	FLARES, AERIAL†	1.4S				0	E0	P135			
0405	CARTRIDGES, SIGNAL†	1.4S				0	E0	P135			
0406	DINITROSOBENZENE†	1.3C				0	E0	P114(b)			
0407	TETRAZOL-1-ACETIC ACID†	1.4C				0	E0	P114(b)			
0408	FUZES, DETONATING with protective features†	1.1D				0	E0	P141			
0409	FUZES, DETONATING with protective features†	1.2D				0	E0	P141			
0410	FUZES, DETONATING with protective features†	1.4D				0	E0	P141			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0411	PENTAERYTHRITE TETRANITRATE (PENTAERYTHRITOL TETRANITRATE; PETN) with not less than 7 % wax, by mass†	1.1D			131	0	E0	P112(b) P112(c)			
0412	CARTRIDGES FOR WEAPONS with bursting charge†	1.4E				0	E0	P130 LP101	PP67 L1		
0413	CARTRIDGES FOR WEAPONS, BLANK†	1.2C				0	E0	P130 LP101			
0414	CHARGES, PROPELLING, FOR CANNON†	1.2C				0	E0	P130 LP101			
0415	CHARGES, PROPELLING†	1.2C				0	E0	P143	PP76		
0417	CARTRIDGES FOR WEAPONS, INERT PROJECTILE or CARTRIDGES, SMALL ARMS†	1.3C				0	E0	P130 LP101			
0418	FLARES, SURFACE†	1.1G				0	E0	P135			
0419	FLARES, SURFACE†	1.2G				0	E0	P135			
0420	FLARES, AERIAL†	1.1G				0	E0	P135			
0421	FLARES, AERIAL†	1.2G				0	E0	P135			
0424	PROJECTILES, inert with tracer†	1.3G				0	E0	P130 LP101	PP67 L1		
0425	PROJECTILES, inert with tracer†	1.4G				0	E0	P130 LP101	PP67 L1		
0426	PROJECTILES with burster or expelling charge†	1.2F				0	E0	P130 LP101			
0427	PROJECTILES with burster or expelling charge†	1.4F				0	E0	P130 LP101			
0428	ARTICLES, PYROTECHNIC for technical purposes†	1.1G				0	E0	P135			
0429	ARTICLES, PYROTECHNIC for technical purposes†	1.2G				0	E0	P135			
0430	ARTICLES, PYROTECHNIC for technical purposes†	1.3G				0	E0	P135			
0431	ARTICLES, PYROTECHNIC for technical purposes†	1.4G				0	E0	P135			
0432	ARTICLES, PYROTECHNIC for technical purposes†	1.4S				0	E0	P135			
0433	POWDER CAKE (POWDER PASTE), WETTED with not less than 17 % alcohol, by mass†	1.1C			266	0	E0	P111			
0434	PROJECTILES with burster or expelling charge†	1.2G				0	E0	P130 LP101	PP67 L1		
0435	PROJECTILES with burster or expelling charge†	1.4G				0	E0	P130 LP101	PP67 L1		
0436	ROCKETS with expelling charge†	1.2C				0	E0	P130 LP101	PP67 L1		
0437	ROCKETS with expelling charge†	1.3C				0	E0	P130 LP101	PP67 L1		
0438	ROCKETS with expelling charge†	1.4C				0	E0	P130 LP101	PP67 L1		
0439	CHARGES, SHAPED, without detonator†	1.2D				0	E0	P137	PP70		
0440	CHARGES, SHAPED, without detonator†	1.4D				0	E0	P137	PP70		
0441	CHARGES, SHAPED, without detonator†	1.4S			347	0	E0	P137	PP70		
0442	CHARGES, EXPLOSIVE, COMMERCIAL without detonator†	1.1D				0	E0	P137			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0443	CHARGES, EXPLOSIVE, COMMERCIAL without detonator†	1.2D				0	E0	P137			
0444	CHARGES, EXPLOSIVE, COMMERCIAL without detonator†	1.4D				0	E0	P137			
0445	CHARGES, EXPLOSIVE, COMMERCIAL without detonator†	1.4S			347	0	E0	P137			
0446	CASES, COMBUSTIBLE, EMPTY, WITHOUT PRIMER†	1.4C				0	E0	P136			
0447	CASES, COMBUSTIBLE, EMPTY, WITHOUT PRIMER†	1.3C				0	E0	P136			
0448	5-MERCAPTOTETRAZOL-1-ACETIC ACID†	1.4C				0	E0	P114(b)			
0449	TORPEDOES, LIQUID FUELLED with or without bursting charge†	1.1J				0	E0	P101			
0450	TORPEDOES, LIQUID FUELLED with inert head†	1.3J				0	E0	P101			
0451	TORPEDOES with bursting charge†	1.1D				0	E0	P130 LP101	PP67 L1		
0452	GRENADES, PRACTICE, hand or rifle†	1.4G				0	E0	P141			
0453	ROCKETS, LINE-THROWING†	1.4G				0	E0	P130 LP101			
0454	IGNITERS†	1.4S				0	E0	P142			
0455	DETONATORS, NON-ELECTRIC for blasting†	1.4S			347	0	E0	P131	PP68		
0456	DETONATORS, ELECTRIC for blasting†	1.4S			347	0	E0	P131			
0457	CHARGES, BURSTING, PLASTICS BONDED	1.1D				0	E0	P130 LP101			
0458	CHARGES, BURSTING, PLASTICS BONDED	1.2D				0	E0	P130 LP101			
0459	CHARGES, BURSTING, PLASTICS BONDED	1.4D				0	E0	P130 LP101			
0460	CHARGES, BURSTING, PLASTICS BONDED	1.4S			347	0	E0	P130 LP101			
0461	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.†	1.1B			178 274	0	E0	P101			
0462	ARTICLES, EXPLOSIVE, N.O.S.	1.1C			178 274	0	E0	P101			
0463	ARTICLES, EXPLOSIVE, N.O.S.	1.1D			178 274	0	E0	P101			
0464	ARTICLES, EXPLOSIVE, N.O.S.	1.1E			178 274	0	E0	P101			
0465	ARTICLES, EXPLOSIVE, N.O.S.	1.1F			178 274	0	E0	P101			
0466	ARTICLES, EXPLOSIVE, N.O.S.	1.2C			178 274	0	E0	P101			
0467	ARTICLES, EXPLOSIVE, N.O.S.	1.2D			178 274	0	E0	P101			
0468	ARTICLES, EXPLOSIVE, N.O.S.	1.2E			178 274	0	E0	P101			
0469	ARTICLES, EXPLOSIVE, N.O.S.	1.2F			178 274	0	E0	P101			
0470	ARTICLES, EXPLOSIVE, N.O.S.	1.3C			178 274	0	E0	P101			
0471	ARTICLES, EXPLOSIVE, N.O.S.	1.4E			178 274	0	E0	P101			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0472	ARTICLES, EXPLOSIVE, N.O.S.	1.4F			178 274	0	E0	P101			
0473	SUBSTANCES, EXPLOSIVE, N.O.S.	1.1A			178 274	0	E0	P101			
0474	SUBSTANCES, EXPLOSIVE, N.O.S.	1.1C			178 274	0	E0	P101			
0475	SUBSTANCES, EXPLOSIVE, N.O.S.	1.1D			178 274	0	E0	P101			
0476	SUBSTANCES, EXPLOSIVE, N.O.S.	1.1G			178 274	0	E0	P101			
0477	SUBSTANCES, EXPLOSIVE, N.O.S.	1.3C			178 274	0	E0	P101			
0478	SUBSTANCES, EXPLOSIVE, N.O.S.	1.3G			178 274	0	E0	P101			
0479	SUBSTANCES, EXPLOSIVE, N.O.S.	1.4C			178 274	0	E0	P101			
0480	SUBSTANCES, EXPLOSIVE, N.O.S.	1.4D			178 274	0	E0	P101			
0481	SUBSTANCES, EXPLOSIVE, N.O.S.	1.4S			178 274 347	0	E0	P101			
0482	SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE (SUBSTANCES, EVI), N.O.S.†	1.5D			178 274	0	E0	P101			
0483	CYCLOTRIMETHYLENE-TRINITRAMINE (CYCLONITE; HEXOGEN; RDX), DESENSITIZED	1.1D				0	E0	P112(b) P112(c)			
0484	CYCLOTETRAMETHYLENE-TETRANITRAMINE (HMX; OCTOGEN), DESENSITIZED	1.1D				0	E0	P112(b) P112(c)			
0485	SUBSTANCES, EXPLOSIVE, N.O.S.	1.4G			178 274	0	E0	P101			
0486	ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES, EEI)†	1.6N				0	E0	P101			
0487	SIGNALS, SMOKE†	1.3G				0	E0	P135			
0488	AMMUNITION, PRACTICE†	1.3G				0	E0	P130 LP101	PP67 L1		
0489	DINITROGLYCOLURIL (DINGU)†	1.1D				0	E0	P112(b) P112(c)			
0490	NITROTRIAZOLONE (NTO)†	1.1D				0	E0	P112(b) P112(c)			
0491	CHARGES, PROPELLING†	1.4C				0	E0	P143	PP76		
0492	SIGNALS, RAILWAY TRACK, EXPLOSIVE†	1.3G				0	E0	P135			
0493	SIGNALS, RAILWAY TRACK, EXPLOSIVE†	1.4G				0	E0	P135			
0494	JET PERFORATING GUNS, CHARGED, oil well, without detonator†	1.4D				0	E0	P101			
0495	PROPELLANT, LIQUID†	1.3C			224	0	E0	P115	PP53 PP54 PP57 PP58		
0496	OCTONAL	1.1D				0	E0	P112(b) P112(c)			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
0497	PROPELLANT, LIQUID†	1.1C			224	0	E0	P115	PP53 PP54 PP57 PP58		
0498	PROPELLANT, SOLID†	1.1C				0	E0	P114(b)			
0499	PROPELLANT, SOLID†	1.3C				0	E0	P114(b)			
0500	DETONATOR ASSEMBLIES, NON-ELECTRIC for blasting†	1.4S			347	0	E0	P131			
0501	PROPELLANT, SOLID†	1.4C				0	E0	P114(b)			
0502	ROCKETS with inert head†	1.2C				0	E0	P130 LP101	PP67 L1		
0503	SAFETY DEVICES, PYROTECHNIC†	1.4G			235 289	0	E0	P135			
0504	1H-TETRAZOLE	1.1D				0	E0	P112(c)	PP48		
0505	SIGNALS, DISTRESS, ship†	1.4G				0	E0	P135			
0506	SIGNALS, DISTRESS, ship†	1.4S				0	E0	P135			
0507	SIGNALS, SMOKE†	1.4S				0	E0	P135			
0508	1-HYDROXYBENZOTRIAZOLE, ANHYDROUS, dry or wetted with less than 20 % water, by mass	1.3C				0	E0	P114(b)	PP48 PP50		
0509	POWDER, SMOKELESS†	1.4C				0	E0	P114(b)	PP48		
0510	ROCKET MOTORS†	1.4C				0	E0	P130 LP101	PP67 L1		
0511	DETONATORS, ELECTRONIC programmable for blasting†	1.1B				0	E0	P131			
0512	DETONATORS, ELECTRONIC programmable for blasting†	1.4B				0	E0	P131			
0513	DETONATORS, ELECTRONIC programmable for blasting†	1.4S			347	0	E0	P131			
1001	ACETYLENE, DISSOLVED	2.1				0	E0	P200			
1002	AIR, COMPRESSED	2.2			392 397	120 ml	E1	P200			
1003	AIR, REFRIGERATED LIQUID	2.2	5.1			0	E0	P203		T75	TP5 TP22
1005	AMMONIA, ANHYDROUS	2.3	8		23 379	0	E0	P200		T50	
1006	ARGON, COMPRESSED	2.2			378 392	120 ml	E1	P200			
1008	BORON TRIFLUORIDE	2.3	8		373	0	E0	P200			
1009	BROMOTRIFLUOROMETHANE (REFRIGERANT GAS R 13B1)	2.2				120 ml	E1	P200		T50	
1010	BUTADIENES, STABILIZED or BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, containing more than 40 % butadienes	2.1			386	0	E0	P200		T50	
1011	BUTANE	2.1			392	0	E0	P200		T50	
1012	BUTYLENE	2.1			398	0	E0	P200		T50	
1013	CARBON DIOXIDE	2.2			378 392	120 ml	E1	P200			
1016	CARBON MONOXIDE, COMPRESSED	2.3	2.1			0	E0	P200			
1017	CHLORINE	2.3	5.1 8			0	E0	P200		T50	TP19
1018	CHLORODIFLUOROMETHANE (REFRIGERANT GAS R 22)	2.2				120 ml	E1	P200		T50	

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1020	CHLOROPENTAFLUORO-ETHANE (REFRIGERANT GAS R 115)	2.2				120 ml	E1	P200		T50	
1021	1-CHLORO-1,2,2,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 124)	2.2				120 ml	E1	P200		T50	
1022	CHLOROTRIFLUORO-METHANE (REFRIGERANT GAS R 13)	2.2				120 ml	E1	P200			
1023	COAL GAS, COMPRESSED	2.3	2.1			0	E0	P200			
1026	CYANOGEN	2.3	2.1			0	E0	P200			
1027	CYCLOPROPANE	2.1				0	E0	P200		T50	
1028	DICHLORODIFLUORO-METHANE (REFRIGERANT GAS R 12)	2.2				120 ml	E1	P200		T50	
1029	DICHLOROFLUOROMETHANE (REFRIGERANT GAS R 21)	2.2				120 ml	E1	P200		T50	
1030	1,1-DIFLUOROETHANE (REFRIGERANT GAS R 152a)	2.1				0	E0	P200		T50	
1032	DIMETHYLAMINE, ANHYDROUS	2.1				0	E0	P200		T50	
1033	DIMETHYL ETHER	2.1				0	E0	P200		T50	
1035	ETHANE	2.1				0	E0	P200			
1036	ETHYLAMINE	2.1				0	E0	P200		T50	
1037	ETHYL CHLORIDE	2.1				0	E0	P200		T50	
1038	ETHYLENE, REFRIGERATED LIQUID	2.1				0	E0	P203		T75	TP5
1039	ETHYL METHYL ETHER	2.1				0	E0	P200			
1040	ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C	2.3	2.1		342	0	E0	P200		T50	TP20
1041	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9 % but not more than 87 % ethylene oxide	2.1				0	E0	P200		T50	
1043	FERTILIZER AMMONIATING SOLUTION with free ammonia	2.2				120 ml	E0	P200			
1044	FIRE EXTINGUISHERS with compressed or liquefied gas	2.2			225	120 ml	E0	P003	PP91		
1045	FLUORINE, COMPRESSED	2.3	5.1 8			0	E0	P200			
1046	HELIUM, COMPRESSED	2.2			378 392	120 ml	E1	P200			
1048	HYDROGEN BROMIDE, ANHYDROUS	2.3	8			0	E0	P200			
1049	HYDROGEN, COMPRESSED	2.1			392	0	E0	P200			
1050	HYDROGEN CHLORIDE, ANHYDROUS	2.3	8			0	E0	P200			
1051	HYDROGEN CYANIDE, STABILIZED containing less than 3 % water	6.1	3	I	386	0	E0	P200			
1052	HYDROGEN FLUORIDE, ANHYDROUS	8	6.1	I		0	E0	P200		T10	TP2
1053	HYDROGEN SULPHIDE	2.3	2.1			0	E0	P200			
1055	ISOBUTYLENE	2.1				0	E0	P200		T50	
1056	KRYPTON, COMPRESSED	2.2			378 392	120 ml	E1	P200			

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1057	LIGHTERS or LIGHTER REFILLS containing flammable gas	2.1			201	0	E0	P002	PP84		
1058	LIQUEFIED GASES, non-flammable, charged with nitrogen, carbon dioxide or air	2.2			392	120 ml	E1	P200			
1060	METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED	2.1			386	0	E0	P200		T50	
1061	METHYLAMINE, ANHYDROUS	2.1				0	E0	P200		T50	
1062	METHYL BROMIDE with not more than 2 % chloropicrin	2.3			23	0	E0	P200		T50	
1063	METHYL CHLORIDE (REFRIGERANT GAS R 40)	2.1				0	E0	P200		T50	
1064	METHYL MERCAPTAN	2.3	2.1			0	E0	P200		T50	
1065	NEON, COMPRESSED	2.2			378 392	120 ml	E1	P200			
1066	NITROGEN, COMPRESSED	2.2			378 392	120 ml	E1	P200			
1067	DINITROGEN TETROXIDE (NITROGEN DIOXIDE)	2.3	5.1 8			0	E0	P200		T50	TP21
1069	NITROSYL CHLORIDE	2.3	8			0	E0	P200			
1070	NITROUS OXIDE	2.2	5.1			0	E0	P200			
1071	OIL GAS, COMPRESSED	2.3	2.1			0	E0	P200			
1072	OXYGEN, COMPRESSED	2.2	5.1		355	0	E0	P200			
1073	OXYGEN, REFRIGERATED LIQUID	2.2	5.1			0	E0	P203		T75	TP5 TP22
1075	PETROLEUM GASES, LIQUEFIED	2.1			392	0	E0	P200		T50	
1076	PHOSGENE	2.3	8			0	E0	P200			
1077	PROPYLENE	2.1				0	E0	P200		T50	
1078	REFRIGERANT GAS, N.O.S.	2.2			274	120 ml	E1	P200		T50	
1079	SULPHUR DIOXIDE	2.3	8			0	E0	P200		T50	TP19
1080	SULPHUR HEXAFLUORIDE	2.2			392	120 ml	E1	P200			
1081	TETRAFLUOROETHYLENE, STABILIZED	2.1			386	0	E0	P200			
1082	TRIFLUOROCHLORO-ETHYLENE, STABILIZED (REFRIGERANT GAS R 1113)	2.3	2.1		386	0	E0	P200		T50	
1083	TRIMETHYLAMINE, ANHYDROUS	2.1				0	E0	P200		T50	
1085	VINYL BROMIDE, STABILIZED	2.1			386	0	E0	P200		T50	
1086	VINYL CHLORIDE, STABILIZED	2.1			386	0	E0	P200		T50	
1087	VINYL METHYL ETHER, STABILIZED	2.1			386	0	E0	P200		T50	
1088	ACETAL	3		II		1 L	E2	P001 IBC02		T4	TP1
1089	ACETALDEHYDE	3		I		0	E0	P001		T11	TP2 TP7
1090	ACETONE	3		II		1 L	E2	P001 IBC02		T4	TP1
1091	ACETONE OILS	3		II		1 L	E2	P001 IBC02		T4	TP1 TP8
1092	ACROLEIN, STABILIZED	6.1	3	I	354 386	0	E0	P601		T22	TP2 TP7 TP13

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1093	ACRYLONITRILE, STABILIZED	3	6.1	I	386	0	E0	P001		T14	TP2 TP13
1098	ALLYL ALCOHOL	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
1099	ALLYL BROMIDE	3	6.1	I		0	E0	P001		T14	TP2 TP13
1100	ALLYL CHLORIDE	3	6.1	I		0	E0	P001		T14	TP2 TP13
1104	AMYL ACETATES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1105	PENTANOLS	3		II		1 L	E2	P001 IBC02		T4	TP1 TP29
1105	PENTANOLS	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1106	AMYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1106	AMYLAMINE	3	8	III	223	5 L	E1	P001 IBC03		T4	TP1
1107	AMYL CHLORIDE	3		II		1 L	E2	P001 IBC02		T4	TP1
1108	1-PENTENE (n-AMYLENE)	3		I		0	E3	P001		T11	TP2
1109	AMYL FORMATES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1110	n-AMYL METHYL KETONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1111	AMYL MERCAPTAN	3		II		1 L	E2	P001 IBC02		T4	TP1
1112	AMYL NITRATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1113	AMYL NITRITE	3		II		1 L	E2	P001 IBC02		T4	TP1
1114	BENZENE	3		II		1 L	E2	P001 IBC02		T4	TP1
1120	BUTANOLS	3		II		1 L	E2	P001 IBC02		T4	TP1 TP29
1120	BUTANOLS	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1123	BUTYL ACETATES	3		II		1 L	E2	P001 IBC02		T4	TP1
1123	BUTYL ACETATES	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1125	n-BUTYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1126	1-BROMOBUTANE	3		II		1 L	E2	P001 IBC02		T4	TP1
1127	CHLOROBUTANES	3		II		1 L	E2	P001 IBC02		T4	TP1
1128	n-BUTYL FORMATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1129	BUTYRALDEHYDE	3		II		1 L	E2	P001 IBC02		T4	TP1

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1130	CAMPHOR OIL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1131	CARBON DISULPHIDE	3	6.1	I		0	E0	P001	PP31	T14	TP2 TP7 TP13
1133	ADHESIVES containing flammable liquid	3		I		500 ml	E3	P001		T11	TP1 TP8 TP27
1133	ADHESIVES containing flammable liquid	3		II		5 L	E2	P001 IBC02	PP1	T4	TP1 TP8
1133	ADHESIVES containing flammable liquid	3		III	223	5 L	E1	P001 IBC03 LP01	PP1	T2	TP1
1134	CHLOROBENZENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1135	ETHYLENE CHLOROHYDRIN	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
1136	COAL TAR DISTILLATES, FLAMMABLE	3		II		1 L	E2	P001 IBC02		T4	TP1
1136	COAL TAR DISTILLATES, FLAMMABLE	3		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
1139	COATING SOLUTION (includes surface treatments or coatings used for industrial or other purposes such as vehicle undercoating, drum or barrel lining)	3		I		500 ml	E3	P001		T11	TP1 TP8 TP27
1139	COATING SOLUTION (includes surface treatments or coatings used for industrial or other purposes such as vehicle undercoating, drum or barrel lining)	3		II		5 L	E2	P001 IBC02		T4	TP1 TP8
1139	COATING SOLUTION (includes surface treatments or coatings used for industrial or other purposes such as vehicle undercoating, drum or barrel lining)	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1143	CROTONALDEHYDE or CROTONALDEHYDE, STABILIZED	6.1	3	I	324 354 386	0	E0	P602		T20	TP2 TP13
1144	CROTONYLENE	3		I		0	E3	P001		T11	TP2
1145	CYCLOHEXANE	3		II		1 L	E2	P001 IBC02		T4	TP1
1146	CYCLOPENTANE	3		II		1 L	E2	P001 IBC02		T7	TP1
1147	DECAHYDRONAPHTHALENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1148	DIACETONE ALCOHOL	3		II		1 L	E2	P001 IBC02		T4	TP1
1148	DIACETONE ALCOHOL	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1149	DIBUTYL ETHERS	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1150	1,2-DICHLOROETHYLENE	3		II		1 L	E2	P001 IBC02		T7	TP2

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1152	DICHLOROPENTANES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1153	ETHYLENE GLYCOL DIETHYL ETHER	3		II		1 L	E2	P001 IBC02		T4	TP1
1153	ETHYLENE GLYCOL DIETHYL ETHER	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1154	DIETHYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1155	DIETHYL ETHER (ETHYL ETHER)	3		I		0	E3	P001		T11	TP2
1156	DIETHYL KETONE	3		II		1 L	E2	P001 IBC02		T4	TP1
1157	DIISOBUTYL KETONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1158	DIISOPROPYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1159	DIISOPROPYL ETHER	3		II		1 L	E2	P001 IBC02		T4	TP1
1160	DIMETHYLAMINE AQUEOUS SOLUTION	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1161	DIMETHYL CARBONATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1162	DIMETHYLDICHLOROSILANE	3	8	II		0	E0	P010		T10	TP2 TP7 TP13
1163	DIMETHYLHYDRAZINE, UNSYMMETRICAL	6.1	3 8	I	354	0	E0	P602		T20	TP2 TP13
1164	DIMETHYL SULPHIDE	3		II		1 L	E2	P001 IBC02	B8	T7	TP2
1165	DIOXANE	3		II		1 L	E2	P001 IBC02		T4	TP1
1166	DIOXOLANE	3		II		1 L	E2	P001 IBC02		T4	TP1
1167	DIVINYL ETHER, STABILIZED	3		I	386	0	E3	P001		T11	TP2
1170	ETHANOL (ETHYL ALCOHOL) or ETHANOL SOLUTION (ETHYL ALCOHOL SOLUTION)	3		II	144	1 L	E2	P001 IBC02		T4	TP1
1170	ETHANOL (ETHYL ALCOHOL) or ETHANOL SOLUTION (ETHYL ALCOHOL SOLUTION)	3		III	144 223	5 L	E1	P001 IBC03 LP01		T2	TP1
1171	ETHYLENE GLYCOL MONOETHYL ETHER	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1172	ETHYLENE GLYCOL MONOETHYL ETHER ACETATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1173	ETHYL ACETATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1175	ETHYLBENZENE	3		II		1 L	E2	P001 IBC02		T4	TP1
1176	ETHYL BORATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1177	2-ETHYLBUTYL ACETATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1178	2-ETHYLBUTYRALDEHYDE	3		II		1 L	E2	P001 IBC02		T4	TP1
1179	ETHYL BUTYL ETHER	3		II		1 L	E2	P001 IBC02		T4	TP1
1180	ETHYL BUTYRATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1181	ETHYL CHLOROACETATE	6.1	3	II		100 ml	E4	P001 IBC02		T7	TP2
1182	ETHYL CHLOROFORMATE	6.1	3 8	I	354	0	E0	P602		T20	TP2 TP13
1183	ETHYLDICHLOROSILANE	4.3	3 8	I		0	E0	P401		T14	TP2 TP7 TP13
1184	ETHYLENE DICHLORIDE	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1
1185	ETHYLENEIMINE, STABILIZED	6.1	3	I	354 386	0	E0	P601		T22	TP2 TP13
1188	ETHYLENE GLYCOL MONOMETHYL ETHER	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1189	ETHYLENE GLYCOL MONOMETHYL ETHER ACETATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1190	ETHYL FORMATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1191	OCTYL ALDEHYDES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1192	ETHYL LACTATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1193	ETHYL METHYL KETONE (METHYL ETHYL KETONE)	3		II		1 L	E2	P001 IBC02		T4	TP1
1194	ETHYL NITRITE SOLUTION	3	6.1	I		0	E0	P001			
1195	ETHYL PROPIONATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1196	ETHYLTRICHLOROSILANE	3	8	II		0	E0	P010		T10	TP2 TP7 TP13
1197	EXTRACTS, LIQUID, for flavour or aroma	3		II		5 L	E2	P001 IBC02		T4	TP1 TP8
1197	EXTRACTS, LIQUID, for flavour or aroma	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1198	FORMALDEHYDE SOLUTION, FLAMMABLE	3	8	III		5 L	E1	P001 IBC03		T4	TP1
1199	FURALDEHYDES	6.1	3	II		100 ml	E4	P001 IBC02		T7	TP2
1201	FUSEL OIL	3		II		1 L	E2	P001 IBC02		T4	TP1
1201	FUSEL OIL	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1202	GAS OIL or DIESEL FUEL or HEATING OIL, LIGHT	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1203	MOTOR SPIRIT or GASOLINE or PETROL	3		II	243	1 L	E2	P001 IBC02		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1204	NITROGLYCERIN SOLUTION IN ALCOHOL with not more than 1 % nitroglycerin	3		II		1 L	E0	P001 IBC02	PP5		
1206	HEPTANES	3		II		1 L	E2	P001 IBC02		T4	TP1
1207	HEXALDEHYDE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1208	HEXANES	3		II		1 L	E2	P001 IBC02		T4	TP1
1210	PRINTING INK, flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable	3		I	163 367	500 ml	E3	P001		T11	TP1 TP8
1210	PRINTING INK, flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable	3		II	163 367	5 L	E2	P001 IBC02	PP1	T4	TP1TP8
1210	PRINTING INK, flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable	3		III	163 223 367	5 L	E1	P001 IBC03 LP01	PP1	T2	TP1
1212	ISOBUTANOL (ISOBUTYL ALCOHOL)	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1213	ISOBUTYL ACETATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1214	ISOBUTYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1216	ISOOCTENES	3		II		1 L	E2	P001 IBC02		T4	TP1
1218	ISOPRENE, STABILIZED	3		I	386	0	E3	P001		T11	TP2
1219	ISOPROPANOL (ISOPROPYL ALCOHOL)	3		II		1 L	E2	P001 IBC02		T4	TP1
1220	ISOPROPYL ACETATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1221	ISOPROPYLAMINE	3	8	I		0	E0	P001		T11	TP2
1222	ISOPROPYL NITRATE	3		II	26	1 L	E2	P001 IBC02	B7		
1223	KEROSENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP2
1224	KETONES, LIQUID, N.O.S.	3		II	274	1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
1224	KETONES, LIQUID, N.O.S.	3		III	223 274	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
1228	MERCAPTANS, LIQUID, FLAMMABLE, TOXIC, N.O.S. or MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	6.1	II	274	1 L	E0	P001 IBC02		T11	TP2 TP27
1228	MERCAPTANS, LIQUID, FLAMMABLE, TOXIC, N.O.S. or MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1229	MESITYL OXIDE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1230	METHANOL	3	6.1	II	279	1 L	E2	P001 IBC02		T7	TP2
1231	METHYL ACETATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1233	METHYLAMYL ACETATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1234	METHYLAL	3		II		1 L	E2	P001 IBC02	B8	T7	TP2
1235	METHYLAMINE, AQUEOUS SOLUTION	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1237	METHYL BUTYRATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1238	METHYL CHLOROFORMATE	6.1	3 8	I	354	0	E0	P602		T22	TP2 TP13
1239	METHYL CHLOROMETHYL ETHER	6.1	3	I	354	0	E0	P602		T22	TP2 TP13
1242	METHYLDICHLOROSILANE	4.3	3 8	I		0	E0	P401		T14	TP2 TP7 TP13
1243	METHYL FORMATE	3		I		0	E3	P001		T11	TP2
1244	METHYLHYDRAZINE	6.1	3 8	I	354	0	E0	P602		T22	TP2 TP13
1245	METHYL ISOBUTYL KETONE	3		II		1 L	E2	P001 IBC02		T4	TP1
1246	METHYL ISOPROPENYL KETONE, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1
1247	METHYL METHACRYLATE MONOMER, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1
1248	METHYL PROPIONATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1249	METHYL PROPYL KETONE	3		II		1 L	E2	P001 IBC02		T4	TP1
1250	METHYLTRICHLOROSILANE	3	8	II		0	E0	P010		T10	TP2 TP7 TP13
1251	METHYL VINYL KETONE, STABILIZED	6.1	3 8	I	354 386	0	E0	P601		T22	TP2 TP13
1259	NICKEL CARBONYL	6.1	3	I		0	E0	P601			
1261	NITROMETHANE	3		II	26	1 L	E0	P001			
1262	OCTANES	3		II		1 L	E2	P001 IBC02		T4	TP1
1263	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or reducing compound)	3		I	163 367	500 ml	E3	P001		T11	TP1 TP8 TP27
1263	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or reducing compound)	3		II	163 367	5 L	E2	P001 IBC02	PP1	T4	TP1 TP8 TP28

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1263	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or reducing compound)	3		III	163 223 367	5 L	E1	P001 IBC03 LP01	PP1	T2	TP1 TP29
1264	PARALDEHYDE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1265	PENTANES, liquid	3		I		0	E3	P001		T11	TP2
1265	PENTANES, liquid	3		II		1 L	E2	P001 IBC02	B8	T4	TP1
1266	PERFUMERY PRODUCTS with flammable solvents	3		II	163	5 L	E2	P001 IBC02		T4	TP1 TP8
1266	PERFUMERY PRODUCTS with flammable solvents	3		III	163 223	5 L	E1	P001 IBC03 LP01		T2	TP1
1267	PETROLEUM CRUDE OIL	3		I	357	500 ml	E3	P001		T11	TP1 TP8
1267	PETROLEUM CRUDE OIL	3		II	357	1 L	E2	P001 IBC02		T4	TP1 TP8
1267	PETROLEUM CRUDE OIL	3		III	223 357	5 L	E1	P001 IBC03 LP01		T2	TP1
1268	PETROLEUM DISTILLATES, N.O.S. or PETROLEUM PRODUCTS, N.O.S.	3		I		500 ml	E3	P001		T11	TP1 TP8
1268	PETROLEUM DISTILLATES, N.O.S. or PETROLEUM PRODUCTS, N.O.S.	3		II		1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
1268	PETROLEUM DISTILLATES, N.O.S. or PETROLEUM PRODUCTS, N.O.S.	3		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
1272	PINE OIL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1274	n-PROPANOL (PROPYL ALCOHOL, NORMAL)	3		II		1 L	E2	P001 IBC02		T4	TP1
1274	n-PROPANOL (PROPYL ALCOHOL, NORMAL)	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1275	PROPIONALDEHYDE	3		II		1 L	E2	P001 IBC02		T7	TP1
1276	n-PROPYL ACETATE	3		II		1 L	E2	P001 IBC02		T4	TP1
1277	PROPYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1278	1-CHLOROPROPANE	3		II		1 L	E0	P001 IBC02	B8	T7	TP2
1279	1,2-DICHLOROPROPANE	3		II		1 L	E2	P001 IBC02		T4	TP1
1280	PROPYLENE OXIDE	3		I		0	E3	P001		T11	TP2 TP7
1281	PROPYL FORMATES	3		II		1 L	E2	P001 IBC02		T4	TP1
1282	PYRIDINE	3		II		1 L	E2	P001 IBC02		T4	TP2
1286	ROSIN OIL	3		II		5 L	E2	P001 IBC02		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1286	ROSIN OIL	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1287	RUBBER SOLUTION	3		II		5 L	E2	P001 IBC02		T4	TP1 TP8
1287	RUBBER SOLUTION	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1288	SHALE OIL	3		II		1 L	E2	P001 IBC02		T4	TP1 TP8
1288	SHALE OIL	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1289	SODIUM METHYLATE SOLUTION in alcohol	3	8	II		1 L	E2	P001 IBC02		T7	TP1 TP8
1289	SODIUM METHYLATE SOLUTION in alcohol	3	8	III	223	5 L	E1	P001 IBC03		T4	TP1
1292	TETRAETHYL SILICATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1293	TINCTURES, MEDICINAL	3		II		1 L	E2	P001 IBC02		T4	TP1 TP8
1293	TINCTURES, MEDICINAL	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1294	TOLUENE	3		II		1 L	E2	P001 IBC02		T4	TP1
1295	TRICHLOROSILANE	4.3	3 8	I		0	E0	P401		T14	TP2 TP7 TP13
1296	TRIETHYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1297	TRIMETHYLAMINE, AQUEOUS SOLUTION, not more than 50 % trimethylamine, by mass	3	8	I		0	E0	P001		T11	TP1
1297	TRIMETHYLAMINE, AQUEOUS SOLUTION, not more than 50 % trimethylamine, by mass	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1297	TRIMETHYLAMINE, AQUEOUS SOLUTION, not more than 50 % trimethylamine, by mass	3	8	III	223	5 L	E1	P001 IBC03		T7	TP1
1298	TRIMETHYLCHLOROSILANE	3	8	II		0	E0	P010		T10	TP2 TP7 TP13
1299	TURPENTINE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1300	TURPENTINE SUBSTITUTE	3		II		1 L	E2	P001 IBC02		T4	TP1
1300	TURPENTINE SUBSTITUTE	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1301	VINYL ACETATE, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1
1302	VINYL ETHYL ETHER, STABILIZED	3		I	386	0	E3	P001		T11	TP2
1303	VINYLIDENE CHLORIDE, STABILIZED	3		I	386	0	E3	P001		T12	TP2 TP7
1304	VINYL ISOBUTYL ETHER, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1305	VINYLTRICHLOROSILANE	3	8	II		0	E0	P010		T10	TP2 TP7 TP13
1306	WOOD PRESERVATIVES, LIQUID	3		II		5 L	E2	P001 IBC02		T4	TP1 TP8
1306	WOOD PRESERVATIVES, LIQUID	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1307	XYLENES	3		II		1 L	E2	P001 IBC02		T4	TP1
1307	XYLENES	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1308	ZIRCONIUM SUSPENDED IN A FLAMMABLE LIQUID	3		I		0	E0	P001	PP33		
1308	ZIRCONIUM SUSPENDED IN A FLAMMABLE LIQUID	3		II		1 L	E2	P001	PP33		
1308	ZIRCONIUM SUSPENDED IN A FLAMMABLE LIQUID	3		III	223	5 L	E1	P001			
1309	ALUMINIUM POWDER, COATED	4.1		II		1 kg	E2	P002 IBC08	PP38 B2, B4	T3	TP33
1309	ALUMINIUM POWDER, COATED	4.1		III	223	5 kg	E1	P002 IBC08 LP02	PP11 B3	T1	TP33
1310	AMMONIUM PICRATE, WETTED with not less than 10 % water, by mass	4.1		I	28	0	E0	P406	PP26		
1312	BORNEOL	4.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1313	CALCIUM RESINATE	4.1		III		5 kg	E1	P002 IBC06		T1	TP33
1314	CALCIUM RESINATE, FUSED	4.1		III		5 kg	E1	P002 IBC04		T1	TP33
1318	COBALT RESINATE, PRECIPITATED	4.1		III		5 kg	E1	P002 IBC06		T1	TP33
1320	DINITROPHENOL, WETTED with not less than 15 % water, by mass	4.1	6.1	I	28	0	E0	P406	PP26		
1321	DINITROPHENOLATES, WETTED with not less than 15 % water, by mass	4.1	6.1	I	28	0	E0	P406	PP26		
1322	DINITRORESORCINOL, WETTED with not less than 15 % water, by mass	4.1		I	28	0	E0	P406	PP26		
1323	FERROCERIUM	4.1		II	249	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1324	FILMS, NITROCELLULOSE BASE, gelatin coated, except scrap	4.1		III		5 kg	E1	P002	PP15		
1325	FLAMMABLE SOLID, ORGANIC, N.O.S.	4.1		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1325	FLAMMABLE SOLID, ORGANIC, N.O.S.	4.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1326	HAFNIUM POWDER, WETTED with not less than 25 % water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns	4.1		II		1 kg	E2	P410 IBC06	PP40 B2	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1327	HAY, STRAW or BHUSA	4.1			281	3 kg	E0	P003 IBC08	PP19 B6		
1328	HEXAMETHYLENE-TETRAMINE	4.1		III		5 kg	E1	P002 IBC08	B3	T1	TP33
1330	MANGANESE RESINATE	4.1		III		5 kg	E1	P002 IBC06		T1	TP33
1331	MATCHES, 'STRIKE ANYWHERE'	4.1		III	293	5 kg	E0	P407	PP27		
1332	METALDEHYDE	4.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1333	CERIUM, slabs, ingots or rods	4.1		II		1 kg	E2	P002 IBC08	B2, B4		
1334	NAPHTHALENE, CRUDE or NAPHTHALENE, REFINED	4.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
1336	NITROGUANIDINE (PICRITE), WETTED with not less than 20 % water, by mass	4.1		I	28	0	E0	P406			
1337	NITROSTARCH, WETTED with not less than 20 % water, by mass	4.1		I	28	0	E0	P406			
1338	PHOSPHORUS, AMORPHOUS	4.1		III		5 kg	E1	P410 IBC08	B3	T1	TP33
1339	PHOSPHORUS HEPTASULPHIDE, free from yellow and white phosphorus	4.1		II		1 kg	E2	P410 IBC04		T3	TP33
1340	PHOSPHORUS PENTASULPHIDE, free from yellow and white phosphorus	4.3	4.1	II		500 g	E2	P410 IBC04		T3	TP33
1341	PHOSPHORUS SESQUISULPHIDE, free from yellow and white phosphorus	4.1		II		1 kg	E2	P410 IBC04		T3	TP33
1343	PHOSPHORUS TRISULPHIDE, free from yellow and white phosphorus	4.1		II		1 kg	E2	P410 IBC04		T3	TP33
1344	TRINITROPHENOL (PICRIC ACID), WETTED with not less than 30 % water, by mass	4.1		I	28	0	E0	P406	PP26		
1345	RUBBER SCRAP or RUBBER SHODDY, powdered or granulated, not exceeding 840 microns and rubber content exceeding 45 %	4.1		II	223	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1346	SILICON POWDER, AMORPHOUS	4.1		III	32	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1347	SILVER PICRATE, WETTED with not less than 30 % water, by mass	4.1		I	28	0	E0	P406	PP25 PP26		
1348	SODIUM DINITRO-o-CRESOLATE, WETTED with not less than 15 % water, by mass	4.1	6.1	I	28	0	E0	P406	PP26		
1349	SODIUM PICRAMATE, WETTED with not less than 20 % water, by mass	4.1		I	28	0	E0	P406	PP26		
1350	SULPHUR	4.1		III	242	5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1352	TITANIUM POWDER, WETTED with not less than 25 % water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced particle size less than 840 microns	4.1		II		1 kg	E2	P410 IBC06	PP40 B2	T3	TP33
1353	FIBRES or FABRICS IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S.	4.1		III		5 kg	E1	P410 IBC08	B3		
1354	TRINITROBENZENE, WETTED with not less than 30 % water, by mass	4.1		I	28	0	E0	P406			
1355	TRINITROBENZOIC ACID, WETTED with not less than 30 % water, by mass	4.1		I	28	0	E0	P406			
1356	TRINITROTOLUENE (TNT), WETTED with not less than 30 % water, by mass	4.1		I	28	0	E0	P406			
1357	UREA NITRATE, WETTED with not less than 20 % water, by mass	4.1		I	28 227	0	E0	P406			
1358	ZIRCONIUM POWDER, WETTED with not less than 25 % water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced particle size less than 840 microns	4.1		II		1 kg	E2	P410 IBC06	PP40 B2	T3	TP33
1360	CALCIUM PHOSPHIDE	4.3	6.1	I		0	E0	P403			
1361	CARBON, animal or vegetable origin	4.2		II		0	E0	P002 IBC06	PP12	T3	TP33
1361	CARBON, animal or vegetable origin	4.2		III	223	0	E0	P002 IBC08 LP02	PP12 B3	T1	TP33
1362	CARBON, ACTIVATED	4.2		III	223	0	E1	P002 IBC08 LP02	PP11 B3	T1	TP33
1363	COPRA	4.2		III	29	0	E0	P003 IBC08 LP02	PP20 B3, B6	BK2	
1364	COTTON WASTE, OILY	4.2		III		0	E0	P003 IBC08 LP02	PP19 B3, B6		
1365	COTTON, WET	4.2		III	29	0	E0	P003 IBC08 LP02	PP19 B3, B6		
1369	p-NITROSODIMETHYLANILINE	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
1372	FIBRES, ANIMAL or FIBRES, VEGETABLE burnt, wet or damp	4.2		III	123	0	E1	P410			
1373	FIBRES or FABRICS, ANIMAL or VEGETABLE or SYNTHETIC, N.O.S. with oil	4.2		III		0	E0	P410 IBC08	B3	T1	TP33
1374	FISH MEAL (FISH SCRAP), UNSTABILIZED	4.2		II	300	0	E2	P410 IBC08	B2, B4	T3	TP33
1376	IRON OXIDE, SPENT or IRON SPONGE, SPENT obtained from coal gas purification	4.2		III	223	0	E0	P002 IBC08 LP02	B3	T1 BK2	TP33
1378	METAL CATALYST, WETTED with a visible excess of liquid	4.2		II	274	0	E0	P410 IBC01	PP39	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1379	PAPER, UNSATURATED OIL TREATED, incompletely dried (including carbon paper)	4.2		III		0	E0	P410 IBC08	B3		
1380	PENTABORANE	4.2	6.1	I		0	E0	P601			
1381	PHOSPHORUS, WHITE or YELLOW, DRY or UNDER WATER or IN SOLUTION	4.2	6.1	I		0	E0	P405		T9	TP3 TP31
1382	POTASSIUM SULPHIDE, ANHYDROUS or POTASSIUM SULPHIDE with less than 30 % water of crystallization	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
1383	PYROPHORIC METAL, N.O.S. or PYROPHORIC ALLOY, N.O.S.	4.2		I	274	0	E0	P404		T21	TP7 TP33
1384	SODIUM DITHIONITE (SODIUM HYDROSULPHITE)	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
1385	SODIUM SULPHIDE, ANHYDROUS or SODIUM SULPHIDE with less than 30 % water of crystallization	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
1386	SEED CAKE with more than 1.5 % oil and not more than 11 % moisture	4.2		III	29	0	E0	P003 IBC08 LP02	PP20 B3, B6	BK2	
1387	WOOL WASTE, WET	4.2		III	123	0	E1	P410			
1389	ALKALI METAL AMALGAM, LIQUID	4.3		I	182	0	E0	P402			
1390	ALKALI METAL AMIDES	4.3		II	182	500 g	E2	P410 IBC07	B2	T3	TP33
1391	ALKALI METAL DISPERSION or ALKALINE EARTH METAL DISPERSION	4.3		I	182 183	0	E0	P402			
1392	ALKALINE EARTH METAL AMALGAM, LIQUID	4.3		I	183	0	E0	P402			
1393	ALKALINE EARTH METAL ALLOY, N.O.S.	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
1394	ALUMINIUM CARBIDE	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
1395	ALUMINIUM FERROSILICON POWDER	4.3	6.1	II		500 g	E2	P410 IBC05	B2	T3	TP33
1396	ALUMINIUM POWDER, UNCOATED	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
1396	ALUMINIUM POWDER, UNCOATED	4.3		III	223	1 kg	E1	P410 IBC08	B4	T1	TP33
1397	ALUMINIUM PHOSPHIDE	4.3	6.1	I		0	E0	P403			
1398	ALUMINIUM SILICON POWDER, UNCOATED	4.3		III	37 223	1 kg	E1	P410 IBC08	B4	T1 BK2	TP33
1400	BARIUM	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
1401	CALCIUM	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
1402	CALCIUM CARBIDE	4.3		I		0	E0	P403 IBC04	B1	T9	TP7 TP33
1402	CALCIUM CARBIDE	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
1403	CALCIUM CYANAMIDE with more than 0.1 % calcium carbide	4.3		III	38	1 kg	E1	P410 IBC08	B4	T1	TP33
1404	CALCIUM HYDRIDE	4.3		I		0	E0	P403			
1405	CALCIUM SILICIDE	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1405	CALCIUM SILICIDE	4.3		III	223	1 kg	E1	P410 IBC08	B4	T1	TP33
1407	CAESIUM	4.3		I		0	E0	P403 IBC04	B1		
1408	FERROSILICON with 30 % or more but less than 90 % silicon	4.3	6.1	III	39 223	1 kg	E1	P003 IBC08	PP20 B4, B6	T1 BK2	TP33
1409	METAL HYDRIDES, WATER-REACTIVE, N.O.S.	4.3		I	274	0	E0	P403			
1409	METAL HYDRIDES, WATER-REACTIVE, N.O.S.	4.3		II	274	500 g	E2	P410 IBC04		T3	TP33
1410	LITHIUM ALUMINIUM HYDRIDE	4.3		I		0	E0	P403			
1411	LITHIUM ALUMINIUM HYDRIDE, ETHEREAL	4.3	3	I		0	E0	P402			
1413	LITHIUM BOROHYDRIDE	4.3		I		0	E0	P403			
1414	LITHIUM HYDRIDE	4.3		I		0	E0	P403			
1415	LITHIUM	4.3		I		0	E0	P403 IBC04	B1	T9	TP7 TP33
1417	LITHIUM SILICON	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
1418	MAGNESIUM POWDER or MAGNESIUM ALLOYS POWDER	4.3	4.2	I		0	E0	P403			
1418	MAGNESIUM POWDER or MAGNESIUM ALLOYS POWDER	4.3	4.2	II		0	E2	P410 IBC05	B2	T3	TP33
1418	MAGNESIUM POWDER or MAGNESIUM ALLOYS POWDER	4.3	4.2	III	223	0	E1	P410 IBC08	B4	T1	TP33
1419	MAGNESIUM ALUMINIUM PHOSPHIDE	4.3	6.1	I		0	E0	P403			
1420	POTASSIUM METAL ALLOYS, LIQUID	4.3		I		0	E0	P402			
1421	ALKALI METAL ALLOY, LIQUID, N.O.S.	4.3		I	182	0	E0	P402			
1422	POTASSIUM SODIUM ALLOYS, LIQUID	4.3		I		0	E0	P402		T9	TP3 TP7 TP31
1423	RUBIDIUM	4.3		I		0	E0	P403 IBC04	B1		
1426	SODIUM BOROHYDRIDE	4.3		I		0	E0	P403			
1427	SODIUM HYDRIDE	4.3		I		0	E0	P403			
1428	SODIUM	4.3		I		0	E0	P403 IBC04	B1	T9	TP7 TP33
1431	SODIUM METHYLATE	4.2	8	II		0	E2	P410 IBC05	B2	T3	TP33
1432	SODIUM PHOSPHIDE	4.3	6.1	I		0	E0	P403			
1433	STANNIC PHOSPHIDES	4.3	6.1	I		0	E0	P403			
1435	ZINC ASHES	4.3		III	223	1 kg	E1	P002 IBC08	B4	T1 BK2	TP33
1436	ZINC POWDER or ZINC DUST	4.3	4.2	I		0	E0	P403			
1436	ZINC POWDER or ZINC DUST	4.3	4.2	II		0	E2	P410 IBC07	B2	T3	TP33
1436	ZINC POWDER or ZINC DUST	4.3	4.2	III	223	0	E1	P410 IBC08	B4	T1	TP33
1437	ZIRCONIUM HYDRIDE	4.1		II		1 kg	E2	P410 IBC04	PP40	T3	TP33
1438	ALUMINIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1439	AMMONIUM DICHROMATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1442	AMMONIUM PERCHLORATE	5.1		II	152	1 kg	E2	P002 IBC06	B2	T3	TP33
1444	AMMONIUM PERSULPHATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1445	BARIUM CHLORATE, SOLID	5.1	6.1	II		1 kg	E2	P002 IBC06	B2	T3	TP33
1446	BARIUM NITRATE	5.1	6.1	II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1447	BARIUM PERCHLORATE, SOLID	5.1	6.1	II		1 kg	E2	P002 IBC06	B2	T3	TP33
1448	BARIUM PERMANGANATE	5.1	6.1	II		1 kg	E2	P002 IBC06	B2	T3	TP33
1449	BARIUM PEROXIDE	5.1	6.1	II		1 kg	E2	P002 IBC06	B2	T3	TP33
1450	BROMATES, INORGANIC, N.O.S.	5.1		II	274 350	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1451	CAESIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1452	CALCIUM CHLORATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1453	CALCIUM CHLORITE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1454	CALCIUM NITRATE	5.1		III	208	5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
1455	CALCIUM PERCHLORATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1456	CALCIUM PERMANGANATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1457	CALCIUM PEROXIDE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1458	CHLORATE AND BORATE MIXTURE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1458	CHLORATE AND BORATE MIXTURE	5.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1459	CHLORATE AND MAGNESIUM CHLORIDE MIXTURE, SOLID	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1459	CHLORATE AND MAGNESIUM CHLORIDE MIXTURE, SOLID	5.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1461	CHLORATES, INORGANIC, N.O.S.	5.1		II	274 351	1 kg	E2	P002 IBC06	B2	T3	TP33
1462	CHLORITES, INORGANIC, N.O.S.	5.1		II	274 352	1 kg	E2	P002 IBC06	B2	T3	TP33
1463	CHROMIUM TRIOXIDE, ANHYDROUS	5.1	6.1 8	II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1465	DIDYMIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1466	FERRIC NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1467	GUANIDINE NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1469	LEAD NITRATE	5.1	6.1	II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1470	LEAD PERCHLORATE, SOLID	5.1	6.1	II		1 kg	E2	P002 IBC06	B2	T3	TP33
1471	LITHIUM HYPOCHLORITE, DRY or LITHIUM HYPOCHLORITE MIXTURE	5.1		II		1 kg	E2	P002 IBC08	B2, B4		
1471	LITHIUM HYPOCHLORITE, DRY or LITHIUM HYPOCHLORITE MIXTURE	5.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1472	LITHIUM PEROXIDE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1473	MAGNESIUM BROMATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1474	MAGNESIUM NITRATE	5.1		III	332	5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
1475	MAGNESIUM PERCHLORATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1476	MAGNESIUM PEROXIDE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1477	NITRATES, INORGANIC, N.O.S.	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1477	NITRATES, INORGANIC, N.O.S.	5.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1479	OXIDIZING SOLID, N.O.S.	5.1		I	274	0	E0	P503 IBC05	B1		
1479	OXIDIZING SOLID, N.O.S.	5.1		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1479	OXIDIZING SOLID, N.O.S.	5.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1481	PERCHLORATES, INORGANIC, N.O.S.	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1481	PERCHLORATES, INORGANIC, N.O.S.	5.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1482	PERMANGANATES, INORGANIC, N.O.S.	5.1		II	206 274 353	1 kg	E2	P002 IBC06	B2	T3	TP33
1482	PERMANGANATES, INORGANIC, N.O.S.	5.1		III	206 223 274 353	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1483	PEROXIDES, INORGANIC, N.O.S.	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1483	PEROXIDES, INORGANIC, N.O.S.	5.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1484	POTASSIUM BROMATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1485	POTASSIUM CHLORATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1486	POTASSIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
1487	POTASSIUM NITRATE AND SODIUM NITRITE MIXTURE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1488	POTASSIUM NITRITE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1489	POTASSIUM PERCHLORATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1490	POTASSIUM PERMANGANATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1491	POTASSIUM PEROXIDE	5.1		I		0	E0	P503 IBC06	B1		
1492	POTASSIUM PERSULPHATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1493	SILVER NITRATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1494	SODIUM BROMATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1495	SODIUM CHLORATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3 BK1 BK2	TP33
1496	SODIUM CHLORITE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1498	SODIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
1499	SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
1500	SODIUM NITRITE	5.1	6.1	III		5 kg	E1	P002 IBC08	B3	T1	TP33
1502	SODIUM PERCHLORATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1503	SODIUM PERMANGANATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1504	SODIUM PEROXIDE	5.1		I		0	E0	P503 IBC05	B1		
1505	SODIUM PERSULPHATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1506	STRONTIUM CHLORATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1507	STRONTIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1508	STRONTIUM PERCHLORATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1509	STRONTIUM PEROXIDE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1510	TETRANITROMETHANE	6.1	5.1	I	354	0	E0	P602			
1511	UREA HYDROGEN PEROXIDE	5.1	8	III		5 kg	E1	P002 IBC08	B3	T1	TP33
1512	ZINC AMMONIUM NITRITE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1513	ZINC CHLORATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1514	ZINC NITRATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1515	ZINC PERMANGANATE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1516	ZINC PEROXIDE	5.1		II		1 kg	E2	P002 IBC06	B2	T3	TP33
1517	ZIRCONIUM PICRAMATE, WETTED with not less than 20 % water, by mass	4.1		I	28	0	E0	P406	PP26		
1541	ACETONE CYANOHYDRIN, STABILIZED	6.1		I	354	0	E0	P602		T20	TP2 TP13
1544	ALKALOIDS, SOLID, N.O.S. or ALKALOID SALTS, SOLID, N.O.S.	6.1		I	43 274	0	E5	P002 IBC07	B1	T6	TP33
1544	ALKALOIDS, SOLID, N.O.S. or ALKALOID SALTS, SOLID, N.O.S.	6.1		II	43 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1544	ALKALOIDS, SOLID, N.O.S. or ALKALOID SALTS, SOLID, N.O.S.	6.1		III	43 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1545	ALLYL ISOTHIOCYANATE, STABILIZED	6.1	3	II	386	100 ml	E0	P001 IBC02		T7	TP2
1546	AMMONIUM ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1547	ANILINE	6.1		II	279	100 ml	E4	P001 IBC02		T7	TP2
1548	ANILINE HYDROCHLORIDE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1549	ANTIMONY COMPOUND, INORGANIC, SOLID, N.O.S.	6.1		III	45 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1550	ANTIMONY LACTATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1551	ANTIMONY POTASSIUM TARTRATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1553	ARSENIC ACID, LIQUID	6.1		I		0	E5	P001		T20	TP2 TP7 TP13
1554	ARSENIC ACID, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1555	ARSENIC BROMIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1556	ARSENIC COMPOUND, LIQUID, N.O.S., inorganic, including: Arsenates, n.o.s., Arsenites, n.o.s.; and Arsenic sulphides, n.o.s.	6.1		I	43 274	0	E5	P001		T14	TP2 TP13 TP27
1556	ARSENIC COMPOUND, LIQUID, N.O.S., inorganic, including: Arsenates, n.o.s., Arsenites, n.o.s.; and Arsenic sulphides, n.o.s.	6.1		II	43 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
1556	ARSENIC COMPOUND, LIQUID, N.O.S., inorganic, including: Arsenates, n.o.s., Arsenites, n.o.s.; and Arsenic sulphides, n.o.s.	6.1		III	43 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1557	ARSENIC COMPOUND, SOLID, N.O.S., inorganic, including: Arsenates, n.o.s.; Arsenites, n.o.s.; and Arsenic sulphides, n.o.s.	6.1		I	43 274	0	E5	P002 IBC07	B1	T6	TP33
1557	ARSENIC COMPOUND, SOLID, N.O.S., inorganic, including: Arsenates, n.o.s.; Arsenites, n.o.s.; and Arsenic sulphides, n.o.s.	6.1		II	43 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1557	ARSENIC COMPOUND, SOLID, N.O.S., inorganic, including: Arsenates, n.o.s.; Arsenites, n.o.s.; and Arsenic sulphides, n.o.s.	6.1		III	43 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1558	ARSENIC	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1559	ARSENIC PENTOXIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1560	ARSENIC TRICHLORIDE	6.1		I		0	E0	P602		T14	TP2 TP13
1561	ARSENIC TRIOXIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1562	ARSENICAL DUST	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1564	BARIUM COMPOUND, N.O.S.	6.1		II	177 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1564	BARIUM COMPOUND, N.O.S.	6.1		III	177 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1565	BARIUM CYANIDE	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
1566	BERYLLIUM COMPOUND, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1566	BERYLLIUM COMPOUND, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1567	BERYLLIUM POWDER	6.1	4.1	II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1569	BROMOACETONE	6.1	3	II		0	E0	P602		T20	TP2 TP13
1570	BRUCINE	6.1		I	43	0	E5	P002 IBC07	B1	T6	TP33
1571	BARIUM AZIDE, WETTED with not less than 50 % water, by mass	4.1	6.1	I	28	0	E0	P406			
1572	CACODYLIC ACID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1573	CALCIUM ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1574	CALCIUM ARSENATE AND CALCIUM ARSENITE MIXTURE, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1575	CALCIUM CYANIDE	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
1577	CHLORODINITROBENZENES, LIQUID	6.1		II	279	100 ml	E4	P001 IBC02		T7	TP2
1578	CHLORONITROBENZENES, SOLID	6.1		II	279	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1579	4-CHLORO-o-TOLUIDINE HYDROCHLORIDE, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1580	CHLOROPICRIN	6.1		I	354	0	E0	P601		T22	TP2 TP13
1581	CHLOROPICRIN AND METHYL BROMIDE MIXTURE with more than 2 % chloropicrin	2.3				0	E0	P200		T50	
1582	CHLOROPICRIN AND METHYL CHLORIDE MIXTURE	2.3				0	E0	P200		T50	
1583	CHLOROPICRIN MIXTURE, N.O.S.	6.1		I	274 315	0	E0	P602			
1583	CHLOROPICRIN MIXTURE, N.O.S.	6.1		II	274	100 ml	E0	P001 IBC02			
1583	CHLOROPICRIN MIXTURE, N.O.S.	6.1		III	223 274	5 L	E0	P001 IBC03 LP01			
1585	COPPER ACETOARSENITE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1586	COPPER ARSENITE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1587	COPPER CYANIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1588	CYANIDES, INORGANIC, SOLID, N.O.S.	6.1		I	47 274	0	E5	P002 IBC07	B1	T6	TP33
1588	CYANIDES, INORGANIC, SOLID, N.O.S.	6.1		II	47 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1588	CYANIDES, INORGANIC, SOLID, N.O.S.	6.1		III	47 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1589	CYANOGEN CHLORIDE, STABILIZED	2.3	8		386	0	E0	P200			
1590	DICHLOROANILINES, LIQUID	6.1		II	279	100 ml	E4	P001 IBC02		T7	TP2
1591	o-DICHLOROBENZENE	6.1		III	279	5 L	E1	P001 IBC03 LP01		T4	TP1
1593	DICHLOROMETHANE	6.1		III		5 L	E1	P001 IBC03 LP01	B8	T7	TP2
1594	DIETHYL SULPHATE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1595	DIMETHYL SULPHATE	6.1	8	I	354	0	E0	P602		T20	TP2 TP13
1596	DINITROANILINES	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1597	DINITROBENZENES, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1597	DINITROBENZENES, LIQUID	6.1		III	223	5 L	E1	P001 IBC03 LP01		T7	TP2
1598	DINITRO-o-CRESOL	6.1		II	43	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1599	DINITROPHENOL SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1599	DINITROPHENOL SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1600	DINITROTOLUENES, MOLTEN	6.1		II		0	E0	NONE		T7	TP3
1601	DISINFECTANT, SOLID, TOXIC, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1601	DISINFECTANT, SOLID, TOXIC, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1601	DISINFECTANT, SOLID, TOXIC, N.O.S.	6.1		III	274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1602	DYE, LIQUID, TOXIC, N.O.S. or DYE INTERMEDIATE, LIQUID, TOXIC, N.O.S.	6.1		I	274	0	E5	P001			
1602	DYE, LIQUID, TOXIC, N.O.S. or DYE INTERMEDIATE, LIQUID, TOXIC, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02			
1602	DYE, LIQUID, TOXIC, N.O.S. or DYE INTERMEDIATE, LIQUID, TOXIC, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01			
1603	ETHYL BROMOACETATE	6.1	3	II		100 ml	E0	P001 IBC02		T7	TP2
1604	ETHYLENEDIAMINE	8	3	II		1 L	E2	P001 IBC02		T7	TP2
1605	ETHYLENE DIBROMIDE	6.1		I	354	0	E0	P602		T20	TP2 TP13
1606	FERRIC ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1607	FERRIC ARSENITE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1608	FERROUS ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1611	HEXAETHYL TETRAPHOSPHATE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1612	HEXAETHYL TETRAPHOSPHATE AND COMPRESSED GAS MIXTURE	2.3				0	E0	P200			
1613	HYDROCYANIC ACID, AQUEOUS SOLUTION (HYDROGEN CYANIDE, AQUEOUS SOLUTION) with not more than 20 % hydrogen cyanide	6.1		I	48	0	E0	P601		T14	TP2 TP13
1614	HYDROGEN CYANIDE, STABILIZED, containing less than 3 % water and absorbed in a porous inert material	6.1		I	386	0	E0	P099			
1616	LEAD ACETATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1617	LEAD ARSENATES	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1618	LEAD ARSENITES	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1620	LEAD CYANIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1621	LONDON PURPLE	6.1		II	43	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1622	MAGNESIUM ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1623	MERCURIC ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1624	MERCURIC CHLORIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1625	MERCURIC NITRATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1626	MERCURIC POTASSIUM CYANIDE	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
1627	MERCUROUS NITRATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1629	MERCURY ACETATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1630	MERCURY AMMONIUM CHLORIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1631	MERCURY BENZOATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1634	MERCURY BROMIDES	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1636	MERCURY CYANIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1637	MERCURY GLUCONATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1638	MERCURY IODIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1639	MERCURY NUCLEATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1640	MERCURY OLEATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1641	MERCURY OXIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1642	MERCURY OXYCYANIDE, DESENSITIZED	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1643	MERCURY POTASSIUM IODIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1644	MERCURY SALICYLATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1645	MERCURY SULPHATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1646	MERCURY THIOCYANATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1647	METHYL BROMIDE AND ETHYLENE DIBROMIDE MIXTURE, LIQUID	6.1		I	354	0	E0	P602		T20	TP2 TP13
1648	ACETONITRILE	3		II		1 L	E2	P001 IBC02		T7	TP2
1649	MOTOR FUEL ANTI-KNOCK MIXTURE	6.1		I		0	E0	P602		T14	TP2 TP13
1650	beta-NAPHTHYLAMINE, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1651	NAPHTHYLTHIOUREA	6.1		II	43	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1652	NAPHTHYLUREA	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1653	NICKEL CYANIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1654	NICOTINE	6.1		II		100 ml	E4	P001 IBC02			
1655	NICOTINE COMPOUND, SOLID, N.O.S. or NICOTINE PREPARATION, SOLID, N.O.S.	6.1		I	43 274	0	E5	P002 IBC07	B1	T6	TP33
1655	NICOTINE COMPOUND, SOLID, N.O.S. or NICOTINE PREPARATION, SOLID, N.O.S.	6.1		II	43 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1655	NICOTINE COMPOUND, SOLID, N.O.S. or NICOTINE PREPARATION, SOLID, N.O.S.	6.1		III	43 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1656	NICOTINE HYDROCHLORIDE, LIQUID or SOLUTION	6.1		II	43	100 ml	E4	P001 IBC02			
1656	NICOTINE HYDROCHLORIDE, LIQUID or SOLUTION	6.1		III	43 223	5 L	E1	P001 IBC03 LP01			
1657	NICOTINE SALICYLATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1658	NICOTINE SULPHATE SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1658	NICOTINE SULPHATE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T7	TP2
1659	NICOTINE TARTRATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1660	NITRIC OXIDE, COMPRESSED	2.3	5.1 8			0	E0	P200			
1661	NITROANILINES (o-, m-, p-)	6.1		II	279	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1662	NITROBENZENE	6.1		II	279	100 ml	E4	P001 IBC02		T7	TP2
1663	NITROPHENOLS (o-, m-, p-)	6.1		III	279	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1664	NITROTOLUENES, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1665	NITROXYLENES, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1669	PENTACHLOROETHANE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1670	PERCHLOROMETHYL MERCAPTAN	6.1		I	354	0	E0	P602		T20	TP2 TP13
1671	PHENOL, SOLID	6.1		II	279	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1672	PHENYLCARBYLAMINE CHLORIDE	6.1		I		0	E0	P602		T14	TP2 TP13
1673	PHENYLENEDIAMINES (o-, m-, p-)	6.1		III	279	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1674	PHENYLMERCURIC ACETATE	6.1		II	43	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1677	POTASSIUM ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1678	POTASSIUM ARSENITE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1679	POTASSIUM CUPROCYANIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1680	POTASSIUM CYANIDE, SOLID	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
1683	SILVER ARSENITE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1684	SILVER CYANIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1685	SODIUM ARSENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1686	SODIUM ARSENITE, AQUEOUS SOLUTION	6.1		II	43	100 ml	E4	P001 IBC02		T7	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1686	SODIUM ARSENITE, AQUEOUS SOLUTION	6.1		III	43 223	5 L	E1	P001 IBC03 LP01		T4	TP2
1687	SODIUM AZIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4		
1688	SODIUM CACODYLATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1689	SODIUM CYANIDE, SOLID	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
1690	SODIUM FLUORIDE, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1691	STRONTIUM ARSENITE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1692	STRYCHNINE or STRYCHNINE SALTS	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
1693	TEAR GAS SUBSTANCE, LIQUID, N.O.S.	6.1		I	274	0	E0	P001			
1693	TEAR GAS SUBSTANCE, LIQUID, N.O.S.	6.1		II	274	0	E0	P001 IBC02			
1694	BROMOBENZYL CYANIDES, LIQUID	6.1		I	138	0	E0	P001		T14	TP2 TP13
1695	CHLOROACETONE, STABILIZED	6.1	3 8	I	354	0	E0	P602		T20	TP2 TP13
1697	CHLOROACETOPHENONE, SOLID	6.1		II		0	E0	P002 IBC08	B2, B4	T3	TP33
1698	DIPHENYLAMINE CHLOROARSINE	6.1		I		0	E0	P002		T6	TP33
1699	DIPHENYLCHLOROARSINE, LIQUID	6.1		I		0	E0	P001			
1700	TEAR GAS CANDLES	6.1	4.1			0	E0	P600			
1701	XYLYL BROMIDE, LIQUID	6.1		II		0	E0	P001 IBC02		T7	TP2 TP13
1702	1,1,2,2-TETRACHLORO-ETHANE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1704	TETRAETHYL DITHIOPYROPHOSPHATE	6.1		II	43	100 ml	E4	P001 IBC02		T7	TP2
1707	THALLIUM COMPOUND, N.O.S.	6.1		II	43 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
1708	TOLUIDINES, LIQUID	6.1		II	279	100 ml	E4	P001 IBC02		T7	TP2
1709	2,4-TOLUYLENEDIAMINE, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1710	TRICHLOROETHYLENE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
1711	XYLIDINES, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1712	ZINC ARSENATE, ZINC ARSENITE or ZINC ARSENATE AND ZINC ARSENITE MIXTURE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1713	ZINC CYANIDE	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
1714	ZINC PHOSPHIDE	4.3	6.1	I		0	E0	P403			
1715	ACETIC ANHYDRIDE	8	3	II		1 L	E2	P001 IBC02		T7	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1716	ACETYL BROMIDE	8		II		1 L	E2	P001 IBC02		T8	TP2
1717	ACETYL CHLORIDE	3	8	II		1 L	E2	P001 IBC02		T8	TP2
1718	BUTYL ACID PHOSPHATE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
1719	CAUSTIC ALKALI LIQUID, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
1719	CAUSTIC ALKALI LIQUID, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
1722	ALLYL CHLOROFORMATE	6.1	3 8	I		0	E0	P001		T14	TP2 TP13
1723	ALLYL IODIDE	3	8	II		1 L	E2	P001 IBC02		T7	TP2 TP13
1724	ALLYLTRICHLOROSILANE, STABILIZED	8	3	II	386	0	E0	P010		T10	TP2 TP7 TP13
1725	ALUMINIUM BROMIDE, ANHYDROUS	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1726	ALUMINIUM CHLORIDE, ANHYDROUS	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1727	AMMONIUM HYDROGENDIFLUORIDE, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1728	AMYLTRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1729	ANISOYL CHLORIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1730	ANTIMONY PENTACHLORIDE, LIQUID	8		II		1 L	E2	P001 IBC02		T7	TP2
1731	ANTIMONY PENTACHLORIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1731	ANTIMONY PENTACHLORIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1732	ANTIMONY PENTAFLUORIDE	8	6.1	II		1 L	E0	P001 IBC02		T7	TP2
1733	ANTIMONY TRICHLORIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1736	BENZOYL CHLORIDE	8		II		1 L	E2	P001 IBC02		T8	TP2 TP13
1737	BENZYL BROMIDE	6.1	8	II		0	E4	P001 IBC02		T8	TP2 TP13
1738	BENZYL CHLORIDE	6.1	8	II		0	E4	P001 IBC02		T8	TP2 TP13
1739	BENZYL CHLOROFORMATE	8		I		0	E0	P001		T10	TP2 TP13
1740	HYDROGENDIFLUORIDES, SOLID, N.O.S.	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1740	HYDROGENDIFLUORIDES, SOLID, N.O.S.	8		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1741	BORON TRICHLORIDE	2.3	8			0	E0	P200			
1742	BORON TRIFLUORIDE ACETIC ACID COMPLEX, LIQUID	8		II		1 L	E2	P001 IBC02		T8	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1743	BORON TRIFLUORIDE PROPIONIC ACID COMPLEX, LIQUID	8		II		1 L	E2	P001 IBC02		T8	TP2
1744	BROMINE or BROMINE SOLUTION	8	6.1	I		0	E0	P804		T22	TP2 TP10 TP13
1745	BROMINE PENTAFLUORIDE	5.1	6.1 8	I		0	E0	P200		T22	TP2 TP13
1746	BROMINE TRIFLUORIDE	5.1	6.1 8	I		0	E0	P200		T22	TP2 TP13
1747	BUTYLTRICHLOROSILANE	8	3	II		0	E0	P010		T10	TP2 TP7 TP13
1748	CALCIUM HYPOCHLORITE, DRY or CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 39 % available chlorine (8.8 % available oxygen)	5.1		II	314	1 kg	E2	P002 IBC08	PP85 B2, B4, B13		
1748	CALCIUM HYPOCHLORITE, DRY or CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 39 % available chlorine (8.8 % available oxygen)	5.1		III	316	5 kg	E1	P002 IBC08	PP85 B4, B13		
1749	CHLORINE TRIFLUORIDE	2.3	5.1 8			0	E0	P200			
1750	CHLOROACETIC ACID SOLUTION	6.1	8	II		100 ml	E4	P001 IBC02		T7	TP2
1751	CHLOROACETIC ACID, SOLID	6.1	8	II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1752	CHLOROACETYL CHLORIDE	6.1	8	I	354	0	E0	P602		T20	TP2 TP13
1753	CHLOROPHENYL-TRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7
1754	CHLOROSULPHONIC ACID (with or without sulphur trioxide)	8		I		0	E0	P001		T20	TP2
1755	CHROMIC ACID SOLUTION	8		II		1 L	E2	P001 IBC02		T8	TP2
1755	CHROMIC ACID SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1756	CHROMIC FLUORIDE, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1757	CHROMIC FLUORIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1757	CHROMIC FLUORIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1758	CHROMIUM OXYCHLORIDE	8		I		0	E0	P001		T10	TP2
1759	CORROSIVE SOLID, N.O.S.	8		I	274	0	E0	P002 IBC07	B1	T6	TP33
1759	CORROSIVE SOLID, N.O.S.	8		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1759	CORROSIVE SOLID, N.O.S.	8		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1760	CORROSIVE LIQUID, N.O.S.	8		I	274	0	E0	P001		T14	TP2 TP27
1760	CORROSIVE LIQUID, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP2 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1760	CORROSIVE LIQUID, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
1761	CUPRIETHYLENEDIAMINE SOLUTION	8	6.1	II		1 L	E2	P001 IBC02		T7	TP2
1761	CUPRIETHYLENEDIAMINE SOLUTION	8	6.1	III	223	5 L	E1	P001 IBC03		T7	TP1 TP28
1762	CYCLOHEXENYL-TRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1763	CYCLOHEXYL-TRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1764	DICHLOROACETIC ACID	8		II		1 L	E2	P001 IBC02		T8	TP2
1765	DICHLOROACETYL CHLORIDE	8		II		1 L	E2	P001 IBC02		T7	TP2
1766	DICHLOROPHENYL-TRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1767	DIETHYLDICHLOROSILANE	8	3	II		0	E0	P010		T10	TP2 TP7 TP13
1768	DIFLUOROPHOSPHORIC ACID, ANHYDROUS	8		II		1 L	E2	P001 IBC02		T8	TP2
1769	DIPHENYLDICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1770	DIPHENYLMETHYL BROMIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1771	DODECYLTRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1773	FERRIC CHLORIDE, ANHYDROUS	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1774	FIRE EXTINGUISHER CHARGES, corrosive liquid	8		II		1 L	E0	P001	PP4		
1775	FLUOROBORIC ACID	8		II		1 L	E2	P001 IBC02		T7	TP2
1776	FLUOROPHOSPHORIC ACID, ANHYDROUS	8		II		1 L	E2	P001 IBC02		T8	TP2
1777	FLUOROSULPHONIC ACID	8		I		0	E0	P001		T10	TP2
1778	FLUOROSILICIC ACID	8		II		1 L	E2	P001 IBC02		T8	TP2
1779	FORMIC ACID with more than 85 % acid by mass	8	3	II		1 L	E2	P001 IBC02		T7	TP2
1780	FUMARYL CHLORIDE	8		II		1 L	E2	P001 IBC02		T7	TP2
1781	HEXADECYL-TRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1782	HEXAFLUOROPHOSPHORIC ACID	8		II		1 L	E2	P001 IBC02		T8	TP2
1783	HEXAMETHYLENEDIAMINE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1783	HEXAMETHYLENEDIAMINE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1784	HEXYLTRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1786	HYDROFLUORIC ACID AND SULPHURIC ACID MIXTURE	8	6.1	I		0	E0	P001		T10	TP2 TP13
1787	HYDRIODIC ACID	8		II		1 L	E2	P001 IBC02		T7	TP2
1787	HYDRIODIC ACID	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1788	HYDROBROMIC ACID	8		II		1 L	E2	P001 IBC02		T7	TP2
1788	HYDROBROMIC ACID	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1789	HYDROCHLORIC ACID	8		II		1 L	E2	P001 IBC02		T8	TP2
1789	HYDROCHLORIC ACID	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1790	HYDROFLUORIC ACID, with more than 60 % hydrogen fluoride	8	6.1	I		0	E0	P802	PP79 PP81	T10	TP2 TP13
1790	HYDROFLUORIC ACID, with not more than 60 % hydrogen fluoride	8	6.1	II		1 L	E2	P001 IBC02		T8	TP2
1791	HYPOCHLORITE SOLUTION	8		II		1 L	E2	P001 IBC02	PP10 B5	T7	TP2 TP24
1791	HYPOCHLORITE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP2 TP24
1792	IODINE MONOCHLORIDE, SOLID	8		II		1 kg	E0	P002 IBC08	B2, B4	T7	TP2
1793	ISOPROPYL ACID PHOSPHATE	8		III		5 L	E1	P001 IBC02 LP01		T4	TP1
1794	LEAD SULPHATE with more than 3 % free acid	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1796	NITRATING ACID MIXTURE with more than 50 % nitric acid	8	5.1	I		0	E0	P001		T10	TP2 TP13
1796	NITRATING ACID MIXTURE with not more than 50 % nitric acid	8		II		1 L	E0	P001 IBC02		T8	TP2 TP13
1798	NITROHYDROCHLORIC ACID	8		I		0	E0	P802		T10	TP2 TP13
1799	NONYLTRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1800	OCTADECYL-TRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1801	OCTYLTRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1802	PERCHLORIC ACID with not more than 50 % acid, by mass	8	5.1	II		1 L	E0	P001 IBC02		T7	TP2
1803	PHENOLSULPHONIC ACID, LIQUID	8		II		1 L	E2	P001 IBC02		T7	TP2
1804	PHENYLTRICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1805	PHOSPHORIC ACID, SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1806	PHOSPHORUS PENTACHLORIDE	8		II		1 kg	E0	P002 IBC08	B2, B4	T3	TP33
1807	PHOSPHORUS PENTOXIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1808	PHOSPHORUS TRIBROMIDE	8		II		1 L	E0	P001 IBC02		T7	TP2
1809	PHOSPHORUS TRICHLORIDE	6.1	8	I	354	0	E0	P602		T20	TP2 TP13
1810	PHOSPHORUS OXYCHLORIDE	6.1	8	I	354	0	E0	P602		T20	TP2 TP13
1811	POTASSIUM HYDROGEN DIFLUORIDE SOLID	8	6.1	II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1812	POTASSIUM FLUORIDE, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1813	POTASSIUM HYDROXIDE, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1814	POTASSIUM HYDROXIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1814	POTASSIUM HYDROXIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1815	PROPIONYL CHLORIDE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1816	PROPYLTRICHLOROSILANE	8	3	II		0	E0	P010		T10	TP2 TP7 TP13
1817	PYROSULPHURYL CHLORIDE	8		II		1 L	E2	P001 IBC02		T8	TP2
1818	SILICON TETRACHLORIDE	8		II		0	E0	P010		T10	TP2 TP7 TP13
1819	SODIUM ALUMINATE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1819	SODIUM ALUMINATE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1823	SODIUM HYDROXIDE, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1824	SODIUM HYDROXIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1824	SODIUM HYDROXIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1825	SODIUM MONOXIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1826	NITRATING ACID MIXTURE, SPENT, with more than 50 % nitric acid	8	5.1	I	113	0	E0	P001		T10	TP2 TP13
1826	NITRATING ACID MIXTURE, SPENT, with not more than 50 % nitric acid	8		II	113	1 L	E0	P001 IBC02		T8	TP2
1827	STANNIC CHLORIDE, ANHYDROUS	8		II		1 L	E2	P001 IBC02		T7	TP2
1828	SULPHUR CHLORIDES	8		I		0	E0	P602		T20	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1829	SULPHUR TRIOXIDE, STABILIZED	8		I	386	0	E0	P001		T20	TP4 TP13 TP25 TP26
1830	SULPHURIC ACID with more than 51 % acid	8		II		1 L	E2	P001 IBC02		T8	TP2
1831	SULPHURIC ACID, FUMING	8	6.1	I		0	E0	P602		T20	TP2 TP13
1832	SULPHURIC ACID, SPENT	8		II	113	1 L	E0	P001 IBC02		T8	TP2
1833	SULPHUROUS ACID	8		II		1 L	E2	P001 IBC02		T7	TP2
1834	SULPHURYL CHLORIDE	6.1	8	I	354	0	E0	P602		T20	TP2 TP13
1835	TETRAMETHYLAMMONIUM HYDROXIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1835	TETRAMETHYLAMMONIUM HYDROXIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T7	TP2
1836	THIONYL CHLORIDE	8		I		0	E0	P802		T10	TP2 TP13
1837	THIOPHOSPHORYL CHLORIDE	8		II		1 L	E0	P001 IBC02		T7	TP2
1838	TITANIUM TETRACHLORIDE	6.1	8	I	354	0	E0	P602		T20	TP2 TP13
1839	TRICHLOROACETIC ACID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1840	ZINC CHLORIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
1841	ACETALDEHYDE AMMONIA	9		III		5 kg	E1	P002 IBC08 LP02	B3, B6	T1	TP33
1843	AMMONIUM DINITRO-o-CRESOLATE, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1845	CARBON DIOXIDE, SOLID (DRY ICE)	9				0	E0	P003	PP18		
1846	CARBON TETRACHLORIDE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1847	POTASSIUM SULPHIDE, HYDRATED with not less than 30 % water of crystallization	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1848	PROPIONIC ACID with not less than 10 % and less than 90 % acid by mass	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
1849	SODIUM SULPHIDE, HYDRATED with not less than 30 % water	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
1851	MEDICINE, LIQUID, TOXIC, N.O.S.	6.1		II	221	100 ml	E4	P001			
1851	MEDICINE, LIQUID, TOXIC, N.O.S.	6.1		III	221 223	5 L	E1	P001			
1854	BARIUM ALLOYS, PYROPHORIC	4.2		I		0	E0	P404		T21	TP7 TP33
1855	CALCIUM, PYROPHORIC or CALCIUM ALLOYS, PYROPHORIC	4.2		I		0	E0	P404			
1856	RAGS, OILY	4.2			29 123	0	E0	P003 IBC08	PP19 B6		

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1857	TEXTILE WASTE, WET	4.2		III	123	0	E1	P410			
1858	HEXAFLUOROPROPYLENE (REFRIGERANT GAS R 1216)	2.2				120 ml	E1	P200		T50	
1859	SILICON TETRAFLUORIDE	2.3	8			0	E0	P200			
1860	VINYL FLUORIDE, STABILIZED	2.1			386	0	E0	P200			
1862	ETHYL CROTONATE	3		II		1 L	E2	P001 IBC02		T4	TP2
1863	FUEL, AVIATION, TURBINE ENGINE	3		I		500 ml	E3	P001		T11	TP1 TP8 TP28
1863	FUEL, AVIATION, TURBINE ENGINE	3		II		1 L	E2	P001 IBC02		T4	TP1 TP8
1863	FUEL, AVIATION, TURBINE ENGINE	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
1865	n-PROPYL NITRATE	3		II	26	1 L	E2	P001 IBC02	B7		
1866	RESIN SOLUTION, flammable	3		I		500 ml	E3	P001		T11	TP1 TP8 TP28
1866	RESIN SOLUTION, flammable	3		II		5 L	E2	P001 IBC02	PP1	T4	TP1 TP8
1866	RESIN SOLUTION, flammable	3		III	223	5 L	E1	P001 IBC03 LP01	PP1	T2	TP1
1868	DECABORANE	4.1	6.1	II		1 kg	E0	P002 IBC06	B2	T3	TP33
1869	MAGNESIUM or MAGNESIUM ALLOYS with more than 50 % magnesium in pellets, turnings or ribbons	4.1		III	59	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1870	POTASSIUM BOROHYDRIDE	4.3		I		0	E0	P403			
1871	TITANIUM HYDRIDE	4.1		II		1 kg	E2	P410 IBC04	PP40	T3	TP33
1872	LEAD DIOXIDE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1873	PERCHLORIC ACID with more than 50 % but not more than 72 % acid, by mass	5.1	8	I	60	0	E0	P502	PP28	T10	TP1
1884	BARIUM OXIDE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1885	BENZIDINE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1886	BENZYLIDENE CHLORIDE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
1887	BROMOCHLOROMETHANE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
1888	CHLOROFORM	6.1		III		5 L	E1	P001 IBC03 LP01		T7	TP2
1889	CYANOGEN BROMIDE	6.1	8	I		0	E0	P002		T6	TP33
1891	ETHYL BROMIDE	3	6.1	II		1 L	E2	P001 IBC02	B8	T7	TP2 TP13
1892	ETHYLDICHLOROARSINE	6.1		I	354	0	E0	P602		T20	TP2 TP13

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1894	PHENYLMERCURIC HYDROXIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1895	PHENYLMERCURIC NITRATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
1897	TETRACHLOROETHYLENE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
1898	ACETYL IODIDE	8		II		1 L	E2	P001 IBC02		T7	TP2 TP13
1902	DIISOOCTYL ACID PHOSPHATE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
1903	DISINFECTANT, LIQUID, CORROSIVE, N.O.S.	8		I	274	0	E0	P001			
1903	DISINFECTANT, LIQUID, CORROSIVE, N.O.S.	8		II	274	1 L	E2	P001 IBC02			
1903	DISINFECTANT, LIQUID, CORROSIVE, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01			
1905	SELENIC ACID	8		I		0	E0	P002 IBC07	B1	T6	TP33
1906	SLUDGE ACID	8		II		1 L	E0	P001 IBC02		T8	TP2 TP28
1907	SODA LIME with more than 4 % sodium hydroxide	8		III	62	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1908	CHLORITE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2 TP24
1908	CHLORITE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP2 TP24
1910	CALCIUM OXIDE	8		III	106	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1911	DIBORANE	2.3	2.1			0	E0	P200			
1912	METHYL CHLORIDE AND METHYLENE CHLORIDE MIXTURE	2.1			228	0	E0	P200		T50	
1913	NEON, REFRIGERATED LIQUID	2.2				120 ml	E1	P203		T75	TP5
1914	BUTYL PROPIONATES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1915	CYCLOHEXANONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1916	2,2'-DICHLORODIETHYL ETHER	6.1	3	II		100 ml	E4	P001 IBC02		T7	TP2
1917	ETHYL ACRYLATE, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1 TP13
1918	ISOPROPYLBENZENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1919	METHYL ACRYLATE, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1 TP13
1920	NONANES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1921	PROPYLENEIMINE, STABILIZED	3	6.1	I	386	0	E0	P001		T14	TP2 TP13

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1922	PYRROLIDINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
1923	CALCIUM DITHIONITE (CALCIUM HYDROSULPHITE)	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
1928	METHYL MAGNESIUM BROMIDE IN ETHYL ETHER	4.3	3	I		0	E0	P402			
1929	POTASSIUM DITHIONITE (POTASSIUM HYDROSULPHITE)	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
1931	ZINC DITHIONITE (ZINC HYDROSULPHITE)	9		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
1932	ZIRCONIUM SCRAP	4.2		III	223	0	E0	P002 IBC08 LP02	B3	T1	TP33
1935	CYANIDE SOLUTION, N.O.S.	6.1		I	274	0	E5	P001		T14	TP2 TP13 TP27
1935	CYANIDE SOLUTION, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
1935	CYANIDE SOLUTION, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP13 TP28
1938	BROMOACETIC ACID SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
1938	BROMOACETIC ACID SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T7	TP2
1939	PHOSPHORUS OXYBROMIDE	8		II		1 kg	E0	P002 IBC08	B2, B4	T3	TP33
1940	THIOGLYCOLIC ACID	8		II		1 L	E2	P001 IBC02		T7	TP2
1941	DIBROMODIFLUOROMETHANE	9		III		5 L	E1	P001 LP01		T11	TP2
1942	AMMONIUM NITRATE with not more than 0.2 % combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance	5.1		III	306	5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
1944	MATCHES, SAFETY (book, card or strike on box)	4.1		III	293 294	5 kg	E1	P407			
1945	MATCHES, WAX 'VESTA'	4.1		III	293 294	5 kg	E1	P407			
1950	AEROSOLS	2			63 190 277 327 344 381	See SP 277	E0	P207 LP200	PP87 L2		
1951	ARGON, REFRIGERATED LIQUID	2.2				120 ml	E1	P203		T75	TP5
1952	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with not more than 9 % ethylene oxide	2.2			392	120 ml	E1	P200			
1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1		274	0	E0	P200			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1954	COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1			274 392	0	E0	P200			
1955	COMPRESSED GAS, TOXIC, N.O.S.	2.3			274	0	E0	P200			
1956	COMPRESSED GAS, N.O.S.	2.2			274 378 392	120 ml	E1	P200			
1957	DEUTERIUM, COMPRESSED	2.1				0	E0	P200			
1958	1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 114)	2.2				120 ml	E1	P200		T50	
1959	1,1-DIFLUOROETHYLENE (REFRIGERANT GAS R 1132a)	2.1				0	E0	P200			
1961	ETHANE, REFRIGERATED LIQUID	2.1				0	E0	P203		T75	TP5
1962	ETHYLENE	2.1				0	E0	P200			
1963	HELIUM, REFRIGERATED LIQUID	2.2				120 ml	E1	P203		T75	TP5 TP34
1964	HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.	2.1			274	0	E0	P200			
1965	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S.	2.1			274 392	0	E0	P200		T50	
1966	HYDROGEN, REFRIGERATED LIQUID	2.1				0	E0	P203		T75	TP5 TP34
1967	INSECTICIDE GAS, TOXIC, N.O.S.	2.3			274	0	E0	P200			
1968	INSECTICIDE GAS, N.O.S.	2.2			274	120 ml	E1	P200			
1969	ISOBUTANE	2.1			392	0	E0	P200		T50	
1970	KRYPTON, REFRIGERATED LIQUID	2.2				120 ml	E1	P203		T75	TP5
1971	METHANE, COMPRESSED or NATURAL GAS, COMPRESSED with high methane content	2.1			392	0	E0	P200			
1972	METHANE, REFRIGERATED LIQUID or NATURAL GAS, REFRIGERATED LIQUID with high methane content	2.1				0	E0	P203		T75	TP5
1973	CHLORODIFLUOROMETHANE AND CHLOROPENTAFLUORO-ETHANE MIXTURE with fixed boiling point, with approximately 49 % chlorodifluoromethane (REFRIGERANT GAS R 502)	2.2				120 ml	E1	P200		T50	
1974	CHLORODIFLUORO-BROMOMETHANE (REFRIGERANT GAS R 12B1)	2.2				120 ml	E1	P200		T50	
1975	NITRIC OXIDE AND DINITROGEN TETROXIDE MIXTURE (NITRIC OXIDE AND NITROGEN DIOXIDE MIXTURE)	2.3	5.1 8			0	E0	P200			
1976	OCTAFLUOROCYCLOBUTANE (REFRIGERANT GAS RC 318)	2.2				120 ml	E1	P200		T50	
1977	NITROGEN, REFRIGERATED LIQUID	2.2			345 346	120 ml	E1	P203		T75	TP5
1978	PROPANE	2.1			392	0	E0	P200		T50	
1982	TETRAFLUOROMETHANE (REFRIGERANT GAS R 14)	2.2				120 ml	E1	P200			

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1983	1-CHLORO-2,2,2-TRIFLUOROETHANE (REFRIGERANT GAS R 133a)	2.2				120 ml	E1	P200		T50	
1984	TRIFLUOROMETHANE (REFRIGERANT GAS R 23)	2.2				120 ml	E1	P200			
1986	ALCOHOLS, FLAMMABLE, TOXIC, N.O.S.	3	6.1	I	274	0	E0	P001		T14	TP2 TP13 TP27
1986	ALCOHOLS, FLAMMABLE, TOXIC, N.O.S.	3	6.1	II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
1986	ALCOHOLS, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
1987	ALCOHOLS, N.O.S.	3		II	274	1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
1987	ALCOHOLS, N.O.S.	3		III	223 274	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
1988	ALDEHYDES, FLAMMABLE, TOXIC, N.O.S.	3	6.1	I	274	0	E0	P001		T14	TP2 TP13 TP27
1988	ALDEHYDES, FLAMMABLE, TOXIC, N.O.S.	3	6.1	II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
1988	ALDEHYDES, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
1989	ALDEHYDES, N.O.S.	3		I	274	0	E3	P001		T11	TP1 TP27
1989	ALDEHYDES, N.O.S.	3		II	274	1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
1989	ALDEHYDES, N.O.S.	3		III	223 274	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
1990	BENZALDEHYDE	9		III		5 L	E1	P001 IBC03 LP01		T2	TP1
1991	CHLOROPRENE, STABILIZED	3	6.1	I	386	0	E0	P001		T14	TP2 TP6 TP13
1992	FLAMMABLE LIQUID, TOXIC, N.O.S.	3	6.1	I	274	0	E0	P001		T14	TP2 TP13 TP27
1992	FLAMMABLE LIQUID, TOXIC, N.O.S.	3	6.1	II	274	1 L	E2	P001 IBC02		T7	TP2 TP13
1992	FLAMMABLE LIQUID, TOXIC, N.O.S.	3	6.1	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
1993	FLAMMABLE LIQUID, N.O.S.	3		I	274	0	E3	P001		T11	TP1 TP27
1993	FLAMMABLE LIQUID, N.O.S.	3		II	274	1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
1993	FLAMMABLE LIQUID, N.O.S.	3		III	223 274	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
1994	IRON PENTACARBONYL	6.1	3	I	354	0	E0	P601		T22	TP2 TP13
1999	TARS, LIQUID, including road oils, and cutback bitumens	3		II		5 L	E2	P001 IBC02		T3	TP3 TP29

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1999	TARS, LIQUID, including road oils, and cutback bitumens	3		III	223	5 L	E1	P001 IBC03 LP01		T1	TP3
2000	CELLULOID in block, rods, rolls, sheets, tubes, etc., except scrap	4.1		III	223 383	5 kg	E1	P002 LP02	PP7		
2001	COBALT NAPHTHENATES, POWDER	4.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2002	CELLULOID, SCRAP	4.2		III	223	0	E0	P002 IBC08 LP02	PP8 B3		
2004	MAGNESIUM DIAMIDE	4.2		II		0	E2	P410 IBC06		T3	TP33
2006	PLASTICS, NITROCELLULOSE-BASED, SELF-HEATING, N.O.S.	4.2		III	274	0	E0	P002			
2008	ZIRCONIUM POWDER, DRY	4.2		I		0	E0	P404		T21	TP7 TP33
2008	ZIRCONIUM POWDER, DRY	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
2008	ZIRCONIUM POWDER, DRY	4.2		III	223	0	E1	P002 IBC08 LP02	B3	T1	TP33
2009	ZIRCONIUM, DRY, finished sheets, strip or coiled wire	4.2		III	223	0	E1	P002 LP02			
2010	MAGNESIUM HYDRIDE	4.3		I		0	E0	P403			
2011	MAGNESIUM PHOSPHIDE	4.3	6.1	I		0	E0	P403			
2012	POTASSIUM PHOSPHIDE	4.3	6.1	I		0	E0	P403			
2013	STRONTIUM PHOSPHIDE	4.3	6.1	I		0	E0	P403			
2014	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20 % but not more than 60 % hydrogen peroxide (stabilized as necessary)	5.1	8	II		1 L	E2	P504 IBC02	PP10 B5	T7	TP2 TP6 TP24
2015	HYDROGEN PEROXIDE, STABILIZED or HYDROGEN PEROXIDE, AQUEOUS SOLUTION, STABILIZED with more than 60 % hydrogen peroxide	5.1	8	I		0	E0	P501		T9	TP2 TP6 TP24
2016	AMMUNITION, TOXIC, NON-EXPLOSIVE without burster or expelling charge, non-fuzed	6.1				0	E0	P600			
2017	AMMUNITION, TEAR-PRODUCING, NON-EXPLOSIVE without burster or expelling charge, non-fuzed	6.1	8			0	E0	P600			
2018	CHLOROANILINES, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2019	CHLOROANILINES, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2020	CHLOROPHENOLS, SOLID	6.1		III	205	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2021	CHLOROPHENOLS, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2022	CRESYLIC ACID	6.1	8	II		100 ml	E4	P001 IBC02		T7	TP2 TP13
2023	EPICHLOROHYDRIN	6.1	3	II	279	100 ml	E4	P001 IBC02		T7	TP2 TP13

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2024	MERCURY COMPOUND, LIQUID, N.O.S.	6.1		I	43 66 274	0	E5	P001			
2024	MERCURY COMPOUND, LIQUID, N.O.S.	6.1		II	43 66 274	100 ml	E4	P001 IBC02			
2024	MERCURY COMPOUND, LIQUID, N.O.S.	6.1		III	43 66 223 274	5 L	E1	P001 IBC03 LP01			
2025	MERCURY COMPOUND, SOLID, N.O.S.	6.1		I	43 66 274	0	E5	P002 IBC07	B1	T6	TP33
2025	MERCURY COMPOUND, SOLID, N.O.S.	6.1		II	43 66 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2025	MERCURY COMPOUND, SOLID, N.O.S.	6.1		III	43 66 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2026	PHENYLMERCURIC COMPOUND, N.O.S.	6.1		I	43 274	0	E5	P002 IBC07	B1	T6	TP33
2026	PHENYLMERCURIC COMPOUND, N.O.S.	6.1		II	43 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2026	PHENYLMERCURIC COMPOUND, N.O.S.	6.1		III	43 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2027	SODIUM ARSENITE, SOLID	6.1		II	43	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2028	BOMBS, SMOKE, NON-EXPLOSIVE with corrosive liquid, without initiating device	8		II		0	E0	P803			
2029	HYDRAZINE, ANHYDROUS	8	3 6.1	I		0	E0	P001			
2030	HYDRAZINE AQUEOUS SOLUTION with more than 37 % hydrazine, by mass	8	6.1	I		0	E0	P001		T10	TP2 TP13
2030	HYDRAZINE AQUEOUS SOLUTION with more than 37 % hydrazine, by mass	8	6.1	II		1 L	E0	P001 IBC02		T7	TP2 TP13
2030	HYDRAZINE AQUEOUS SOLUTION with more than 37 % hydrazine, by mass	8	6.1	III		5 L	E1	P001 IBC03 LP01		T4	TP1
2031	NITRIC ACID, other than red fuming, with more than 70 % nitric acid	8	5.1	I		0	E0	P001	PP81	T10	TP2 TP13
2031	NITRIC ACID, other than red fuming, with at least 65 %, but not more than 70 % nitric acid	8	5.1	II		1 L	E2	P001 IBC02	PP81 B15	T8	TP2
2031	NITRIC ACID, other than red fuming, with less than 65 % nitric acid	8		II		1 L	E2	P001 IBC02	PP81 B15	T8	TP2
2032	NITRIC ACID, RED FUMING	8	5.1 6.1	I		0	E0	P602	PP81	T20	TP2 TP13
2033	POTASSIUM MONOXIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2034	HYDROGEN AND METHANE MIXTURE, COMPRESSED	2.1				0	E0	P200			
2035	1,1,1-TRIFLUOROETHANE (REFRIGERANT GAS R 143a)	2.1				0	E0	P200		T50	

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2036	XENON	2.2			378 392	120 ml	E1	P200			
2037	RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) without a release device, non-refillable	2			191 277 303 327 344	See SP 277	E0	P003 LP200	PP17, PP96 L2		
2038	DINITROTOLUENES, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2044	2,2-DIMETHYLPROPANE	2.1				0	E0	P200			
2045	ISOBUTYRALDEHYDE (ISOBUTYL ALDEHYDE)	3		II		1 L	E2	P001 IBC02		T4	TP1
2046	CYMENES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2047	DICHLOROPROPENES	3		II		1 L	E2	P001 IBC02		T4	TP1
2047	DICHLOROPROPENES	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
2048	DICYCLOPENTADIENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2049	DIETHYLBENZENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2050	DIISOBUTYLENE, ISOMERIC COMPOUNDS	3		II		1 L	E2	P001 IBC02		T4	TP1
2051	2-DIMETHYLAMINOETHANOL	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2052	DIPENTENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2053	METHYL ISOBUTYL CARBINOL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2054	MORPHOLINE	8	3	I		0	E0	P001		T10	TP2
2055	STYRENE MONOMER, STABILIZED	3		III	386	5 L	E1	P001 IBC03 LP01		T2	TP1
2056	TETRAHYDROFURAN	3		II		1 L	E2	P001 IBC02		T4	TP1
2057	TRIPROPYLENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2057	TRIPROPYLENE	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
2058	VALERALDEHYDE	3		II		1 L	E2	P001 IBC02		T4	TP1
2059	NITROCELLULOSE SOLUTION, FLAMMABLE with not more than 12.6 % nitrogen, by dry mass, and not more than 55 % nitrocellulose	3		I	198	0	E0	P001		T11	TP1 TP8 TP27
2059	NITROCELLULOSE SOLUTION, FLAMMABLE with not more than 12.6 % nitrogen, by dry mass, and not more than 55 % nitrocellulose	3		II	198	1 L	E0	P001 IBC02		T4	TP1 TP8

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2059	NITROCELLULOSE SOLUTION, FLAMMABLE with not more than 12.6 % nitrogen, by dry mass, and not more than 55 % nitrocellulose	3		III	198 223	5 L	E0	P001 IBC03 LP01		T2	TP1
2067	AMMONIUM NITRATE BASED FERTILIZER	5.1		III	306 307	5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
2071	AMMONIUM NITRATE BASED FERTILIZER	9		III	193	5 kg	E1	P002 IBC08 LP02	B3	BK2	
2073	AMMONIA SOLUTION, relative density less than 0.880 at 15 °C in water, with more than 35 % but not more than 50 % ammonia	2.2				120 ml	E0	P200			
2074	ACRYLAMIDE, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2075	CHLORAL, ANHYDROUS, STABILIZED	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2076	CRESOLS, LIQUID	6.1	8	II		100 ml	E4	P001 IBC02		T7	TP2
2077	alpha-NAPHTHYLAMINE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2078	TOLUENE DIISOCYANATE	6.1		II	279	100 ml	E4	P001 IBC02		T7	TP2 TP13
2079	DIETHYLENETRIAMINE	8		II		1 L	E2	P001 IBC02		T7	TP2
2186	HYDROGEN CHLORIDE, REFRIGERATED LIQUID	2.3	8			0	E0	P099			
2187	CARBON DIOXIDE, REFRIGERATED LIQUID	2.2				120 ml	E1	P203		T75	TP5
2188	ARSINE	2.3	2.1			0	E0	P200			
2189	DICHLOROSILANE	2.3	2.1 8			0	E0	P200			
2190	OXYGEN DIFLUORIDE, COMPRESSED	2.3	5.1 8			0	E0	P200			
2191	SULPHURYL FLUORIDE	2.3				0	E0	P200			
2192	GERMANE	2.3	2.1			0	E0	P200			
2193	HEXAFLUOROETHANE (REFRIGERANT GAS R 116)	2.2				120 ml	E1	P200			
2194	SELENIUM HEXAFLUORIDE	2.3	8			0	E0	P200			
2195	TELLURIUM HEXAFLUORIDE	2.3	8			0	E0	P200			
2196	TUNGSTEN HEXAFLUORIDE	2.3	8			0	E0	P200			
2197	HYDROGEN IODIDE, ANHYDROUS	2.3	8			0	E0	P200			
2198	PHOSPHORUS PENTAFLUORIDE	2.3	8			0	E0	P200			
2199	PHOSPHINE	2.3	2.1			0	E0	P200			
2200	PROPADIENE, STABILIZED	2.1			386	0	E0	P200			
2201	NITROUS OXIDE, REFRIGERATED LIQUID	2.2	5.1			0	E0	P203		T75	TP5 TP22
2202	HYDROGEN SELENIDE, ANHYDROUS	2.3	2.1			0	E0	P200			
2203	SILANE	2.1				0	E0	P200			
2204	CARBONYL SULPHIDE	2.3	2.1			0	E0	P200			

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2205	ADIPONITRILE	6.1		III		5 L	E1	P001 IBC03 LP01		T3	TP1
2206	ISOCYANATES, TOXIC, N.O.S. or ISOCYANATE SOLUTION, TOXIC, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2206	ISOCYANATES, TOXIC, N.O.S. or ISOCYANATE SOLUTION, TOXIC, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP13 TP28
2208	CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 10 % but not more than 39 % available chlorine	5.1		III	314	5 kg	E1	P002 IBC08 LP02	PP85 B3, B13 L3		
2209	FORMALDEHYDE SOLUTION with not less than 25 % formaldehyde	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2210	MANEB or MANEB PREPARATION with not less than 60 % maneb	4.2	4.3	III	273	0	E1	P002 IBC06		T1	TP33
2211	POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour	9		III	382	5 kg	E1	P002 IBC08	PP14 B3, B6	T1	TP33
2212	ASBESTOS, AMPHIBOLE (amosite, tremolite, actinolite, anthophyllite, crocidolite)	9		II	168 274	1 kg	E0	P002 IBC08	PP37 B2, B4	T3	TP33
2213	PARAFORMALDEHYDE	4.1		III	223	5 kg	E1	P002 IBC08 LP02	PP12 B3	T1 BK1 BK2 BK3	TP33
2214	PHTHALIC ANHYDRIDE with more than 0.05 % of maleic anhydride	8		III	169	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2215	MALEIC ANHYDRIDE	8		III		5 kg	E1	P002 IBC08	B3	T1	TP33
2215	MALEIC ANHYDRIDE, MOLTEN	8		III		0	E0	NONE		T4	TP3
2216	FISH MEAL (FISH SCRAP), STABILIZED	9		III	29 117 300 308	0	E1	P900 IBC08	B3	T1 BK2	TP33
2217	SEED CAKE with not more than 1.5 % oil and not more than 11 % moisture	4.2		III	29 142	0	E0	P002 IBC08 LP02	PP20 B3, B6	BK2	
2218	ACRYLIC ACID, STABILIZED	8	3	II	386	1 L	E2	P001 IBC02		T7	TP2
2219	ALLYL GLYCIDYL ETHER	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2222	ANISOLE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2224	BENZONITRILE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2225	BENZENESULPHONYL CHLORIDE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2226	BENZOTRICHLORIDE	8		II		1 L	E2	P001 IBC02		T7	TP2
2227	n-BUTYL METHACRYLATE, STABILIZED	3		III	386	5 L	E1	P001 IBC03 LP01		T2	TP1

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2232	2-CHLOROETHANAL	6.1		I	354	0	E0	P602		T20	TP2 TP13
2233	CHLOROANISIDINES	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2234	CHLOROBENZOTRIFLUORIDES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2235	CHLOROBENZYL CHLORIDES, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2236	3-CHLORO-4-METHYLPHENYL ISOCYANATE, LIQUID	6.1		II		100 ml	E4	P001 IBC02			
2237	CHLORONITROANILINES	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2238	CHLOROTOLUENES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2239	CHLOROTOLUIDINES, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2240	CHROMOSULPHURIC ACID	8		I		0	E0	P001		T10	TP2 TP13
2241	CYCLOHEPTANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2242	CYCLOHEPTENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2243	CYCLOHEXYL ACETATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2244	CYCLOPENTANOL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2245	CYCLOPENTANONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2246	CYCLOPENTENE	3		II		1 L	E2	P001 IBC02	B8	T7	TP2
2247	n-DECANE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2248	DI-n-BUTYLAMINE	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2249	DICHLORODIMETHYL ETHER, SYMMETRICAL	6.1	3	I		0	E0	P099			
2250	DICHLOROPHENYL ISOCYANATES	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2251	BICYCLO[2.2.1]-HEPTA-2,5-DIENE, STABILIZED (2,5-NORBORNADIENE, STABILIZED)	3		II	386	1 L	E2	P001 IBC02		T7	TP2
2252	1,2-DIMETHOXYETHANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2253	N,N-DIMETHYLANILINE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2254	MATCHES, FUSEE	4.1		III	293	5 kg	E0	P407			
2256	CYCLOHEXENE	3		II		1 L	E2	P001 IBC02		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2257	POTASSIUM	4.3		I		0	E0	P403 IBC04	B1	T9	TP7 TP33
2258	1,2-PROPYLENEDIAMINE	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2259	TRIETHYLENETETRAMINE	8		II		1 L	E2	P001 IBC02		T7	TP2
2260	TRIPROPYLAMINE	3	8	III		5 L	E1	P001 IBC03		T4	TP1
2261	XYLENOLS, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2262	DIMETHYLCARBAMOYL CHLORIDE	8		II		1 L	E2	P001 IBC02		T7	TP2
2263	DIMETHYLCYCLOHEXANES	3		II		1 L	E2	P001 IBC02		T4	TP1
2264	N,N-DIMETHYL-CYCLOHEXYLAMINE	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2265	N,N-DIMETHYLFORMAMIDE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP2
2266	DIMETHYL-N-PROPYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP2 TP13
2267	DIMETHYL THIOPHOSPHORYL CHLORIDE	6.1	8	II		100 ml	E4	P001 IBC02		T7	TP2
2269	3,3'-IMINODIPROPYLAMINE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP2
2270	ETHYLAMINE, AQUEOUS SOLUTION with not less than 50 % but not more than 70 % ethylamine	3	8	II		1 L	E2	P001 IBC02		T7	TP1
2271	ETHYL AMYL KETONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2272	N-ETHYLANILINE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2273	2-ETHYLANILINE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2274	N-ETHYL-N-BENZYLANILINE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2275	2-ETHYLBUTANOL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2276	2-ETHYLHEXYLAMINE	3	8	III		5 L	E1	P001 IBC03		T4	TP1
2277	ETHYL METHACRYLATE, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1
2278	n-HEPTENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2279	HEXACHLOROBUTADIENE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2280	HEXAMETHYLENEDIAMINE, SOLID	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2281	HEXAMETHYLENE-DIISOCYANATE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2 TP13

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2282	HEXANOLS	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2283	ISOBUTYL METHACRYLATE, STABILIZED	3		III	386	5 L	E1	P001 IBC03 LP01		T2	TP1
2284	ISOBUTYRONITRILE	3	6.1	II		1 L	E2	P001 IBC02		T7	TP2 TP13
2285	ISOCYANATOBENZO-TRIFLUORIDES	6.1	3	II		100 ml	E4	P001 IBC02		T7	TP2
2286	PENTAMETHYLHEPTANE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2287	ISOHEPTENES	3		II		1 L	E2	P001 IBC02		T4	TP1
2288	ISOHEXENES	3		II		1 L	E2	P001 IBC02	B8	T11	TP1
2289	ISOPHORONEDIAMINE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2290	ISOPHORONE DIISOCYANATE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP2
2291	LEAD COMPOUND, SOLUBLE, N.O.S.	6.1		III	199 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2293	4-METHOXY-4-METHYLPENTAN-2-ONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2294	N-METHYLANILINE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2295	METHYL CHLOROACETATE	6.1	3	I		0	E0	P001		T14	TP2 TP13
2296	METHYLCYCLOHEXANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2297	METHYLCYCLOHEXANONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2298	METHYLCYCLOPENTANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2299	METHYL DICHLOROACETATE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2300	2-METHYL-5-ETHYLPYRIDINE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2301	2-METHYLFURAN	3		II		1 L	E2	P001 IBC02		T4	TP1
2302	5-METHYLHEXAN-2-ONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2303	ISOPROPENYLBENZENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2304	NAPHTHALENE, MOLTEN	4.1		III		0	E0	NONE		T1	TP3
2305	NITROBENZENESULPHONIC ACID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2306	NITROBENZOTRIFLUORIDES, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2307	3-NITRO-4-CHLOROBENZOTRIFLUORIDE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2308	NITROSYLSULPHURIC ACID, LIQUID	8		II		1 L	E2	P001 IBC02		T8	TP2
2309	OCTADIENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2310	PENTANE-2,4-DIONE	3	6.1	III		5 L	E1	P001 IBC03		T4	TP1
2311	PHENETIDINES	6.1		III	279	5 L	E1	P001 IBC03 LP01		T4	TP1
2312	PHENOL, MOLTEN	6.1		II		0	E0	NONE		T7	TP3
2313	PICOLINES	3		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2315	POLYCHLORINATED BIPHENYLS, LIQUID	9		II	305	1 L	E2	P906 IBC02		T4	TP1
2316	SODIUM CUPROCYANIDE, SOLID	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
2317	SODIUM CUPROCYANIDE SOLUTION	6.1		I		0	E5	P001		T14	TP2 TP13
2318	SODIUM HYDROSULPHIDE with less than 25 % water of crystallization	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
2319	TERPENE HYDROCARBONS, N.O.S.	3		III		5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
2320	TETRAETHYLENEPENTAMINE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2321	TRICHLOROBENZENES, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2322	TRICHLOROBUTENE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2323	TRIETHYL PHOSPHITE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2324	TRIISOBUTYLENE	3		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2325	1,3,5-TRIMETHYLBENZENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2326	TRIMETHYL-CYCLOHEXYLAMINE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2327	TRIMETHYL-HEXAMETHYLENEDIAMINES	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2328	TRIMETHYLHEXAMETHYLENE DIISOCYANATE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP2 TP13
2329	TRIMETHYL PHOSPHITE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2330	UNDECANE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2331	ZINC CHLORIDE, ANHYDROUS	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2332	ACETALDEHYDE OXIME	3		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2333	ALLYL ACETATE	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1 TP13
2334	ALLYLAMINE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2335	ALLYL ETHYL ETHER	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1 TP13
2336	ALLYL FORMATE	3	6.1	I		0	E0	P001		T14	TP2 TP13
2337	PHENYL MERCAPTAN	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2338	BENZOTRIFLUORIDE	3		II		1 L	E2	P001 IBC02		T4	TP1
2339	2-BROMOBUTANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2340	2-BROMOETHYL ETHYL ETHER	3		II		1 L	E2	P001 IBC02		T4	TP1
2341	1-BROMO-3-METHYLBUTANE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2342	BROMOMETHYLPROPANES	3		II		1 L	E2	P001 IBC02		T4	TP1
2343	2-BROMOPENTANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2344	BROMOPROPANES	3		II		1 L	E2	P001 IBC02		T4	TP1
2344	BROMOPROPANES	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
2345	3-BROMOPROPYNE	3		II		1 L	E2	P001 IBC02		T4	TP1
2346	BUTANEDIONE	3		II		1 L	E2	P001 IBC02		T4	TP1
2347	BUTYL MERCAPTAN	3		II		1 L	E2	P001 IBC02		T4	TP1
2348	BUTYL ACRYLATES, STABILIZED	3		III	386	5 L	E1	P001 IBC03 LP01		T2	TP1
2350	BUTYL METHYL ETHER	3		II		1 L	E2	P001 IBC02		T4	TP1
2351	BUTYL NITRITES	3		II		1 L	E2	P001 IBC02		T4	TP1
2351	BUTYL NITRITES	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
2352	BUTYL VINYL ETHER, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1
2353	BUTYRYL CHLORIDE	3	8	II		1 L	E2	P001 IBC02		T8	TP2 TP13
2354	CHLOROMETHYL ETHYL ETHER	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1 TP13
2356	2-CHLOROPROPANE	3		I		0	E3	P001		T11	TP2 TP13

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2357	CYCLOHEXYLAMINE	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2358	CYCLOOCTATETRAENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2359	DIALLYLAMINE	3	6.1 8	II		1 L	E2	P001 IBC99		T7	TP1
2360	DIALLYL ETHER	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1 TP13
2361	DIISOBUTYLAMINE	3	8	III		5 L	E1	P001 IBC03		T4	TP1
2362	1,1-DICHLOROETHANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2363	ETHYL MERCAPTAN	3		I		0	E0	P001		T11	TP2 TP13
2364	n-PROPYLBENZENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2366	DIETHYL CARBONATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2367	alpha-METHYL-VALERALDEHYDE	3		II		1 L	E2	P001 IBC02		T4	TP1
2368	alpha-PINENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2370	1-HEXENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2371	ISOPENTENES	3		I		0	E3	P001		T11	TP2
2372	1,2-DI-(DIMETHYLAMINO) ETHANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2373	DIETHOXYMETHANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2374	3,3-DIETHOXYPROPENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2375	DIETHYL SULPHIDE	3		II		1 L	E2	P001 IBC02		T7	TP1 TP13
2376	2,3-DIHYDROPYRAN	3		II		1 L	E2	P001 IBC02		T4	TP1
2377	1,1-DIMETHOXYETHANE	3		II		1 L	E2	P001 IBC02		T7	TP1
2378	2-DIMETHYL-AMINOACETONITRILE	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1
2379	1,3-DIMETHYLBUTYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
2380	DIMETHYLDIETHOXYSILANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2381	DIMETHYL DISULPHIDE	3	6.1	II		1 L	E0	P001 IBC02		T7	TP2 TP13
2382	DIMETHYLHYDRAZINE, SYMMETRICAL	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2383	DIPROPYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
2384	DI-n-PROPYL ETHER	3		II		1 L	E2	P001 IBC02		T4	TP1
2385	ETHYL ISOBUTYRATE	3		II		1 L	E2	P001 IBC02		T4	TP1
2386	1-ETHYLPIPERIDINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2387	FLUOROBENZENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2388	FLUOROTOLUENES	3		II		1 L	E2	P001 IBC02		T4	TP1
2389	FURAN	3		I		0	E3	P001		T12	TP2 TP13
2390	2-IODOBUTANE	3		II		1 L	E2	P001 IBC02		T4	TP1
2391	IODOMETHYLPROPANES	3		II		1 L	E2	P001 IBC02		T4	TP1
2392	IODOPROPANES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2393	ISOBUTYL FORMATE	3		II		1 L	E2	P001 IBC02		T4	TP1
2394	ISOBUTYL PROPIONATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2395	ISOBUTYRYL CHLORIDE	3	8	II		1 L	E2	P001 IBC02		T7	TP2
2396	METHACRYLALDEHYDE, STABILIZED	3	6.1	II	386	1 L	E2	P001 IBC02		T7	TP1 TP13
2397	3-METHYLBUTAN-2-ONE	3		II		1 L	E2	P001 IBC02		T4	TP1
2398	METHYL tert-BUTYL ETHER	3		II		1 L	E2	P001 IBC02		T7	TP1
2399	1-METHYLPIPERIDINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
2400	METHYL ISOVALERATE	3		II		1 L	E2	P001 IBC02		T4	TP1
2401	PIPERIDINE	8	3	I		0	E0	P001		T10	TP2
2402	PROPANETHIOLS	3		II		1 L	E2	P001 IBC02		T4	TP1 TP13
2403	ISOPROPENYL ACETATE	3		II		1 L	E2	P001 IBC02		T4	TP1
2404	PROPIONITRILE	3	6.1	II		1 L	E0	P001 IBC02		T7	TP1 TP13
2405	ISOPROPYL BUTYRATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2406	ISOPROPYL ISOBUTYRATE	3		II		1 L	E2	P001 IBC02		T4	TP1
2407	ISOPROPYL CHLOROFORMATE	6.1	3 8	I	354	0	E0	P602			
2409	ISOPROPYL PROPIONATE	3		II		1 L	E2	P001 IBC02		T4	TP1
2410	1,2,3,6-TETRAHYDROPYRIDINE	3		II		1 L	E2	P001 IBC02		T4	TP1
2411	BUTYRONITRILE	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1 TP13
2412	TETRAHYDROTHIOPHENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2413	TETRAPROPYL ORTHOTITANATE	3		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2414	THIOPHENE	3		II		1 L	E2	P001 IBC02		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2416	TRIMETHYL BORATE	3		II		1 L	E2	P001 IBC02		T7	TP1
2417	CARBONYL FLUORIDE	2.3	8			0	E0	P200			
2418	SULPHUR TETRAFLUORIDE	2.3	8			0	E0	P200			
2419	BROMOTRIFLUOROETHYLENE	2.1				0	E0	P200			
2420	HEXAFLUOROACETONE	2.3	8			0	E0	P200			
2421	NITROGEN TRIOXIDE	2.3	5.1 8			0	E0	P200			
2422	OCTAFLUOROBUT-2-ENE (REFRIGERANT GAS R 1318)	2.2				120 ml	E1	P200			
2424	OCTAFLUOROPROPANE (REFRIGERANT GAS R 218)	2.2				120 ml	E1	P200		T50	
2426	AMMONIUM NITRATE, LIQUID (hot concentrated solution)	5.1			252	0	E0	NONE		T7	TP1 TP16 TP17
2427	POTASSIUM CHLORATE, AQUEOUS SOLUTION	5.1		II		1 L	E2	P504 IBC02		T4	TP1
2427	POTASSIUM CHLORATE, AQUEOUS SOLUTION	5.1		III	223	5 L	E1	P504 IBC02		T4	TP1
2428	SODIUM CHLORATE, AQUEOUS SOLUTION	5.1		II		1 L	E2	P504 IBC02		T4	TP1
2428	SODIUM CHLORATE, AQUEOUS SOLUTION	5.1		III	223	5 L	E1	P504 IBC02		T4	TP1
2429	CALCIUM CHLORATE, AQUEOUS SOLUTION	5.1		II		1 L	E2	P504 IBC02		T4	TP1
2429	CALCIUM CHLORATE, AQUEOUS SOLUTION	5.1		III	223	5 L	E1	P504 IBC02		T4	TP1
2430	ALKYLPHENOLS, SOLID, N.O.S. (including C2-C12 homologues)	8		I		0	E0	P002 IBC07	B1	T6	TP33
2430	ALKYLPHENOLS, SOLID, N.O.S. (including C2-C12 homologues)	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2430	ALKYLPHENOLS, SOLID, N.O.S. (including C2-C12 homologues)	8		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2431	ANISIDINES	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2432	N,N-DIETHYLANILINE	6.1		III	279	5 L	E1	P001 IBC03 LP01		T4	TP1
2433	CHLORONITROTOLUENES, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2434	DIBENZYLDICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
2435	ETHYLPHENYL-DICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
2436	THIOACETIC ACID	3		II		1 L	E2	P001 IBC02		T4	TP1
2437	METHYLPHENYL-DICHLOROSILANE	8		II		0	E0	P010		T10	TP2 TP7 TP13
2438	TRIMETHYLACETYL CHLORIDE	6.1	3 8	I		0	E0	P001		T14	TP2 TP13
2439	SODIUM HYDROGENDIFLUORIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2440	STANNIC CHLORIDE PENTAHYDRATE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2441	TITANIUM TRICHLORIDE, PYROPHORIC or TITANIUM TRICHLORIDE MIXTURE, PYROPHORIC	4.2	8	I		0	E0	P404			
2442	TRICHLOROACETYL CHLORIDE	8		II		0	E0	P001		T7	TP2
2443	VANADIUM OXYTRICHLORIDE	8		II		1 L	E0	P001 IBC02		T7	TP2
2444	VANADIUM TETRACHLORIDE	8		I		0	E0	P802		T10	TP2
2446	NITROCRESOLS, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2447	PHOSPHORUS, WHITE, MOLTEN	4.2	6.1	I		0	E0	NONE		T21	TP3 TP7 TP26
2448	SULPHUR, MOLTEN	4.1		III		0	E0	IBC01		T1	TP3
2451	NITROGEN TRIFLUORIDE	2.2	5.1			0	E0	P200			
2452	ETHYLACETYLENE, STABILIZED	2.1			386	0	E0	P200			
2453	ETHYL FLUORIDE (REFRIGERANT GAS R 161)	2.1				0	E0	P200			
2454	METHYL FLUORIDE (REFRIGERANT GAS R 41)	2.1				0	E0	P200			
2455	METHYL NITRITE	2.2				120 ml	E1	P200			
2456	2-CHLOROPROPENE	3		I		0	E3	P001		T11	TP2
2457	2,3-DIMETHYLBUTANE	3		II		1 L	E2	P001 IBC02		T7	TP1
2458	HEXADIENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2459	2-METHYL-1-BUTENE	3		I		0	E3	P001		T11	TP2
2460	2-METHYL-2-BUTENE	3		II		1 L	E2	P001 IBC02	B8	T7	TP1
2461	METHYLPENTADIENE	3		II		1 L	E2	P001 IBC02		T4	TP1
2463	ALUMINIUM HYDRIDE	4.3		I		0	E0	P403			
2464	BERYLLIUM NITRATE	5.1	6.1	II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2465	DICHLOROISOCYANURIC ACID, DRY or DICHLOROISOCYANURIC ACID SALTS	5.1		II	135	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2466	POTASSIUM SUPEROXIDE	5.1		I		0	E0	P503 IBC06	B1		
2468	TRICHLOROISOCYANURIC ACID, DRY	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2469	ZINC BROMATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2470	PHENYLACETONITRILE, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2471	OSMIUM TETROXIDE	6.1		I		0	E5	P002 IBC07	PP30 B1	T6	TP33

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(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2473	SODIUM ARSANILATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2474	THIOPHOSGENE	6.1		I	279 354	0	E0	P602		T20	TP2 TP13
2475	VANADIUM TRICHLORIDE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2477	METHYL ISOTHIOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2478	ISOCYANATES, FLAMMABLE, TOXIC, N.O.S. or ISOCYANATE SOLUTION, FLAMMABLE, TOXIC, N.O.S.	3	6.1	II	274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2478	ISOCYANATES, FLAMMABLE, TOXIC, N.O.S. or ISOCYANATE SOLUTION, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP13 TP28
2480	METHYL ISOCYANATE	6.1	3	I	354	0	E0	P601		T22	TP2 TP13
2481	ETHYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2482	n-PROPYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2483	ISOPROPYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2484	tert-BUTYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2485	n-BUTYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2486	ISOBUTYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2487	PHENYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2488	CYCLOHEXYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2490	DICHLOROISOPROPYL ETHER	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2491	ETHANOLAMINE or ETHANOLAMINE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2493	HEXAMETHYLENEIMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
2495	IODINE PENTAFLUORIDE	5.1	6.1 8	I		0	E0	P200			
2496	PROPIONIC ANHYDRIDE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2498	1,2,3,6-TETRAHYDRO-BENZALDEHYDE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2501	TRIS-(1-AZIRIDINYL) PHOSPHINE OXIDE SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2501	TRIS-(1-AZIRIDINYL) PHOSPHINE OXIDE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2502	VALERYL CHLORIDE	8	3	II		1 L	E2	P001 IBC02		T7	TP2

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2503	ZIRCONIUM TETRACHLORIDE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2504	TETRABROMOETHANE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2505	AMMONIUM FLUORIDE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2506	AMMONIUM HYDROGEN SULPHATE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2507	CHLOROPLATINIC ACID, SOLID	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2508	MOLYBDENUM PENTACHLORIDE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2509	POTASSIUM HYDROGEN SULPHATE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2511	2-CHLOROPROPIONIC ACID	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP2
2512	AMINOPHENOLS (o-, m-, p-)	6.1		III	279	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2513	BROMOACETYL BROMIDE	8		II		1 L	E2	P001 IBC02		T8	TP2
2514	BROMOBENZENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2515	BROMOFORM	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2516	CARBON TETRABROMIDE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2517	1-CHLORO-1,1-DIFLUOROETHANE (REFRIGERANT GAS R 142b)	2.1				0	E0	P200		T50	
2518	1,5,9-CYCLODODECATRIENE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2520	CYCLOOCTADIENES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2521	DIKETENE, STABILIZED	6.1	3	I	354 386	0	E0	P602		T20	TP2 TP13
2522	2-DIMETHYLAMINOETHYL METHACRYLATE, STABILIZED	6.1		II	386	100 ml	E4	P001 IBC02		T7	TP2
2524	ETHYL ORTHOFORMATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2525	ETHYL OXALATE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2526	FURFURYLAMINE	3	8	III		5 L	E1	P001 IBC03		T4	TP1
2527	ISOBUTYL ACRYLATE, STABILIZED	3		III	386	5 L	E1	P001 IBC03 LP01		T2	TP1

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(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2528	ISOBUTYL ISOBUTYRATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2529	ISOBUTYRIC ACID	3	8	III		5 L	E1	P001 IBC03		T4	TP1
2531	METHACRYLIC ACID, STABILIZED	8		II	386	1 L	E2	P001 IBC02 LP01		T7	TP2 TP18 TP30
2533	METHYL TRICHLOROACETATE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2534	METHYLCHLOROSILANE	2.3	2.1 8			0	E0	P200			
2535	4-METHYLMORPHOLINE (N-METHYLMORPHOLINE)	3	8	II		1 L	E2	P001 IBC02		T7	TP1
2536	METHYLTETRAHYDROFURAN	3		II		1 L	E2	P001 IBC02		T4	TP1
2538	NITRONAPHTHALENE	4.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2541	TERPINOLENE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2542	TRIBUTYLAMINE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2545	HAFNIUM POWDER, DRY	4.2		I		0	E0	P404			
2545	HAFNIUM POWDER, DRY	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
2545	HAFNIUM POWDER, DRY	4.2		III	223	0	E1	P002 IBC08 LP02	B3	T1	TP33
2546	TITANIUM POWDER, DRY	4.2		I		0	E0	P404			
2546	TITANIUM POWDER, DRY	4.2		II		0	E2	P410 IBC06	B2	T3	TP33
2546	TITANIUM POWDER, DRY	4.2		III	223	0	E1	P002 IBC08 LP02	B3	T1	TP33
2547	SODIUM SUPEROXIDE	5.1		I		0	E0	P503 IBC06	B1		
2548	CHLORINE PENTAFLUORIDE	2.3	5.1 8			0	E0	P200			
2552	HEXAFLUOROACETONE HYDRATE, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2554	METHYLALLYL CHLORIDE	3		II		1 L	E2	P001 IBC02		T4	TP1 TP13
2555	NITROCELLULOSE WITH WATER (not less than 25 % water, by mass)	4.1		II	394	0	E0	P406			
2556	NITROCELLULOSE WITH ALCOHOL (not less than 25 % alcohol, by mass, and not more than 12.6 % nitrogen, by dry mass)	4.1		II	394	0	E0	P406			
2557	NITROCELLULOSE, with not more than 12.6 % nitrogen, by dry mass, MIXTURE WITH or WITHOUT PLASTICIZER, WITH or WITHOUT PIGMENT	4.1		II	241 394	0	E0	P406			
2558	EPIBROMOHYDRIN	6.1	3	I		0	E0	P001		T14	TP2 TP13

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2560	2-METHYLPENTAN-2-OL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2561	3-METHYL-1-BUTENE	3		I		0	E3	P001		T11	TP2
2564	TRICHLOROACETIC ACID SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
2564	TRICHLOROACETIC ACID SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2565	DICYCLOHEXYLAMINE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2567	SODIUM PENTACHLOROPHENATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2570	CADMIUM COMPOUND	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
2570	CADMIUM COMPOUND	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2570	CADMIUM COMPOUND	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2571	ALKYLSULPHURIC ACIDS	8		II		1 L	E2	P001 IBC02		T8	TP2 TP13 TP28
2572	PHENYLHYDRAZINE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2573	THALLIUM CHLORATE	5.1	6.1	II		1 kg	E2	P002 IBC06	B2	T3	TP33
2574	TRICRESYL PHOSPHATE with more than 3 % ortho isomer	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2576	PHOSPHORUS OXYBROMIDE, MOLTEN	8		II		0	E0	NONE		T7	TP3 TP13
2577	PHENYLACETYL CHLORIDE	8		II		1 L	E2	P001 IBC02		T7	TP2
2578	PHOSPHORUS TRIOXIDE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2579	PIPERAZINE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2580	ALUMINIUM BROMIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2581	ALUMINIUM CHLORIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2582	FERRIC CHLORIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2583	ALKYLSULPHONIC ACIDS, SOLID or ARYLSULPHONIC ACIDS, SOLID with more than 5 % free sulphuric acid	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2584	ALKYSULPHONIC ACIDS, LIQUID or ARYLSULPHONIC ACIDS, LIQUID with more than 5 % free sulphuric acid	8		II		1 L	E2	P001 IBC02		T8	TP2 TP13

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(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2585	ALKYLSULPHONIC ACIDS, SOLID or ARYLSULPHONIC ACIDS, SOLID with not more than 5 % free sulphuric acid	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2586	ALKYLSULPHONIC ACIDS, LIQUID or ARYLSULPHONIC ACIDS, LIQUID with not more than 5 % free sulphuric acid	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2587	BENZOQUINONE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2588	PESTICIDE, SOLID, TOXIC, N.O.S.	6.1		I	61 274	0	E5	P002 IBC99		T6	TP33
2588	PESTICIDE, SOLID, TOXIC, N.O.S.	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2588	PESTICIDE, SOLID, TOXIC, N.O.S.	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2589	VINYL CHLOROACETATE	6.1	3	II		100 ml	E4	P001 IBC02		T7	TP2
2590	ASBESTOS, CHRYSOTILE	9		III	168	5 kg	E1	P002 IBC08	PP37 B2, B3	T1	TP33
2591	XENON, REFRIGERATED LIQUID	2.2				120 ml	E1	P203		T75	TP5
2599	CHLOROTRIFLUOROMETHANE AND TRIFLUOROMETHANE AZEOTROPIC MIXTURE with approximately 60 % chlorotrifluoromethane (REFRIGERANT GAS R 503)	2.2				120 ml	E1	P200			
2601	CYCLOBUTANE	2.1				0	E0	P200			
2602	DICHLORODIFLUORO-METHANE AND DIFLUOROETHANE AZEOTROPIC MIXTURE with approximately 74 % dichlorodifluoromethane (REFRIGERANT GAS R 500)	2.2				120 ml	E1	P200		T50	
2603	CYCLOHEPTATRIENE	3	6.1	II		1 L	E2	P001 IBC02		T7	TP1 TP13
2604	BORON TRIFLUORIDE DIETHYL ETHERATE	8	3	I		0	E0	P001		T10	TP2
2605	METHOXYMETHYL ISOCYANATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2606	METHYL ORTHOSILICATE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2607	ACROLEIN DIMER, STABILIZED	3		III	386	5 L	E1	P001 IBC03 LP01		T2	TP1
2608	NITROPROPANES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2609	TRIALLYL BORATE	6.1		III		5 L	E1	P001 IBC03 LP01			
2610	TRIALLYLAMINE	3	8	III		5 L	E1	P001 IBC03		T4	TP1
2611	PROPYLENE CHLOROHYDRIN	6.1	3	II		100 ml	E4	P001 IBC02		T7	TP2 TP13
2612	METHYL PROPYL ETHER	3		II		1 L	E2	P001 IBC02	B8	T7	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2614	METHALLYL ALCOHOL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2615	ETHYL PROPYL ETHER	3		II		1 L	E2	P001 IBC02		T4	TP1
2616	TRIISOPROPYL BORATE	3		II		1 L	E2	P001 IBC02		T4	TP1
2616	TRIISOPROPYL BORATE	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
2617	METHYLCYCLOHEXANOLS, flammable	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2618	VINYLTOLUENES, STABILIZED	3		III	386	5 L	E1	P001 IBC03 LP01		T2	TP1
2619	BENZYLDIMETHYLAMINE	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2620	AMYL BUTYRATES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2621	ACETYL METHYL CARBINOL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2622	GLYCIDALDEHYDE	3	6.1	II		1 L	E2	P001 IBC02	B8	T7	TP1
2623	FIRELIGHTERS, SOLID with flammable liquid	4.1		III		5 kg	E1	P002 LP02	PP15		
2624	MAGNESIUM SILICIDE	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
2626	CHLORIC ACID, AQUEOUS SOLUTION with not more than 10 % chloric acid	5.1		II		1 L	E0	P504 IBC02		T4	TP1
2627	NITRITES, INORGANIC, N.O.S.	5.1		II	103 274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2628	POTASSIUM FLUOROACETATE	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
2629	SODIUM FLUOROACETATE	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
2630	SELENATES or SELENITES	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
2642	FLUOROACETIC ACID	6.1		I		0	E5	P002 IBC07	B1	T6	TP33
2643	METHYL BROMOACETATE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2644	METHYL IODIDE	6.1		I	354	0	E0	P602		T20	TP2 TP13
2645	PHENACYL BROMIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2646	HEXACHLOROCYCLO-PENTADIENE	6.1		I	354	0	E0	P602		T20	TP2 TP13
2647	MALONONITRILE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2648	1,2-DIBROMOBUTAN-3-ONE	6.1		II		100 ml	E4	P001 IBC02			
2649	1,3-DICHLOROACETONE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2650	1,1-DICHLORO-1-NITROETHANE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2651	4,4'-DIAMINODIPHENYL-METHANE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2653	BENZYL IODIDE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2655	POTASSIUM FLUOROSILICATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2656	QUINOLINE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2657	SELENIUM DISULPHIDE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2659	SODIUM CHLOROACETATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2660	NITROTOLUIDINES (MONO)	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2661	HEXACHLOROACETONE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2664	DIBROMOMETHANE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2667	BUTYLTOLUENES	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2668	CHLOROACETONITRILE	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
2669	CHLOROCRESOLS SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2669	CHLOROCRESOLS SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T7	TP2
2670	CYANURIC CHLORIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2671	AMINOPYRIDINES (o-, m-, p,)	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2672	AMMONIA SOLUTION, relative density between 0.880 and 0.957 at 15 °C in water, with more than 10 % but not more than 35 % ammonia	8		III		5 L	E1	P001 IBC03 LP01	B11	T7	TP1
2673	2-AMINO-4-CHLOROPHENOL	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2674	SODIUM FLUOROSILICATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2676	STIBINE	2.3	2.1			0	E0	P200			
2677	RUBIDIUM HYDROXIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
2677	RUBIDIUM HYDROXIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2678	RUBIDIUM HYDROXIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2679	LITHIUM HYDROXIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2679	LITHIUM HYDROXIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP2
2680	LITHIUM HYDROXIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2681	CAESIUM HYDROXIDE SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
2681	CAESIUM HYDROXIDE SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2682	CAESIUM HYDROXIDE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2683	AMMONIUM SULPHIDE SOLUTION	8	3 6.1	II		1 L	E2	P001 IBC01		T7	TP2 TP13
2684	3-DIETHYLAMINOPROPYL-AMINE	3	8	III		5 L	E1	P001 IBC03		T4	TP1
2685	N,N-DIETHYLETHYLENE-DIAMINE	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2686	2-DIETHYLAMINOETHANOL	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2687	DICYCLOHEXYLAMMONIUM NITRITE	4.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2688	1-BROMO-3-CHLOROPROPANE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2689	GLYCEROL alpha-MONOCHLOROHYDRIN	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2690	N,n-BUTYLIMIDAZOLE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2691	PHOSPHORUS PENTABROMIDE	8		II		1 kg	E0	P002 IBC08	B2, B4	T3	TP33
2692	BORON TRIBROMIDE	8		I		0	E0	P602		T20	TP2 TP13
2693	BISULPHITES, AQUEOUS SOLUTION, N.O.S.	8		III	274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
2698	TETRAHYDROPHTHALIC ANHYDRIDES with more than 0.05 % of maleic anhydride	8		III	29 169	5 kg	E1	P002 IBC08 LP02	PP14 B3	T1	TP33
2699	TRIFLUOROACETIC ACID	8		I		0	E0	P001		T10	TP2
2705	1-PENTOL	8		II		1 L	E2	P001 IBC02		T7	TP2
2707	DIMETHYLDIOXANES	3		II		1 L	E2	P001 IBC02		T4	TP1
2707	DIMETHYLDIOXANES	3		III	223	5 L	E1	P001 IBC03 LP01		T2	TP1
2709	BUTYLBENZENES	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2710	DIPROPYL KETONE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2713	ACRIDINE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2714	ZINC RESINATE	4.1		III		5 kg	E1	P002 IBC06		T1	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2715	ALUMINIUM RESINATE	4.1		III		5 kg	E1	P002 IBC06		T1	TP33
2716	1,4-BUTYNEDIOL	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2717	CAMPHOR, synthetic	4.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2719	BARIUM BROMATE	5.1	6.1	II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2720	CHROMIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2721	COPPER CHLORATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2722	LITHIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2723	MAGNESIUM CHLORATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2724	MANGANESE NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2725	NICKEL NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2726	NICKEL NITRITE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2727	THALLIUM NITRATE	6.1	5.1	II		500 g	E4	P002 IBC06	B2	T3	TP33
2728	ZIRCONIUM NITRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2729	HEXACHLOROBENZENE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2730	NITROANISOLES, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2732	NITROBROMOBENZENES, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. or POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S.	3	8	I	274	0	E0	P001		T14	TP1 TP27
2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. or POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S.	3	8	II	274	1 L	E2	P001 IBC02		T11	TP1 TP27
2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. or POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S.	3	8	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
2734	AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.	8	3	I	274	0	E0	P001		T14	TP2 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2734	AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.	8	3	II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
2735	AMINES, LIQUID, CORROSIVE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, N.O.S.	8		I	274	0	E0	P001		T14	TP2 TP27
2735	AMINES, LIQUID, CORROSIVE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP1 TP27
2735	AMINES, LIQUID, CORROSIVE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
2738	N-BUTYLANILINE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2739	BUTYRIC ANHYDRIDE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2740	n-PROPYL CHLOROFORMATE	6.1	3 8	I		0	E0	P602		T20	TP2 TP13
2741	BARIUM HYPOCHLORITE with more than 22 % available chlorine	5.1	6.1	II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2742	CHLOROFORMATES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.	6.1	3 8	II	274	100 ml	E4	P001 IBC01			
2743	n-BUTYL CHLOROFORMATE	6.1	3 8	II		100 ml	E0	P001		T20	TP2 TP13
2744	CYCLOBUTYL CHLOROFORMATE	6.1	3 8	II		100 ml	E4	P001 IBC01		T7	TP2 TP13
2745	CHLOROMETHYL CHLOROFORMATE	6.1	8	II		100 ml	E4	P001 IBC02		T7	TP2 TP13
2746	PHENYL CHLOROFORMATE	6.1	8	II		100 ml	E4	P001 IBC02		T7	TP2 TP13
2747	tert-BUTYLCYCLOHEXYL CHLOROFORMATE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2748	2-ETHYLHEXYL CHLOROFORMATE	6.1	8	II		100 ml	E4	P001 IBC02		T7	TP2 TP13
2749	TETRAMETHYLSILANE	3		I		0	E0	P001		T14	TP2
2750	1,3-DICHLOROPROPANOL-2	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2751	DIETHYLTHIOPHOSPHORYL CHLORIDE	8		II		1 L	E2	P001 IBC02		T7	TP2
2752	1,2-EPOXY-3-ETHOXYPROPANE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2753	N-ETHYLBENZYLTOLUIDINES, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T7	TP1
2754	N-ETHYLTOLUIDINES	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2757	CARBAMATE PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2757	CARBAMATE PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2757	CARBAMATE PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2758	CARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2758	CARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2759	ARSENICAL PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2759	ARSENICAL PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2759	ARSENICAL PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2760	ARSENICAL PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2760	ARSENICAL PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2761	ORGANOCHLORINE PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2761	ORGANOCHLORINE PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2761	ORGANOCHLORINE PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2762	ORGANOCHLORINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2762	ORGANOCHLORINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2763	TRIAZINE PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2763	TRIAZINE PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2763	TRIAZINE PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08	B3	T1	TP33
2764	TRIAZINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2764	TRIAZINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2771	THIOCARBAMATE PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2771	THIOCARBAMATE PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2771	THIOCARBAMATE PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2772	THIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2772	THIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2775	COPPER BASED PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2775	COPPER BASED PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2775	COPPER BASED PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2776	COPPER BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2776	COPPER BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2777	MERCURY BASED PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2777	MERCURY BASED PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2777	MERCURY BASED PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2778	MERCURY BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2778	MERCURY BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2779	SUBSTITUTED NITROPHENOL PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2779	SUBSTITUTED NITROPHENOL PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2779	SUBSTITUTED NITROPHENOL PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2780	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2780	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2781	BIPYRIDILIUM PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2781	BIPYRIDILIUM PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2781	BIPYRIDILIUM PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2782	BIPYRIDILIUM PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2782	BIPYRIDILIUM PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2783	ORGANOPHOSPHORUS PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2783	ORGANOPHOSPHORUS PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2783	ORGANOPHOSPHORUS PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2784	ORGANOPHOSPHORUS PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2784	ORGANOPHOSPHORUS PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2785	4-THIAPENTANAL	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2786	ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
2786	ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2786	ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2787	ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
2787	ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.	6.1		I	43 274	0	E5	P001		T14	TP2 TP13 TP27
2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.	6.1		II	43 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.	6.1		III	43 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
2789	ACETIC ACID, GLACIAL or ACETIC ACID SOLUTION, more than 80 % acid, by mass	8	3	II		1 L	E2	P001 IBC02		T7	TP2
2790	ACETIC ACID SOLUTION, not less than 50 % but not more than 80 % acid, by mass	8		II		1 L	E2	P001 IBC02		T7	TP2
2790	ACETIC ACID SOLUTION, more than 10 % and less than 50 % acid, by mass	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2793	FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS in a form liable to self-heating	4.2		III	223	0	E1	P003 IBC08 LP02	PP20 B3, B6	BK2	
2794	BATTERIES, WET, FILLED WITH ACID, electric storage	8			295	1 L	E0	P801			
2795	BATTERIES, WET, FILLED WITH ALKALI, electric storage	8			295	1 L	E0	P801			
2796	SULPHURIC ACID with not more than 51 % acid or BATTERY FLUID, ACID	8		II		1 L	E2	P001 IBC02		T8	TP2
2797	BATTERY FLUID, ALKALI	8		II		1 L	E2	P001 IBC02		T7	TP2 TP28
2798	PHENYLPHOSPHORUS DICHLORIDE	8		II		1 L	E0	P001 IBC02		T7	TP2 TP28
2799	PHENYLPHOSPHORUS THIODICHLORIDE	8		II		1 L	E0	P001 IBC02		T7	TP2
2800	BATTERIES, WET, NON-SPILLABLE, electric storage	8			238	1 L	E0	P003	PP16		

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2801	DYE, LIQUID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, LIQUID, CORROSIVE, N.O.S.	8		I	274	0	E0	P001		T14	TP2 TP27
2801	DYE, LIQUID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, LIQUID, CORROSIVE, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
2801	DYE, LIQUID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, LIQUID, CORROSIVE, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
2802	COPPER CHLORIDE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2803	GALLIUM	8		III		5 kg	E0	P800	PP41	T1	TP33
2805	LITHIUM HYDRIDE, FUSED SOLID	4.3		II		500 g	E2	P410 IBC04		T3	TP33
2806	LITHIUM NITRIDE	4.3		I		0	E0	P403 IBC04	B1		
2807	MAGNETIZED MATERIAL	9		III	106		E0				
2809	MERCURY	8	6.1	III	365	5 kg	E0	P800			
2810	TOXIC LIQUID, ORGANIC, N.O.S.	6.1		I	274 315	0	E5	P001		T14	TP2 TP13 TP27
2810	TOXIC LIQUID, ORGANIC, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2810	TOXIC LIQUID, ORGANIC, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
2811	TOXIC SOLID, ORGANIC, N.O.S.	6.1		I	274	0	E5	P002 IBC99		T6	TP33
2811	TOXIC SOLID, ORGANIC, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2811	TOXIC SOLID, ORGANIC, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2812	SODIUM ALUMINATE, SOLID	8		III	106	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2813	WATER-REACTIVE SOLID, N.O.S.	4.3		I	274	0	E0	P403 IBC99		T9	TP7 TP33
2813	WATER-REACTIVE SOLID, N.O.S.	4.3		II	274	500 g	E2	P410 IBC07	B2	T3	TP33
2813	WATER-REACTIVE SOLID, N.O.S.	4.3		III	223 274	1 kg	E1	P410 IBC08	B4	T1	TP33
2814	INFECTIOUS SUBSTANCE, AFFECTING HUMANS	6.2			318 341	0	E0	P620		BK1 BK2	
2815	N-AMINOETHYLPIPERAZINE	8	6.1	III		5 L	E1	P001 IBC03 LP01		T4	TP1
2817	AMMONIUM HYDROGEN-DIFLUORIDE SOLUTION	8	6.1	II		1 L	E2	P001 IBC02		T8	TP2 TP13
2817	AMMONIUM HYDROGEN-DIFLUORIDE SOLUTION	8	6.1	III	223	5 L	E1	P001 IBC03		T4	TP1 TP13
2818	AMMONIUM POLYSULPHIDE SOLUTION	8	6.1	II		1 L	E2	P001 IBC02		T7	TP2 TP13
2818	AMMONIUM POLYSULPHIDE SOLUTION	8	6.1	III	223	5 L	E1	P001 IBC03		T4	TP1 TP13

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2819	AMYL ACID PHOSPHATE	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2820	BUTYRIC ACID	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2821	PHENOL SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2821	PHENOL SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2822	2-CHLOROPYRIDINE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2823	CROTONIC ACID, SOLID	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2826	ETHYL CHLOROTHIOFORMATE	8	3	II		0	E0	P001		T7	TP2
2829	CAPROIC ACID	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2830	LITHIUM FERROSILICON	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
2831	1,1,1-TRICHLOROETHANE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2834	PHOSPHOROUS ACID	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2835	SODIUM ALUMINIUM HYDRIDE	4.3		II		500 g	E0	P410 IBC04		T3	TP33
2837	BISULPHATES, AQUEOUS SOLUTION	8		II		1 L	E2	P001 IBC02		T7	TP2
2837	BISULPHATES, AQUEOUS SOLUTION	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2838	VINYL BUTYRATE, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1
2839	ALDOL	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2840	BUTYRALDOXIME	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2841	DI-n-AMYLAMINE	3	6.1	III		5 L	E1	P001 IBC03		T4	TP1
2842	NITROETHANE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2844	CALCIUM MANGANESE SILICON	4.3		III		1 kg	E1	P410 IBC08	B4	T1	TP33
2845	PYROPHORIC LIQUID, ORGANIC, N.O.S.	4.2		I	274	0	E0	P400		T22	TP2 TP7
2846	PYROPHORIC SOLID, ORGANIC, N.O.S.	4.2		I	274	0	E0	P404			
2849	3-CHLOROPROPANOL-1	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2850	PROPYLENE TETRAMER	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2851	BORON TRIFLUORIDE DIHYDRATE	8		II		1 L	E2	P001 IBC02		T7	TP2
2852	DIPICRYL SULPHIDE, WETTED with not less than 10 % water, by mass	4.1		I	28	0	E0	P406	PP24		
2853	MAGNESIUM FLUOROSILICATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2854	AMMONIUM FLUOROSILICATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2855	ZINC FLUOROSILICATE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2856	FLUOROSILICATES, N.O.S.	6.1		III	274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2857	REFRIGERATING MACHINES containing non-flammable, non-toxic, gases or ammonia solutions (UN 2672)	2.2			119	0	E0	P003	PP32		
2858	ZIRCONIUM, DRY, coiled wire, finished metal sheets, strip (thinner than 254 microns but not thinner than 18 microns)	4.1		III		5 kg	E1	P002 LP02			
2859	AMMONIUM METAVANADATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2861	AMMONIUM POLYVANADATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2862	VANADIUM PENTOXIDE, non-fused form	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2863	SODIUM AMMONIUM VANADATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2864	POTASSIUM METAVANADATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2865	HYDROXYLAMINE SULPHATE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2869	TITANIUM TRICHLORIDE MIXTURE	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2869	TITANIUM TRICHLORIDE MIXTURE	8		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2870	ALUMINIUM BOROHYDRIDE	4.2	4.3	I		0	E0	P400		T21	TP7 TP33
2870	ALUMINIUM BOROHYDRIDE IN DEVICES	4.2	4.3	I		0	E0	P002	PP13		
2871	ANTIMONY POWDER	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2872	DIBROMOCHLOROPROPANES	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2872	DIBROMOCHLOROPROPANES	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
2873	DIBUTYLAMINOETHANOL	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2874	FURFURYL ALCOHOL	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2875	HEXACHLOROPHENE	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2876	RESORCINOL	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2878	TITANIUM SPONGE GRANULES or TITANIUM SPONGE POWDERS	4.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2879	SELENIUM OXYCHLORIDE	8	6.1	I		0	E0	P001		T10	TP2 TP13
2880	CALCIUM HYPOCHLORITE, HYDRATED or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, with not less than 5.5 % but not more than 16 % water	5.1		II	314 322	1 kg	E2	P002 IBC08	PP85 B2, B4, B13		
2880	CALCIUM HYPOCHLORITE, HYDRATED or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, with not less than 5.5 % but not more than 16 % water	5.1		III	223 314	5 kg	E1	P002 IBC08	PP85 B4, B13		
2881	METAL CATALYST, DRY	4.2		I	274	0	E0	P404		T21	TP7 TP33
2881	METAL CATALYST, DRY	4.2		II	274	0	E0	P410 IBC06	B2	T3	TP33
2881	METAL CATALYST, DRY	4.2		III	223 274	0	E1	P002 IBC08 LP02	B3	T1	TP33
2900	INFECTIOUS SUBSTANCE, AFFECTING ANIMALS only	6.2			318 341	0	E0	P620		BK1 BK2	
2901	BROMINE CHLORIDE	2.3	5.1 8			0	E0	P200			
2902	PESTICIDE, LIQUID, TOXIC, N.O.S.	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2902	PESTICIDE, LIQUID, TOXIC, N.O.S.	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2902	PESTICIDE, LIQUID, TOXIC, N.O.S.	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
2903	PESTICIDE, LIQUID, TOXIC, FLAMMABLE, N.O.S., flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2903	PESTICIDE, LIQUID, TOXIC, FLAMMABLE, N.O.S., flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2903	PESTICIDE, LIQUID, TOXIC, FLAMMABLE, N.O.S., flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2
2904	CHLOROPHENOLATES, LIQUID or PHENOLATES, LIQUID	8		III		5 L	E1	P001 IBC03 LP01			
2905	CHLOROPHENOLATES, SOLID or PHENOLATES, SOLID	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2907	ISOSORBIDE DINITRATE MIXTURE with not less than 60 % lactose, mannose, starch or calcium hydrogen phosphate	4.1		II	127	0	E0	P406 IBC06	PP26 PP80 B2, B12		
2908	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - EMPTY PACKAGING	7			290 368	0	E0	See Chapter 1.5			
2909	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM	7			290	0	E0	See Chapter 1.5			
2910	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL	7			290 368	0	E0	See Chapter 1.5			
2911	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - INSTRUMENTS or ARTICLES	7			290	0	E0	See Chapter 1.5			
2912	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile-excepted	7			172 317 325	0	E0	See Chapter 2.7 and section 4.1.9		T5	TP4
2913	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I, SCO-II or SCO-III), non-fissile or fissile-excepted	7			172 317 325	0	E0	See Chapter 2.7 and section 4.1.9		T5	TP4
2915	RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non-fissile or fissile-excepted	7			172 317 325	0	E0	See Chapter 2.7 and section 4.1.9			
2916	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non-fissile or fissile-excepted	7			172 317 325 337	0	E0	See Chapter 2.7 and section 4.1.9			
2917	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non-fissile or fissile-excepted	7			172 317 325 337	0	E0	See Chapter 2.7 and section 4.1.9			
2919	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non-fissile or fissile-excepted	7			172 317 325	0	E0	See Chapter 2.7 and section 4.1.9			
2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	8	3	I	274	0	E0	P001		T14	TP2 TP27
2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	8	3	II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
2921	CORROSIVE SOLID, FLAMMABLE, N.O.S.	8	4.1	I	274	0	E0	P002 IBC99		T6	TP33
2921	CORROSIVE SOLID, FLAMMABLE, N.O.S.	8	4.1	II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2922	CORROSIVE LIQUID, TOXIC, N.O.S.	8	6.1	I	274	0	E0	P001		T14	TP2 TP13 TP27
2922	CORROSIVE LIQUID, TOXIC, N.O.S.	8	6.1	II	274	1 L	E2	P001 IBC02		T7	TP2
2922	CORROSIVE LIQUID, TOXIC, N.O.S.	8	6.1	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2923	CORROSIVE SOLID, TOXIC, N.O.S.	8	6.1	I	274	0	E0	P002 IBC99		T6	TP33
2923	CORROSIVE SOLID, TOXIC, N.O.S.	8	6.1	II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2923	CORROSIVE SOLID, TOXIC, N.O.S.	8	6.1	III	223 274	5 kg	E1	P002 IBC08	B3	T1	TP33
2924	FLAMMABLE LIQUID, CORROSIVE, N.O.S.	3	8	I	274	0	E0	P001		T14	TP2
2924	FLAMMABLE LIQUID, CORROSIVE, N.O.S.	3	8	II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
2924	FLAMMABLE LIQUID, CORROSIVE, N.O.S.	3	8	III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
2925	FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.	4.1	8	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
2925	FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.	4.1	8	III	223 274	5 kg	E1	P002 IBC06		T1	TP33
2926	FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.	4.1	6.1	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
2926	FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.	4.1	6.1	III	223 274	5 kg	E1	P002 IBC06		T1	TP33
2927	TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S.	6.1	8	I	274 315	0	E5	P001		T14	TP2 TP13 TP27
2927	TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S.	6.1	8	II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
2928	TOXIC SOLID, CORROSIVE, ORGANIC, N.O.S.	6.1	8	I	274	0	E5	P002 IBC99		T6	TP33
2928	TOXIC SOLID, CORROSIVE, ORGANIC, N.O.S.	6.1	8	II	274	500 g	E4	P002 IBC06	B2	T3	TP33
2929	TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S.	6.1	3	I	274 315	0	E5	P001		T14	TP2 TP13 TP27
2929	TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S.	6.1	3	II	274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2930	TOXIC SOLID, FLAMMABLE, ORGANIC, N.O.S.	6.1	4.1	I	274	0	E5	P002 IBC99		T6	TP33
2930	TOXIC SOLID, FLAMMABLE, ORGANIC, N.O.S.	6.1	4.1	II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
2931	VANADYL SULPHATE	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
2933	METHYL 2-CHLORO-PROPIONATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2934	ISOPROPYL 2-CHLORO-PROPIONATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2935	ETHYL 2-CHLOROPROPIONATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2936	THIOLACTIC ACID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2937	alpha-METHYLBENZYL ALCOHOL, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2940	9-PHOSPHABICYCLO-NONANES (CYCLOOCTADIENE PHOSPHINES)	4.2		II		0	E2	P410 IBC06	B2	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2941	FLUOROANILINES	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2942	2-TRIFLUOROMETHYLANILINE	6.1		III		5 L	E1	P001 IBC03 LP01			
2943	TETRAHYDROFURFURYL-AMINE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2945	N-METHYLBUTYLAMINE	3	8	II		1 L	E2	P001 IBC02		T7	TP1
2946	2-AMINO-5-DIETHYLAMINO-PENTANE	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
2947	ISOPROPYL CHLOROACETATE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
2948	3-TRIFLUOROMETHYL-ANILINE	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2949	SODIUM HYDROSULPHIDE, HYDRATED with not less than 25 % water of crystallization	8		II		1 kg	E2	P002 IBC08	B2, B4	T7	TP2
2950	MAGNESIUM GRANULES, COATED, particle size not less than 149 microns	4.3		III		1 kg	E1	P410 IBC08	B4	T1 BK2	TP33
2956	5-tert-BUTYL-2,4,6-TRINITRO-m-XYLENE (MUSK XYLENE)	4.1		III	132 133	5 kg	E0	P409			
2965	BORON TRIFLUORIDE DIMETHYL ETHERATE	4.3	3 8	I		0	E0	P401		T10	TP2 TP7 TP13
2966	THIOGLYCOL	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
2967	SULPHAMIC ACID	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2968	MANEB, STABILIZED or MANEB PREPARATION, STABILIZED against self-heating	4.3		III	223	1 kg	E1	P002 IBC08	B4	T1	TP33
2969	CASTOR BEANS or CASTOR MEAL or CASTOR POMACE or CASTOR FLAKE	9		II	141	5 kg	E2	P002 IBC08	PP34 B2, B4	T3 BK1 BK2	TP33
2977	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE	7	6.1 8			0	E0	See Chapter 2.7 and section 4.1.9			
2978	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted	7	6.1 8		317	0	E0	See Chapter 2.7 and section 4.1.9			
2983	ETHYLENE OXIDE AND PROPYLENE OXIDE MIXTURE, not more than 30 % ethylene oxide	3	6.1	I		0	E0	P001		T14	TP2 TP7 TP13
2984	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 8 % but less than 20 % hydrogen peroxide (stabilized as necessary)	5.1		III	65	5 L	E1	P504 IBC02	B5	T4	TP1 TP6 TP24
2985	CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S.	3	8	II		0	E0	P010		T14	TP2 TP7 TP13 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2986	CHLOROSILANES, CORROSIVE, FLAMMABLE, N.O.S.	8	3	II		0	E0	P010		T14	TP2 TP7 TP13 TP27
2987	CHLOROSILANES, CORROSIVE, N.O.S.	8		II		0	E0	P010		T14	TP2 TP7 TP13 TP27
2988	CHLOROSILANES, WATER-REACTIVE, FLAMMABLE, CORROSIVE, N.O.S.	4.3	3 8	I		0	E0	P401		T14	TP2 TP7 TP13
2989	LEAD PHOSPHITE, DIBASIC	4.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
2989	LEAD PHOSPHITE, DIBASIC	4.1		III	223	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
2990	LIFE-SAVING APPLIANCES, SELF-INFLATING	9			296	0	E0	P905			
2991	CARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2991	CARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2991	CARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
2992	CARBAMATE PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2992	CARBAMATE PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2992	CARBAMATE PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
2993	ARSENICAL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2993	ARSENICAL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2993	ARSENICAL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
2994	ARSENICAL PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2994	ARSENICAL PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2994	ARSENICAL PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
2995	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2995	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
2995	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
2996	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2996	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2996	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
2997	TRIAZINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2997	TRIAZINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2997	TRIAZINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
2998	TRIAZINE PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
2998	TRIAZINE PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
2998	TRIAZINE PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3005	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13
3005	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3005	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3006	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13
3006	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3006	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3009	COPPER BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3009	COPPER BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3009	COPPER BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3010	COPPER BASED PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3010	COPPER BASED PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3010	COPPER BASED PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3011	MERCURY BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3011	MERCURY BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3011	MERCURY BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3012	MERCURY BASED PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3012	MERCURY BASED PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3012	MERCURY BASED PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3013	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3013	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3013	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3014	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3014	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3014	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3015	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3015	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3015	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3016	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3016	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3016	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3017	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3017	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3017	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3018	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3018	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3018	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3019	ORGANOTIN PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3019	ORGANOTIN PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3019	ORGANOTIN PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3020	ORGANOTIN PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3020	ORGANOTIN PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3020	ORGANOTIN PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3021	PESTICIDE, LIQUID,FLAMMABLE, TOXIC, N.O.S., flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
3021	PESTICIDE, LIQUID,FLAMMABLE, TOXIC, N.O.S., flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
3022	1,2-BUTYLENE OXIDE, STABILIZED	3		II	386	1 L	E2	P001 IBC02		T4	TP1
3023	2-METHYL-2-HEPTANETHIOL	6.1	3	I	354	0	E0	P602		T20	TP2 TP13
3024	COUMARIN DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
3024	COUMARIN DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3025	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3025	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3025	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
3026	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3026	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3026	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3027	COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
3027	COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3027	COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3028	BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE SOLID, electric storage	8			295 304	2 kg	E0	P801			
3048	ALUMINIUM PHOSPHIDE PESTICIDE	6.1		I	153	0	E0	P002 IBC07	B1	T6	TP33
3054	CYCLOHEXYL MERCAPTAN	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
3055	2-(2-AMINOETHOXY)ETHANOL	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
3056	n-HEPTALDEHYDE	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
3057	TRIFLUOROACETYL CHLORIDE	2.3	8			0	E0	P200		T50	TP21
3064	NITROGLYCERIN, SOLUTION IN ALCOHOL with more than 1 % but not more than 5 % nitroglycerin	3		II	359	0	E0	P300			
3065	ALCOHOLIC BEVERAGES, with more than 70 % alcohol by volume	3		II	146	5 L	E2	P001 IBC02	PP2	T4	TP1
3065	ALCOHOLIC BEVERAGES, with more than 24 % but not more than 70 % alcohol by volume	3		III	144 145 247	5 L	E1	P001 IBC03	PP2	T2	TP1
3066	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or reducing compound)	8		II	163 367	1 L	E2	P001 IBC02		T7	TP2 TP28

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3066	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or reducing compound)	8		III	163 223 367	5 L	E1	P001 IBC03		T4	TP1 TP29
3070	ETHYLENE OXIDE AND DICHLORODIFLUORO-METHANE MIXTURE with not more than 12.5 % ethylene oxide	2.2			392	120 ml	E1	P200		T50	
3071	MERCAPTANS, LIQUID, TOXIC, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURE, LIQUID, TOXIC, FLAMMABLE, N.O.S.	6.1	3	II	274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3072	LIFE-SAVING APPLIANCES NOT SELF-INFLATING containing dangerous goods as equipment	9			296	0	E0	P905			
3073	VINYLPYRIDINES, STABILIZED	6.1	3 8	II	386	100 ml	E4	P001 IBC01		T7	TP2 TP13
3077	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	9		III	274 331 335 375	5 kg	E1	P002 IBC08 LP02	PP12 B3	T1 BK2 BK3	TP33
3078	CERIUM, turnings or gritty powder	4.3		II		500 g	E2	P410 IBC07	B2	T3	TP33
3079	METHACRYLONITRILE, STABILIZED	6.1	3	I	354 386	0	E0	P602		T20	TP2 TP13
3080	ISOCYANATES, TOXIC, FLAMMABLE, N.O.S. or ISOCYANATE SOLUTION, TOXIC, FLAMMABLE, N.O.S.	6.1	3	II	274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.	9		III	274 331 335 375	5 L	E1	P001 IBC03 LP01	PP1	T4	TP1 TP29
3083	PERCHLORYL FLUORIDE	2.3	5.1			0	E0	P200			
3084	CORROSIVE SOLID, OXIDIZING, N.O.S.	8	5.1	I	274	0	E0	P002		T6	TP33
3084	CORROSIVE SOLID, OXIDIZING, N.O.S.	8	5.1	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
3085	OXIDIZING SOLID, CORROSIVE, N.O.S.	5.1	8	I	274	0	E0	P503			
3085	OXIDIZING SOLID, CORROSIVE, N.O.S.	5.1	8	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
3085	OXIDIZING SOLID, CORROSIVE, N.O.S.	5.1	8	III	223 274	5 kg	E1	P002 IBC08	B3	T1	TP33
3086	TOXIC SOLID, OXIDIZING, N.O.S.	6.1	5.1	I	274	0	E5	P002		T6	TP33
3086	TOXIC SOLID, OXIDIZING, N.O.S.	6.1	5.1	II	274	500 g	E4	P002 IBC06	B2	T3	TP33
3087	OXIDIZING SOLID, TOXIC, N.O.S.	5.1	6.1	I	274	0	E0	P503			
3087	OXIDIZING SOLID, TOXIC, N.O.S.	5.1	6.1	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
3087	OXIDIZING SOLID, TOXIC, N.O.S.	5.1	6.1	III	223 274	5 kg	E1	P002 IBC08	B3	T1	TP33
3088	SELF-HEATING SOLID, ORGANIC, N.O.S.	4.2		II	274	0	E2	P410 IBC06	B2	T3	TP33

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3088	SELF-HEATING SOLID, ORGANIC, N.O.S.	4.2		III	223 274	0	E1	P002 IBC08 LP02	B3	T1	TP33
3089	METAL POWDER, FLAMMABLE, N.O.S.	4.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3089	METAL POWDER, FLAMMABLE, N.O.S.	4.1		III	223	5 kg	E1	P002 IBC08	B2, B4	T1	TP33
3090	LITHIUM METAL BATTERIES (including lithium alloy batteries)	9			188 230 310 376 377 384 387	0	E0	P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906			
3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT (including lithium alloy batteries)	9			188 230 310 360 376 377 384 387 390	0	E0	P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906			
3092	1-METHOXY-2-PROPANOL	3		III		5 L	E1	P001 IBC03 LP01		T2	TP1
3093	CORROSIVE LIQUID, OXIDIZING, N.O.S.	8	5.1	I	274	0	E0	P001			
3093	CORROSIVE LIQUID, OXIDIZING, N.O.S.	8	5.1	II	274	1 L	E2	P001 IBC02			
3094	CORROSIVE LIQUID, WATER-REACTIVE, N.O.S.	8	4.3	I	274	0	E0	P001			
3094	CORROSIVE LIQUID, WATER-REACTIVE, N.O.S.	8	4.3	II	274	1 L	E2	P001			
3095	CORROSIVE SOLID, SELF-HEATING, N.O.S.	8	4.2	I	274	0	E0	P002		T6	TP33
3095	CORROSIVE SOLID, SELF-HEATING, N.O.S.	8	4.2	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
3096	CORROSIVE SOLID, WATER-REACTIVE, N.O.S.	8	4.3	I	274	0	E0	P002		T6	TP33
3096	CORROSIVE SOLID, WATER-REACTIVE, N.O.S.	8	4.3	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	5.1	II	274	1 kg	E0	P099			
3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	5.1	III	223 274	5 kg	E0	P099		T1	TP33
3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.	5.1	8	I	274	0	E0	P502			
3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.	5.1	8	II	274	1 L	E2	P504 IBC01			
3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.	5.1	8	III	223 274	5 L	E1	P504 IBC02			
3099	OXIDIZING LIQUID, TOXIC, N.O.S.	5.1	6.1	I	274	0	E0	P502			
3099	OXIDIZING LIQUID, TOXIC, N.O.S.	5.1	6.1	II	274	1 L	E2	P504 IBC01			
3099	OXIDIZING LIQUID, TOXIC, N.O.S.	5.1	6.1	III	223 274	5 L	E1	P504 IBC02			

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3100	OXIDIZING SOLID, SELF-HEATING, N.O.S.	5.1	4.2	I	274	0	E0	P099			
3100	OXIDIZING SOLID, SELF-HEATING, N.O.S.	5.1	4.2	II	274	0	E0	P099			
3101	ORGANIC PEROXIDE TYPE B, LIQUID	5.2			122 181 195 274	25 ml	E0	P520			
3102	ORGANIC PEROXIDE TYPE B, SOLID	5.2			122 181 195 274	100 g	E0	P520			
3103	ORGANIC PEROXIDE TYPE C, LIQUID	5.2			122 195 274	25 ml	E0	P520			
3104	ORGANIC PEROXIDE TYPE C, SOLID	5.2			122 195 274	100 g	E0	P520			
3105	ORGANIC PEROXIDE TYPE D, LIQUID	5.2			122 274	125 ml	E0	P520			
3106	ORGANIC PEROXIDE TYPE D, SOLID	5.2			122 274	500 g	E0	P520			
3107	ORGANIC PEROXIDE TYPE E, LIQUID	5.2			122 274	125 ml	E0	P520			
3108	ORGANIC PEROXIDE TYPE E, SOLID	5.2			122 274	500 g	E0	P520			
3109	ORGANIC PEROXIDE TYPE F, LIQUID	5.2			122 274	125 ml	E0	P520 IBC520		T23	
3110	ORGANIC PEROXIDE TYPE F, SOLID	5.2			122 274	500 g	E0	P520 IBC520		T23	TP33
3111	ORGANIC PEROXIDE TYPE B, LIQUID, TEMPERATURE CONTROLLED	5.2			122 181 195 274	0	E0	P520			
3112	ORGANIC PEROXIDE TYPE B, SOLID, TEMPERATURE CONTROLLED	5.2			122 181 195 274	0	E0	P520			
3113	ORGANIC PEROXIDE TYPE C, LIQUID, TEMPERATURE CONTROLLED	5.2			122 195 274	0	E0	P520			
3114	ORGANIC PEROXIDE TYPE C, SOLID, TEMPERATURE CONTROLLED	5.2			122 195 274	0	E0	P520			
3115	ORGANIC PEROXIDE TYPE D, LIQUID, TEMPERATURE CONTROLLED	5.2			122 274	0	E0	P520			
3116	ORGANIC PEROXIDE TYPE D, SOLID, TEMPERATURE CONTROLLED	5.2			122 274	0	E0	P520			
3117	ORGANIC PEROXIDE TYPE E, LIQUID, TEMPERATURE CONTROLLED	5.2			122 274	0	E0	P520			
3118	ORGANIC PEROXIDE TYPE E, SOLID, TEMPERATURE CONTROLLED	5.2			122 274	0	E0	P520			
3119	ORGANIC PEROXIDE TYPE F, LIQUID, TEMPERATURE CONTROLLED	5.2			122 274	0	E0	P520 IBC520		T23	

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3120	ORGANIC PEROXIDE TYPE F, SOLID, TEMPERATURE CONTROLLED	5.2			122 274	0	E0	P520 IBC520		T23	TP33
3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S.	5.1	4.3	I	274	0	E0	P099			
3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S.	5.1	4.3	II	274	1 kg	E0	P099			
3122	TOXIC LIQUID, OXIDIZING, N.O.S.	6.1	5.1	I	274 315	0	E0	P001			
3122	TOXIC LIQUID, OXIDIZING, N.O.S.	6.1	5.1	II	274	100 ml	E4	P001 IBC02			
3123	TOXIC LIQUID, WATER-REACTIVE, N.O.S.	6.1	4.3	I	274 315	0	E0	P099			
3123	TOXIC LIQUID, WATER-REACTIVE, N.O.S.	6.1	4.3	II	274	100 ml	E4	P001 IBC02			
3124	TOXIC SOLID, SELF-HEATING, N.O.S.	6.1	4.2	I	274	0	E5	P002		T6	TP33
3124	TOXIC SOLID, SELF-HEATING, N.O.S.	6.1	4.2	II	274	0	E4	P002 IBC06	B2	T3	TP33
3125	TOXIC SOLID, WATER-REACTIVE, N.O.S.	6.1	4.3	I	274	0	E5	P099		T6	TP33
3125	TOXIC SOLID, WATER-REACTIVE, N.O.S.	6.1	4.3	II	274	500 g	E4	P002 IBC06	B2	T3	TP33
3126	SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	II	274	0	E2	P410 IBC05	B2	T3	TP33
3126	SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	III	223 274	0	E1	P002 IBC08	B3	T1	TP33
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	II	274	0	E0	P099		T3	TP33
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	III	223 274	0	E0	P099		T1	TP33
3128	SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	II	274	0	E2	P410 IBC05	B2	T3	TP33
3128	SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	III	223 274	0	E1	P002 IBC08	B3	T1	TP33
3129	WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.	4.3	8	I	274	0	E0	P402		T14	TP2 TP7 TP13
3129	WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.	4.3	8	II	274	500 ml	E0	P402 IBC01		T11	TP2 TP7
3129	WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.	4.3	8	III	223 274	1 L	E1	P001 IBC02		T7	TP2 TP7
3130	WATER-REACTIVE LIQUID, TOXIC, N.O.S.	4.3	6.1	I	274	0	E0	P402			
3130	WATER-REACTIVE LIQUID, TOXIC, N.O.S.	4.3	6.1	II	274	500 ml	E0	P402 IBC01			
3130	WATER-REACTIVE LIQUID, TOXIC, N.O.S.	4.3	6.1	III	223 274	1 L	E1	P001 IBC02			
3131	WATER-REACTIVE SOLID, CORROSIVE, N.O.S.	4.3	8	I	274	0	E0	P403		T9	TP7 TP33
3131	WATER-REACTIVE SOLID, CORROSIVE, N.O.S.	4.3	8	II	274	500 g	E2	P410 IBC06	B2	T3	TP33
3131	WATER-REACTIVE SOLID, CORROSIVE, N.O.S.	4.3	8	III	223 274	1 kg	E1	P410 IBC08	B4	T1	TP33
3132	WATER-REACTIVE SOLID, FLAMMABLE, N.O.S.	4.3	4.1	I	274	0	E0	P403 IBC99			
3132	WATER-REACTIVE SOLID, FLAMMABLE, N.O.S.	4.3	4.1	II	274	500 g	E2	P410 IBC04		T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3132	WATER-REACTIVE SOLID, FLAMMABLE, N.O.S.	4.3	4.1	III	223 274	1 kg	E1	P410 IBC06		T1	TP33
3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.	4.3	5.1	II	274	500 g	E0	P099			
3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.	4.3	5.1	III	223 274	1 kg	E0	P099			
3134	WATER-REACTIVE SOLID, TOXIC, N.O.S.	4.3	6.1	I	274	0	E0	P403			
3134	WATER-REACTIVE SOLID, TOXIC, N.O.S.	4.3	6.1	II	274	500 g	E2	P410 IBC05	B2	T3	TP33
3134	WATER-REACTIVE SOLID, TOXIC, N.O.S.	4.3	6.1	III	223 274	1 kg	E1	P410 IBC08	B4	T1	TP33
3135	WATER-REACTIVE SOLID, SELF-HEATING, N.O.S.	4.3	4.2	I	274	0	E0	P403			
3135	WATER-REACTIVE SOLID, SELF-HEATING, N.O.S.	4.3	4.2	II	274	0	E2	P410 IBC05	B2	T3	TP33
3135	WATER-REACTIVE SOLID, SELF-HEATING, N.O.S.	4.3	4.2	III	223 274	0	E1	P410 IBC08	B4	T1	TP33
3136	TRIFLUOROMETHANE, REFRIGERATED LIQUID	2.2				120 ml	E1	P203		T75	TP5
3137	OXIDIZING SOLID, FLAMMABLE, N.O.S.	5.1	4.1	I	274	0	E0	P099			
3138	ETHYLENE, ACETYLENE AND PROPYLENE MIXTURE, REFRIGERATED LIQUID containing at least 71.5 % ethylene with not more than 22.5 % acetylene and not more than 6 % propylene	2.1				0	E0	P203		T75	TP5
3139	OXIDIZING LIQUID, N.O.S.	5.1		I	274	0	E0	P502			
3139	OXIDIZING LIQUID, N.O.S.	5.1		II	274	1 L	E2	P504 IBC02			
3139	OXIDIZING LIQUID, N.O.S.	5.1		III	223 274	5 L	E1	P504 IBC02			
3140	ALKALOIDS, LIQUID, N.O.S. or ALKALOID SALTS, LIQUID, N.O.S.	6.1		I	43 274	0	E5	P001			
3140	ALKALOIDS, LIQUID, N.O.S. or ALKALOID SALTS, LIQUID, N.O.S.	6.1		II	43 274	100 ml	E4	P001 IBC02			
3140	ALKALOIDS, LIQUID, N.O.S. or ALKALOID SALTS, LIQUID, N.O.S.	6.1		III	43 223 274	5 L	E1	P001 IBC03 LP01			
3141	ANTIMONY COMPOUND, INORGANIC, LIQUID, N.O.S.	6.1		III	45 274	5 L	E1	P001 IBC03 LP01			
3142	DISINFECTANT, LIQUID, TOXIC, N.O.S.	6.1		I	274	0	E5	P001			
3142	DISINFECTANT, LIQUID, TOXIC, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02			
3142	DISINFECTANT, LIQUID, TOXIC, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01			
3143	DYE, SOLID, TOXIC, N.O.S. or DYE INTERMEDIATE, SOLID, TOXIC, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
3143	DYE, SOLID, TOXIC, N.O.S. or DYE INTERMEDIATE, SOLID, TOXIC, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3143	DYE, SOLID, TOXIC, N.O.S. or DYE INTERMEDIATE, SOLID, TOXIC, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3144	NICOTINE COMPOUND, LIQUID, N.O.S. or NICOTINE PREPARATION, LIQUID, N.O.S.	6.1		I	43 274	0	E5	P001			
3144	NICOTINE COMPOUND, LIQUID, N.O.S. or NICOTINE PREPARATION, LIQUID, N.O.S.	6.1		II	43 274	100 ml	E4	P001 IBC02			
3144	NICOTINE COMPOUND, LIQUID, N.O.S. or NICOTINE PREPARATION, LIQUID, N.O.S.	6.1		III	43 223 274	5 L	E1	P001 IBC03 LP01			
3145	ALKYLPHENOLS, LIQUID, N.O.S. (including C2-C12 homologues)	8		I		0	E0	P001		T14	TP2
3145	ALKYLPHENOLS, LIQUID, N.O.S. (including C2-C12 homologues)	8		II		1 L	E2	P001 IBC02		T11	TP2 TP27
3145	ALKYLPHENOLS, LIQUID, N.O.S. (including C2-C12 homologues)	8		III	223	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3146	ORGANOTIN COMPOUND, SOLID, N.O.S.	6.1		I	43 274	0	E5	P002 IBC07	B1	T6	TP33
3146	ORGANOTIN COMPOUND, SOLID, N.O.S.	6.1		II	43 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3146	ORGANOTIN COMPOUND, SOLID, N.O.S.	6.1		III	43 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3147	DYE, SOLID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, SOLID, CORROSIVE, N.O.S.	8		I	274	0	E0	P002 IBC07	B1	T6	TP33
3147	DYE, SOLID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, SOLID, CORROSIVE, N.O.S.	8		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3147	DYE, SOLID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, SOLID, CORROSIVE, N.O.S.	8		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3148	WATER-REACTIVE LIQUID, N.O.S.	4.3		I	274	0	E0	P402		T13	TP2 TP7
3148	WATER-REACTIVE LIQUID, N.O.S.	4.3		II	274	500 ml	E2	P402 IBC01		T7	TP2 TP7
3148	WATER-REACTIVE LIQUID, N.O.S.	4.3		III	223 274	1 L	E1	P001 IBC02		T7	TP2 TP7
3149	HYDROGEN PEROXIDE AND PEROXYACETIC ACID MIXTURE with acid(s), water and not more than 5 % peroxyacetic acid, STABILIZED	5.1	8	II	196	1 L	E2	P504 IBC02	PP10 B5	T7	TP2 TP6 TP24
3150	DEVICES, SMALL, HYDROCARBON GAS POWERED or HYDROCARBON GAS REFILLS FOR SMALL DEVICES with release device	2.1				0	E0	P003			
3151	POLYHALOGENATED BIPHENYLS, LIQUID or HALOGENATED MONOMETHYLDIPHENYL-METHANES, LIQUID or POLYHALOGENATED TERPHENYLS, LIQUID	9		II	203 305	1 L	E2	P906 IBC02			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3152	POLYHALOGENATED BIPHENYLS, SOLID or HALOGENATED MONOMETHYLDIPHENYL-METHANES, SOLID or POLYHALOGENATED TERPHENYLS, SOLID	9		II	203 305	1 kg	E2	P906 IBC08	B2, B4	T3	TP33
3153	PERFLUORO (METHYL VINYL ETHER)	2.1				0	E0	P200		T50	
3154	PERFLUORO (ETHYL VINYL ETHER)	2.1				0	E0	P200			
3155	PENTACHLOROPHENOL	6.1		II	43	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3156	COMPRESSED GAS, OXIDIZING, N.O.S.	2.2	5.1		274	0	E0	P200			
3157	LIQUEFIED GAS, OXIDIZING, N.O.S.	2.2	5.1		274	0	E0	P200			
3158	GAS, REFRIGERATED LIQUID, N.O.S.	2.2			274	120 ml	E1	P203		T75	TP5
3159	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)	2.2				120 ml	E1	P200		T50	
3160	LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1		274	0	E0	P200			
3161	LIQUEFIED GAS, FLAMMABLE, N.O.S.	2.1			274	0	E0	P200		T50	
3162	LIQUEFIED GAS, TOXIC, N.O.S.	2.3			274	0	E0	P200			
3163	LIQUEFIED GAS, N.O.S.	2.2			274 392	120 ml	E1	P200		T50	
3164	ARTICLES, PRESSURIZED, PNEUMATIC or HYDRAULIC (containing non-flammable gas)	2.2			283 371	120 ml	E0	P003	PP32		
3165	AIRCRAFT HYDRAULIC POWER UNIT FUEL TANK (containing a mixture of anhydrous hydrazine and methylhydrazine) (M86 fuel)	3	6.1 8	I		0	E0	P301			
3166	VEHICLE, FLAMMABLE GAS POWERED or VEHICLE, FLAMMABLE LIQUID POWERED or VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED	9			123 356 388	0	E0	NONE			
3167	GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, N.O.S., not refrigerated liquid	2.1			209	0	E0	P201			
3168	GAS SAMPLE, NON-PRESSURIZED, TOXIC, FLAMMABLE, N.O.S., not refrigerated liquid	2.3	2.1		209	0	E0	P201			
3169	GAS SAMPLE, NON-PRESSURIZED, TOXIC, N.O.S., not refrigerated liquid	2.3			209	0	E0	P201			
3170	ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS	4.3		II	244	500 g	E2	P410 IBC07	B2	T3 BK2	TP33
3170	ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS	4.3		III	223 244	1 kg	E1	P002 IBC08	B4	T1 BK2	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3171	BATTERY-POWERED VEHICLE or BATTERY-POWERED EQUIPMENT	9			123 388	0	E0	NONE			
3172	TOXINS, EXTRACTED FROM LIVING SOURCES, LIQUID, N.O.S.	6.1		I	210 274	0	E5	P001			
3172	TOXINS, EXTRACTED FROM LIVING SOURCES, LIQUID, N.O.S.	6.1		II	210 274	100 ml	E4	P001 IBC02			
3172	TOXINS, EXTRACTED FROM LIVING SOURCES, LIQUID, N.O.S.	6.1		III	210 223 274	5 L	E1	P001 IBC03 LP01			
3174	TITANIUM DISULPHIDE	4.2		III		0	E1	P002 IBC08 LP02	B3	T1	TP33
3175	SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S.	4.1		II	216 274	1 kg	E2	P002 IBC06	PP9 B2	T3 BK1 BK2	TP33
3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	4.1		II	274	0	E0			T3	TP3 TP26
3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	4.1		III	223 274	0	E0	IBC01		T1	TP3 TP26
3178	FLAMMABLE SOLID, INORGANIC, N.O.S.	4.1		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3178	FLAMMABLE SOLID, INORGANIC, N.O.S.	4.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3179	FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.	4.1	6.1	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
3179	FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.	4.1	6.1	III	223 274	5 kg	E1	P002 IBC06		T1	TP33
3180	FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S.	4.1	8	II	274	1 kg	E2	P002 IBC06	B2	T3	TP33
3180	FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S.	4.1	8	III	223 274	5 kg	E1	P002 IBC06		T1	TP33
3181	METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S.	4.1		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3181	METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S.	4.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3182	METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1		II	274	1 kg	E2	P410 IBC04	PP40	T3	TP33
3182	METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1		III	223 274	5 kg	E1	P002 IBC04		T1	TP33
3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.	4.2		II	274	0	E2	P001 IBC02			
3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.	4.2		III	223 274	0	E1	P001 IBC02			
3184	SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	II	274	0	E2	P402 IBC02			
3184	SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	III	223 274	0	E1	P001 IBC02			
3185	SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	II	274	0	E2	P402 IBC02			
3185	SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	III	223 274	0	E1	P001 IBC02			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2		II	274	0	E2	P001 IBC02			
3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2		III	223 274	0	E1	P001 IBC02			
3187	SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	II	274	0	E2	P402 IBC02			
3187	SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	III	223 274	0	E1	P001 IBC02			
3188	SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	II	274	0	E2	P402 IBC02			
3188	SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	III	223 274	0	E1	P001 IBC02			
3189	METAL POWDER, SELF-HEATING, N.O.S.	4.2		II	274	0	E2	P410 IBC06	B2	T3	TP33
3189	METAL POWDER, SELF-HEATING, N.O.S.	4.2		III	223 274	0	E1	P002 IBC08 LP02	B3	T1	TP33
3190	SELF-HEATING SOLID, INORGANIC, N.O.S.	4.2		II	274	0	E2	P410 IBC06	B2	T3	TP33
3190	SELF-HEATING SOLID, INORGANIC, N.O.S.	4.2		III	223 274	0	E1	P002 IBC08 LP02	B3	T1	TP33
3191	SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	II	274	0	E2	P410 IBC05	B2	T3	TP33
3191	SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	III	223 274	0	E1	P002 IBC08	B3	T1	TP33
3192	SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	II	274	0	E2	P410 IBC05	B2	T3	TP33
3192	SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	III	223 274	0	E1	P002 IBC08	B3	T1	TP33
3194	PYROPHORIC LIQUID, INORGANIC, N.O.S.	4.2		I	274	0	E0	P400			
3200	PYROPHORIC SOLID, INORGANIC, N.O.S.	4.2		I	274	0	E0	P404		T21	TP7 TP33
3205	ALKALINE EARTH METAL ALCOHOLATES, N.O.S.	4.2		II	183 274	0	E2	P410 IBC06	B2	T3	TP33
3205	ALKALINE EARTH METAL ALCOHOLATES, N.O.S.	4.2		III	183 223 274	0	E1	P002 IBC08 LP02	B3	T1	TP33
3206	ALKALI METAL ALCOHOLATES, SELF-HEATING, CORROSIVE, N.O.S.	4.2	8	II	182 274	0	E2	P410 IBC05	B2	T3	TP33
3206	ALKALI METAL ALCOHOLATES, SELF-HEATING, CORROSIVE, N.O.S.	4.2	8	III	182 223 274	0	E1	P002 IBC08	B3	T1	TP33
3208	METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S.	4.3		I	274	0	E0	P403 IBC99			
3208	METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S.	4.3		II	274	500 g	E2	P410 IBC07	B2	T3	TP33
3208	METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S.	4.3		III	223 274	1 kg	E1	P410 IBC08	B4	T1	TP33
3209	METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S.	4.3	4.2	I	274	0	E0	P403			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3209	METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S.	4.3	4.2	II	274	0	E0	P410 IBC05	B2	T3	TP33
3209	METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S.	4.3	4.2	III	223 274	0	E1	P410 IBC08	B4	T1	TP33
3210	CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		II	274 351	1 L	E2	P504 IBC02		T4	TP1
3210	CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		III	223 274 351	5 L	E1	P504 IBC02		T4	TP1
3211	PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		II		1 L	E2	P504 IBC02		T4	TP1
3211	PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		III	223	5 L	E1	P504 IBC02		T4	TP1
3212	HYPOCHLORITES, INORGANIC, N.O.S.	5.1		II	274 349	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3213	BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		II	274 350	1 L	E2	P504 IBC02		T4	TP1
3213	BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		III	223 274 350	5 L	E1	P504 IBC02		T4	TP1
3214	PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		II	206 274 353	1 L	E2	P504 IBC02		T4	TP1
3215	PERSULPHATES, INORGANIC, N.O.S.	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3216	PERSULPHATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		III		5 L	E1	P504 IBC02		T4	TP1 TP29
3218	NITRATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		II	270	1 L	E2	P504 IBC02		T4	TP1
3218	NITRATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		III	223 270	5 L	E1	P504 IBC02		T4	TP1
3219	NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		II	103 274	1 L	E2	P504 IBC01		T4	TP1
3219	NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1		III	103 223 274	5 L	E1	P504 IBC02		T4	TP1
3220	PENTAFLUOROETHANE (REFRIGERANT GAS R 125)	2.2				120 ml	E1	P200		T50	
3221	SELF-REACTIVE LIQUID TYPE B	4.1			181 274	25 ml	E0	P520	PP21		
3222	SELF-REACTIVE SOLID TYPE B	4.1			181 274	100 g	E0	P520	PP21		
3223	SELF-REACTIVE LIQUID TYPE C	4.1			274	25 ml	E0	P520	PP21 PP94 PP95		
3224	SELF-REACTIVE SOLID TYPE C	4.1			274	100 g	E0	P520	PP21 PP94 PP95		
3225	SELF-REACTIVE LIQUID TYPE D	4.1			274	125 ml	E0	P520			
3226	SELF-REACTIVE SOLID TYPE D	4.1			274	500 g	E0	P520			
3227	SELF-REACTIVE LIQUID TYPE E	4.1			274	125 ml	E0	P520			
3228	SELF-REACTIVE SOLID TYPE E	4.1			274	500 g	E0	P520			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3229	SELF-REACTIVE LIQUID TYPE F	4.1			274	125 ml	E0	P520 IBC99		T23	
3230	SELF-REACTIVE SOLID TYPE F	4.1			274	500 g	E0	P520 IBC99		T23	
3231	SELF-REACTIVE LIQUID TYPE B, TEMPERATURE CONTROLLED	4.1			181 194 274	0	E0	P520	PP21		
3232	SELF-REACTIVE SOLID TYPE B, TEMPERATURE CONTROLLED	4.1			181 194 274	0	E0	P520	PP21		
3233	SELF-REACTIVE LIQUID TYPE C, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520	PP21		
3234	SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520	PP21		
3235	SELF-REACTIVE LIQUID TYPE D, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520			
3236	SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520			
3237	SELF-REACTIVE LIQUID TYPE E, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520			
3238	SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520			
3239	SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520		T23	
3240	SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED	4.1			194 274	0	E0	P520		T23	
3241	2-BROMO-2-NITROPROPANE-1,3-DIOL	4.1		III	246	5 kg	E1	P520 IBC08	PP22 B3		
3242	AZODICARBONAMIDE	4.1		II	215	1 kg	E0	P409		T3	TP33
3243	SOLIDS CONTAINING TOXIC LIQUID, N.O.S.	6.1		II	217 274	500 g	E4	P002 IBC02	PP9	T2 BK1 BK2	TP33
3244	SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.	8		II	218 274	1 kg	E2	P002 IBC05	PP9	T3 BK1 BK2	TP33
3245	GENETICALLY MODIFIED MICROORGANISMS or GENETICALLY MODIFIED ORGANISMS	9			219	0	E0	P904 IBC99			
3246	METHANESULPHONYL CHLORIDE	6.1	8	I	354	0	E0	P602		T20	TP2 TP13
3247	SODIUM PEROXOBORATE, ANHYDROUS	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3248	MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	6.1	II	220 221	1 L	E2	P001			
3248	MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	220 221 223	5 L	E1	P001			
3249	MEDICINE, SOLID, TOXIC, N.O.S.	6.1		II	221	500 g	E4	P002		T3	TP33
3249	MEDICINE, SOLID, TOXIC, N.O.S.	6.1		III	221 223	5 kg	E1	P002		T1	TP33
3250	CHLOROACETIC ACID, MOLTEN	6.1	8	II		0	E0	NONE		T7	TP3 TP28
3251	ISOSORBIDE-5-MONONITRATE	4.1		III	132 226	5 kg	E0	P409			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3252	DIFLUOROMETHANE (REFRIGERANT GAS R 32)	2.1				0	E0	P200		T50	
3253	DISODIUM TRIOXOSILICATE	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3254	TRIBUTYLPHOSPHANE	4.2		I		0	E0	P400		T21	TP2 TP7
3255	tert-BUTYL HYPOCHLORITE	4.2	8	I		0	E0	P099			
3256	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S. with flash point above 60 °C, at or above its flash point	3		III	274	0	E0	P099 IBC01		T3	TP3 TP29
3257	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flash point (including molten metals, molten salts, etc.)	9		III	232 274	0	E0	P099 IBC01		T3	TP3 TP29
3258	ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C	9		III	232 274	0	E0	P099			
3259	AMINES, SOLID, CORROSIVE, N.O.S. or POLYAMINES, SOLID, CORROSIVE, N.O.S.	8		I	274	0	E0	P002 IBC07	B1	T6	TP33
3259	AMINES, SOLID, CORROSIVE, N.O.S. or POLYAMINES, SOLID, CORROSIVE, N.O.S.	8		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3259	AMINES, SOLID, CORROSIVE, N.O.S. or POLYAMINES, SOLID, CORROSIVE, N.O.S.	8		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3260	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.	8		I	274	0	E0	P002 IBC07	B1	T6	TP33
3260	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.	8		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3260	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.	8		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3261	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.	8		I	274	0	E0	P002 IBC07	B1	T6	TP33
3261	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.	8		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3261	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.	8		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3262	CORROSIVE SOLID, BASIC, INORGANIC, N.O.S.	8		I	274	0	E0	P002 IBC07	B1	T6	TP33
3262	CORROSIVE SOLID, BASIC, INORGANIC, N.O.S.	8		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3262	CORROSIVE SOLID, BASIC, INORGANIC, N.O.S.	8		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3263	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S.	8		I	274	0	E0	P002 IBC07	B1	T6	TP33
3263	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S.	8		II	274	1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3263	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S.	8		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3264	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.	8		I	274	0	E0	P001		T14	TP2 TP27
3264	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP2 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3264	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.	8		I	274	0	E0	P001		T14	TP2 TP27
3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3266	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.	8		I	274	0	E0	P001		T14	TP2 TP27
3266	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
3266	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3267	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S.	8		I	274	0	E0	P001		T14	TP2 TP27
3267	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S.	8		II	274	1 L	E2	P001 IBC02		T11	TP2 TP27
3267	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S.	8		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3268	SAFETY DEVICES, electrically initiated†	9			280 289	0	E0	P902 LP902			
3269	POLYESTER RESIN KIT, liquid base material	3		II	236 340	5 L	See SP 340 in Chapter 3.3	P302			
3269	POLYESTER RESIN KIT, liquid base material	3		III	236 340	5 L	See SP 340 in Chapter 3.3	P302			
3270	NITROCELLULOSE MEMBRANE FILTERS, with not more than 12.6 % nitrogen, by dry mass	4.1		II	237 286	1 kg	E2	P411			
3271	ETHERS, N.O.S.	3		II	274	1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
3271	ETHERS, N.O.S.	3		III	223 274	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
3272	ESTERS, N.O.S.	3		II	274	1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
3272	ESTERS, N.O.S.	3		III	223 274	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
3273	NITRILES, FLAMMABLE, TOXIC, N.O.S.	3	6.1	I	274	0	E0	P001		T14	TP2 TP13 TP27
3273	NITRILES, FLAMMABLE, TOXIC, N.O.S.	3	6.1	II	274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
3274	ALCOHOLATES SOLUTION, N.O.S., in alcohol	3	8	II	274	1 L	E2	P001 IBC02			
3275	NITRILES, TOXIC, FLAMMABLE, N.O.S.	6.1	3	I	274 315	0	E5	P001		T14	TP2 TP13 TP27

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3275	NITRILES, TOXIC, FLAMMABLE, N.O.S.	6.1	3	II	274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3276	NITRILES, LIQUID, TOXIC, N.O.S.	6.1		I	274 315	0	E5	P001		T14	TP2 TP13 TP27
3276	NITRILES, LIQUID, TOXIC, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3276	NITRILES, LIQUID, TOXIC, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3277	CHLOROFORMATES, TOXIC, CORROSIVE, N.O.S.	6.1	8	II	274	100 ml	E4	P001 IBC02		T8	TP2 TP13 TP28
3278	ORGANOPHOSPHORUS COMPOUND, LIQUID, TOXIC, N.O.S.	6.1		I	43 274 315	0	E5	P001		T14	TP2 TP13 TP27
3278	ORGANOPHOSPHORUS COMPOUND, LIQUID, TOXIC, N.O.S.	6.1		II	43 274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3278	ORGANOPHOSPHORUS COMPOUND, LIQUID, TOXIC, N.O.S.	6.1		III	43 223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3279	ORGANOPHOSPHORUS COMPOUND, TOXIC, FLAMMABLE, N.O.S.	6.1	3	I	43 274 315	0	E5	P001		T14	TP2 TP13 TP27
3279	ORGANOPHOSPHORUS COMPOUND, TOXIC, FLAMMABLE, N.O.S.	6.1	3	II	43 274	100 ml	E4	P001		T11	TP2 TP13 TP27
3280	ORGANOARSENIC COMPOUND, LIQUID, N.O.S.	6.1		I	274 315	0	E5	P001		T14	TP2 TP13 TP27
3280	ORGANOARSENIC COMPOUND, LIQUID, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3280	ORGANOARSENIC COMPOUND, LIQUID, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3281	METAL CARBONYLS, LIQUID, N.O.S.	6.1		I	274 315	0	E5	P601		T14	TP2 TP13 TP27
3281	METAL CARBONYLS, LIQUID, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3281	METAL CARBONYLS, LIQUID, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3282	ORGANOMETALLIC COMPOUND, LIQUID, TOXIC, N.O.S.	6.1		I	274	0	E5	P001		T14	TP2 TP13 TP27
3282	ORGANOMETALLIC COMPOUND, LIQUID, TOXIC, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3282	ORGANOMETALLIC COMPOUND, LIQUID, TOXIC, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3283	SELENIUM COMPOUND, SOLID, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
3283	SELENIUM COMPOUND, SOLID, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3283	SELENIUM COMPOUND, SOLID, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3284	TELLURIUM COMPOUND, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
3284	TELLURIUM COMPOUND, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3284	TELLURIUM COMPOUND, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3285	VANADIUM COMPOUND, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
3285	VANADIUM COMPOUND, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3285	VANADIUM COMPOUND, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3286	FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S.	3	6.1 8	I	274	0	E0	P001		T14	TP2 TP13 TP27
3286	FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S.	3	6.1 8	II	274	1 L	E2	P001 IBC99		T11	TP2 TP13 TP27
3287	TOXIC LIQUID, INORGANIC, N.O.S.	6.1		I	274 315	0	E5	P001		T14	TP2 TP13 TP27
3287	TOXIC LIQUID, INORGANIC, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3287	TOXIC LIQUID, INORGANIC, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03 LP01		T7	TP1 TP28
3288	TOXIC SOLID, INORGANIC, N.O.S.	6.1		I	274	0	E5	P002 IBC99		T6	TP33
3288	TOXIC SOLID, INORGANIC, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3288	TOXIC SOLID, INORGANIC, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3289	TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S.	6.1	8	I	274 315	0	E5	P001		T14	TP2 TP13 TP27
3289	TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S.	6.1	8	II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3290	TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S.	6.1	8	I	274	0	E5	P002 IBC99		T6	TP33
3290	TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S.	6.1	8	II	274	500 g	E4	P002 IBC06	B2	T3	TP33
3291	CLINICAL WASTE, UNSPECIFIED, N.O.S. or (BIO) MEDICAL WASTE, N.O.S. or REGULATED MEDICAL WASTE, N.O.S.	6.2				0	E0	P621 IBC620 LP621		BK2	
3292	BATTERIES, CONTAINING SODIUM, or CELLS, CONTAINING SODIUM	4.3			239	0	E0	P408			
3293	HYDRAZINE, AQUEOUS SOLUTION with not more than 37 % hydrazine, by mass	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
3294	HYDROGEN CYANIDE, SOLUTION IN ALCOHOL with not more than 45 % hydrogen cyanide	6.1	3	I		0	E0	P601		T14	TP2 TP13

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								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3295	HYDROCARBONS, LIQUID, N.O.S.	3		I		500 ml	E3	P001		T11	TP1 TP8 TP28
3295	HYDROCARBONS, LIQUID, N.O.S.	3		II		1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
3295	HYDROCARBONS, LIQUID, N.O.S.	3		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
3296	HEPTAFLUOROPROPANE (REFRIGERANT GAS R 227)	2.2				120 ml	E1	P200		T50	
3297	ETHYLENE OXIDE AND CHLOROTETRAFLUORO-ETHANE MIXTURE with not more than 8.8 % ethylene oxide	2.2			392	120 ml	E1	P200		T50	
3298	ETHYLENE OXIDE AND PENTAFLUOROETHANE MIXTURE with not more than 7.9 % ethylene oxide	2.2			392	120 ml	E1	P200		T50	
3299	ETHYLENE OXIDE AND TETRAFLUOROETHANE MIXTURE with not more than 5.6 % ethylene oxide	2.2			392	120 ml	E1	P200		T50	
3300	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87 % ethylene oxide	2.3	2.1			0	E0	P200			
3301	CORROSIVE LIQUID, SELF-HEATING, N.O.S.	8	4.2	I	274	0	E0	P001			
3301	CORROSIVE LIQUID, SELF-HEATING, N.O.S.	8	4.2	II	274	0	E2	P001			
3302	2-DIMETHYLAMINOETHYL ACRYLATE, STABILIZED	6.1		II	386	100 ml	E4	P001 IBC02		T7	TP2
3303	COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	5.1		274	0	E0	P200			
3304	COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	8		274	0	E0	P200			
3305	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	2.1 8		274	0	E0	P200			
3306	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	5.1 8		274	0	E0	P200			
3307	LIQUEFIED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	5.1		274	0	E0	P200			
3308	LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	8		274	0	E0	P200			
3309	LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	2.1 8		274	0	E0	P200			
3310	LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	5.18		274	0	E0	P200			
3311	GAS, REFRIGERATED LIQUID, OXIDIZING, N.O.S.	2.2	5.1		274	0	E0	P203		T75	TP5 TP22
3312	GAS, REFRIGERATED LIQUID, FLAMMABLE, N.O.S.	2.1			274	0	E0	P203		T75	TP5
3313	ORGANIC PIGMENTS, SELF-HEATING	4.2		II		0	E2	P002 IBC08	B2, B4	T3	TP33
3313	ORGANIC PIGMENTS, SELF-HEATING	4.2		III	223	0	E1	P002 IBC08 LP02	B3	T1	TP33

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3314	PLASTICS MOULDING COMPOUND in dough, sheet or extruded rope form evolving flammable vapour	9		III	207	5 kg	E1	P002 IBC08	PP14 B3, B6		
3315	CHEMICAL SAMPLE, TOXIC	6.1		I	250	0	E0	P099			
3316	CHEMICAL KIT or FIRST AID KIT	9			251 340	See SP 251 in Chapter 3.3	See SP 340 in Chapter 3.3	P901			
3317	2-AMINO-4,6-DINITROPHENOL, WETTED with not less than 20 % water, by mass	4.1		I	28	0	E0	P406	PP26		
3318	AMMONIA SOLUTION, relative density less than 0.880 at 15 °C in water, with more than 50 % ammonia	2.3	8		23	0	E0	P200		T50	
3319	NITROGLYCERIN MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 2 % but not more than 10 % nitroglycerin, by mass	4.1		II	272 274	0	E0	P099			
3320	SODIUM BOROHYDRIDE AND SODIUM HYDROXIDE SOLUTION, with not more than 12 % sodium borohydride and not more than 40 % sodium hydroxide by mass	8		II		1 L	E2	P001 IBC02		T7	TP2
3320	SODIUM BOROHYDRIDE AND SODIUM HYDROXIDE SOLUTION, with not more than 12 % sodium borohydride and not more than 40 % sodium hydroxide by mass	8		III	223	5 L	E1	P001 IBC03 LP01		T4	TP2
3321	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non fissile or fissile-excepted	7			172 317 325 336	0	E0	See Chapter 2.7 and section 4.1.9			
										T5	TP4
3322	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non fissile or fissile-excepted	7			172 317 325 336	0	E0	See Chapter 2.7 and section 4.1.9			
										T5	TP4
3323	RADIOACTIVE MATERIAL, TYPE C PACKAGE, non fissile or fissile-excepted	7			172 317 325	0	E0	See Chapter 2.7 and section 4.1.9			
3324	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE	7			172 326 336	0	E0	See Chapter 2.7 and section 4.1.9			
3325	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, (LSA-III), FISSILE	7			172 326 336	0	E0	See Chapter 2.7 and section 4.1.9			
3326	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE	7			172 326	0	E0	See Chapter 2.7 and section 4.1.9			
3327	RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE, non-special form	7			172 326	0	E0	See Chapter 2.7 and section 4.1.9			
3328	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSILE	7			172 326 337	0	E0	See Chapter 2.7 and section 4.1.9			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3329	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSILE	7			172 326 337	0	E0	See Chapter 2.7 and section 4.1.9			
3330	RADIOACTIVE MATERIAL, TYPE C PACKAGE, FISSILE	7			172 326	0	E0	See Chapter 2.7 and section 4.1.9			
3331	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE	7			172 326	0	E0	See Chapter 2.7 and section 4.1.9			
3332	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, non fissile or fissile-excepted	7			172 317	0	E0	See Chapter 2.7 and section 4.1.9			
3333	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSILE	7			172	0	E0	See Chapter 2.7 and section 4.1.9			
3334	AVIATION REGULATED LIQUID, N.O.S.	9			106 274 276	0	E1	N/A			
3335	AVIATION REGULATED SOLID, N.O.S.	9			106 274 276	0	E1	N/A			
3336	MERCAPTANS, LIQUID, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S.	3		I	274	0	E0	P001		T11	TP2
3336	MERCAPTANS, LIQUID, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S.	3		II	274	1 L	E2	P001 IBC02		T7	TP1 TP8 TP28
3336	MERCAPTANS, LIQUID, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S.	3		III	223 274	5 L	E1	P001 IBC03 LP01		T4	TP1 TP29
3337	REFRIGERANT GAS R 404A	2.2				120 ml	E1	P200		T50	
3338	REFRIGERANT GAS R 407A	2.2				120 ml	E1	P200		T50	
3339	REFRIGERANT GAS R 407B	2.2				120 ml	E1	P200		T50	
3340	REFRIGERANT GAS R 407C	2.2				120 ml	E1	P200		T50	
3341	THIOUREA DIOXIDE	4.2		II		0	E2	P002 IBC06	B2	T3	TP33
3341	THIOUREA DIOXIDE	4.2		III	223	0	E1	P002 IBC08 LP02	B3	T1	TP33
3342	XANTHATES	4.2		II		0	E2	P002 IBC06	B2	T3	TP33
3342	XANTHATES	4.2		III	223	0	E1	P002 IBC08 LP02	B3	T1	TP33
3343	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, FLAMMABLE, N.O.S. with not more than 30 % nitroglycerin, by mass	3			274 278	0	E0	P099			
3344	PENTAERYTHRITE TETRANITRATE (PENTAERYTHRITOL TETRANITRATE; PETN) MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 10 % but not more than 20 % PETN, by mass	4.1		II	272 274	0	E0	P406	PP26 PP80		

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3345	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
3345	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3345	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3346	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
3346	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
3347	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3347	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3347	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28
3348	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3348	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3348	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3349	PYRETHROID PESTICIDE, SOLID, TOXIC	6.1		I	61 274	0	E5	P002 IBC07	B1	T6	TP33
3349	PYRETHROID PESTICIDE, SOLID, TOXIC	6.1		II	61 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3349	PYRETHROID PESTICIDE, SOLID, TOXIC	6.1		III	61 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3350	PYRETHROID PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	I	61 274	0	E0	P001		T14	TP2 TP13 TP27
3350	PYRETHROID PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point less than 23 °C	3	6.1	II	61 274	1 L	E2	P001 IBC02		T11	TP2 TP13 TP27
3351	PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3351	PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3351	PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23 °C	6.1	3	III	61 223 274	5 L	E1	P001 IBC03		T7	TP2 TP28

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3352	PYRETHROID PESTICIDE, LIQUID, TOXIC	6.1		I	61 274	0	E5	P001		T14	TP2 TP13 TP27
3352	PYRETHROID PESTICIDE, LIQUID, TOXIC	6.1		II	61 274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3352	PYRETHROID PESTICIDE, LIQUID, TOXIC	6.1		III	61 223 274	5 L	E1	P001 IBC03 LP01		T7	TP2 TP28
3354	INSECTICIDE GAS, FLAMMABLE, N.O.S.	2.1			274	0	E0	P200			
3355	INSECTICIDE GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1		274	0	E0	P200			
3356	OXYGEN GENERATOR, CHEMICAL†	5.1			284	0	E0	P500			
3357	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30 % nitroglycerin, by mass	3		II	274 288	0	E0	P099			
3358	REFRIGERATING MACHINES containing flammable, non-toxic, liquefied gas	2.1			291	0	E0	P003	PP32		
3359	FUMIGATED CARGO TRANSPORT UNIT	9			302	0	E0	NONE			
3360	FIBRES, VEGETABLE, DRY	4.1			29 123 299	0	E0	P003	PP19		
3361	CHLOROSILANES, TOXIC, CORROSIVE, N.O.S.	6.1	8	II	274	0	E0	P010		T14	TP2 TP7 TP13 TP27
3362	CHLOROSILANES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.	6.1	3 8	II	274	0	E0	P010		T14	TP2 TP7 TP13 TP27
3363	DANGEROUS GOODS IN ARTICLES or DANGEROUS GOODS IN MACHINERY or DANGEROUS GOODS IN APPARATUS	9			301	0	E0	P907			
3364	TRINITROPHENOL (PICRIC ACID), WETTED, with not less than 10 % water by mass	4.1		I	28	0	E0	P406	PP24		
3365	TRINITROCHLOROBENZENE (PICRYL CHLORIDE), WETTED, with not less than 10 % water by mass	4.1		I	28	0	E0	P406	PP24		
3366	TRINITROTOLUENE (TNT), WETTED, with not less than 10 % water by mass	4.1		I	28	0	E0	P406	PP24		
3367	TRINITROBENZENE, WETTED, with not less than 10 % water by mass	4.1		I	28	0	E0	P406	PP24		
3368	TRINITROBENZOIC ACID, WETTED, with not less than 10 % water by mass	4.1		I	28	0	E0	P406	PP24		
3369	SODIUM DINITRO-o-CRESOLATE, WETTED, with not less than 10 % water by mass	4.1		I	28	0	E0	P406	PP24		
3370	UREA NITRATE, WETTED, with not less than 10 % water by mass	4.1		I	28	0	E0	P406	PP78		

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3371	2-METHYLBUTANAL	3		II		1 L	E2	P001 IBC02		T4	TP1
3373	BIOLOGICAL SUBSTANCE, CATEGORY B	6.2			319 341	0	E0	P650		T1 BK1 BK2	TP1
3374	ACETYLENE, SOLVENT FREE	2.1				0	E0	P200			
3375	AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blasting explosives	5.1		II	309	0	E2	P505 IBC02	B16	T1	TP1 TP9 TP17 TP32
3376	4-NITROPHENYLHYDRAZINE, with not less than 30 % water, by mass	4.1		I	28	0	E0	P406	PP26		
3377	SODIUM PERBORATE MONOHYDRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
3378	SODIUM CARBONATE PEROXYHYDRATE	5.1		II		1 kg	E2	P002 IBC08	B2, B4	T3 BK1 BK2	TP33
3378	SODIUM CARBONATE PEROXYHYDRATE	5.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1 BK1 BK2 BK3	TP33
3379	DESENSITIZED EXPLOSIVE, LIQUID, N.O.S.	3		I	274 311	0	E0	P099			
3380	DESENSITIZED EXPLOSIVE, SOLID, N.O.S.	4.1		I	274 311 394	0	E0	P099			
3381	TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1		I	274	0	E0	P601		T22	TP2 TP13
3382	TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1		I	274	0	E0	P602		T20	TP2 TP13
3383	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3	I	274	0	E0	P601		T22	TP2 TP13
3384	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3	I	274	0	E0	P602		T20	TP2 TP13
3385	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	4.3	I	274	0	E0	P601		T22	TP2 TP13
3386	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	4.3	I	274	0	E0	P602		T20	TP2 TP13

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3387	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	5.1	I	274	0	E0	P601		T22	TP2 TP13
3388	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	5.1	I	274	0	E0	P602		T20	TP2 TP13
3389	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	8	I	274	0	E0	P601		T22	TP2 TP13
3390	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	8	I	274	0	E0	P602		T20	TP2 TP13
3391	ORGANOMETALLIC SUBSTANCE, SOLID, PYROPHORIC	4.2		I	274	0	E0	P404	PP86	T21	TP7 TP33 TP36
3392	ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC	4.2		I	274	0	E0	P400	PP86	T21	TP2 TP7 TP36
3393	ORGANOMETALLIC SUBSTANCE, SOLID, PYROPHORIC, WATER-REACTIVE	4.2	4.3	I	274	0	E0	P404	PP86	T21	TP7 TP33 TP36 TP41
3394	ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE	4.2	4.3	I	274	0	E0	P400	PP86	T21	TP2 TP7 TP36 TP41
3395	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE	4.3		I	274	0	E0	P403		T9	TP7 TP33 TP36 TP41
3395	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE	4.3		II	274	500 g	E2	P410 IBC04		T3	TP33 TP36 TP41
3395	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE	4.3		III	223 274	1 kg	E1	P410 IBC06		T1	TP33 TP36 TP41
3396	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, FLAMMABLE	4.3	4.1	I	274	0	E0	P403		T9	TP7 TP33 TP36 TP41
3396	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, FLAMMABLE	4.3	4.1	II	274	500 g	E2	P410 IBC04		T3	TP33 TP36 TP41
3396	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, FLAMMABLE	4.3	4.1	III	223 274	1 kg	E1	P410 IBC06		T1	TP33 TP36 TP41
3397	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, SELF-HEATING	4.3	4.2	I	274	0	E0	P403		T9	TP7 TP33 TP36 TP41

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3397	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, SELF-HEATING	4.3	4.2	II	274	500 g	E2	P410 IBC04		T3	TP33 TP36 TP41
3397	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, SELF-HEATING	4.3	4.2	III	223 274	1 kg	E1	P410 IBC06		T1	TP33 TP36 TP41
3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE	4.3		I	274	0	E0	P402		T13	TP2 TP7 TP36 TP41
3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE	4.3		II	274	500 ml	E2	P001 IBC01		T7	TP2 TP7 TP36 TP41
3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE	4.3		III	223 274	1 L	E1	P001 IBC02		T7	TP2 TP7 TP36 TP41
3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3	I	274	0	E0	P402		T13	TP2 TP7 TP36 TP41
3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3	II	274	500 ml	E2	P001 IBC01		T7	TP2 TP7 TP36 TP41
3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3	III	223 274	1 L	E1	P001 IBC02		T7	TP2 TP7 TP36 TP41
3400	ORGANOMETALLIC SUBSTANCE, SOLID, SELF-HEATING	4.2		II	274	500 g	E2	P410 IBC06		T3	TP33 TP36
3400	ORGANOMETALLIC SUBSTANCE, SOLID, SELF-HEATING	4.2		III	223 274	1 kg	E1	P002 IBC08		T1	TP33 TP36
3401	ALKALI METAL AMALGAM, SOLID	4.3		I	182	0	E0	P403		T9	TP7 TP33
3402	ALKALINE EARTH METAL AMALGAM, SOLID	4.3		I	183	0	E0	P403		T9	TP7 TP33
3403	POTASSIUM METAL ALLOYS, SOLID	4.3		I		0	E0	P403		T9	TP7 TP33
3404	POTASSIUM SODIUM ALLOYS, SOLID	4.3		I		0	E0	P403		T9	TP7 TP33
3405	BARIUM CHLORATE SOLUTION	5.1	6.1	II		1 L	E2	P504 IBC02		T4	TP1
3405	BARIUM CHLORATE SOLUTION	5.1	6.1	III	223	5 L	E1	P001 IBC02		T4	TP1
3406	BARIUM PERCHLORATE SOLUTION	5.1	6.1	II		1 L	E2	P504 IBC02		T4	TP1
3406	BARIUM PERCHLORATE SOLUTION	5.1	6.1	III	223	5 L	E1	P001 IBC02		T4	TP1
3407	CHLORATE AND MAGNESIUM CHLORIDE MIXTURE SOLUTION	5.1		II		1 L	E2	P504 IBC02		T4	TP1
3407	CHLORATE AND MAGNESIUM CHLORIDE MIXTURE SOLUTION	5.1		III	223	5 L	E1	P504 IBC02		T4	TP1
3408	LEAD PERCHLORATE SOLUTION	5.1	6.1	II		1 L	E2	P504 IBC02		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3408	LEAD PERCHLORATE SOLUTION	5.1	6.1	III	223	5 L	E1	P001 IBC02		T4	TP1
3409	CHLORONITROBENZENES, LIQUID	6.1		II	279	100 ml	E4	P001 IBC02		T7	TP2
3410	4-CHLORO-o-TOLUIDINE HYDROCHLORIDE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03		T4	TP1
3411	beta-NAPHTHYLAMINE SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
3411	beta-NAPHTHYLAMINE SOLUTION	6.1		III	223	5 L	E1	P001 IBC02		T7	TP2
3412	FORMIC ACID with not less than 10 % but not more than 85 % acid by mass	8		II		1 L	E2	P001 IBC02		T7	TP2
3412	FORMIC ACID with not less than 5 % but less than 10 % acid by mass	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
3413	POTASSIUM CYANIDE SOLUTION	6.1		I		0	E5	P001		T14	TP2 TP13
3413	POTASSIUM CYANIDE SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3413	POTASSIUM CYANIDE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T7	TP2 TP13 TP28
3414	SODIUM CYANIDE SOLUTION	6.1		I		0	E5	P001		T14	TP2 TP13
3414	SODIUM CYANIDE SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T11	TP2 TP13 TP27
3414	SODIUM CYANIDE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T7	TP2 TP13 TP28
3415	SODIUM FLUORIDE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
3416	CHLOROACETOPHENONE, LIQUID	6.1		II		0	E0	P001 IBC02		T7	TP2 TP13
3417	XYLYL BROMIDE, SOLID	6.1		II		0	E4	P002 IBC08	B2, B4	T3	TP33
3418	2,4-TOLUYLENEDIAMINE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
3419	BORON TRIFLUORIDE ACETIC ACID COMPLEX, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3420	BORON TRIFLUORIDE PROPIONIC ACID COMPLEX, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3421	POTASSIUM HYDROGEN DIFLUORIDE SOLUTION	8	6.1	II		1 L	E2	P001 IBC02		T7	TP2
3421	POTASSIUM HYDROGEN DIFLUORIDE SOLUTION	8	6.1	III	223	5 L	E1	P001 IBC03		T4	TP1
3422	POTASSIUM FLUORIDE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
3423	TETRAMETHYLAMMONIUM HYDROXIDE, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3424	AMMONIUM DINITRO-o-CRESOLATE, SOLUTION	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
3424	AMMONIUM DINITRO-o-CRESOLATE, SOLUTION	6.1		III	223	5 L	E1	P001 IBC02		T7	TP2

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3425	BROMOACETIC ACID, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3426	ACRYLAMIDE SOLUTION	6.1		III	223	5 L	E1	P001 IBC03 LP01		T4	TP1
3427	CHLOROBENZYL CHLORIDES, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3428	3-CHLORO-4-METHYLPHENYL ISOCYANATE, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3429	CHLOROTOLUIDINES, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
3430	XYLENOLS, LIQUID	6.1		II		100 ml	E4	P001 IBC02		T7	TP2
3431	NITROBENZOTRIFLUORIDES, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3432	POLYCHLORINATED BIPHENYLS, SOLID	9		II	305	1 kg	E2	P906 IBC08	B2, B4	T3	TP33
3434	NITROCRESOLS, LIQUID	6.1		III		5 L	E1	P001 IBC03 LP01		T4	TP1
3436	HEXAFLUOROACETONE HYDRATE, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3437	CHLOROCRESOLS, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3438	alpha-METHYLBENZYL ALCOHOL, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3439	NITRILES, SOLID, TOXIC, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
3439	NITRILES, SOLID, TOXIC, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3439	NITRILES, SOLID, TOXIC, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3440	SELENIUM COMPOUND , LIQUID, N.O.S.	6.1		I	274	0	E5	P001		T14	TP2 TP27
3440	SELENIUM COMPOUND , LIQUID, N.O.S.	6.1		II	274	100 ml	E4	P001 IBC02		T11	TP2 TP27
3440	SELENIUM COMPOUND , LIQUID, N.O.S.	6.1		III	223 274	5 L	E1	P001 IBC03		T7	TP1 TP28
3441	CHLORODINITROBENZENES, SOLID	6.1		II	279	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3442	DICHLOROANILINES, SOLID	6.1		II	279	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3443	DINITROBENZENES, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3444	NICOTINE HYDROCHLORIDE, SOLID	6.1		II	43	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3445	NICOTINE SULPHATE, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3446	NITROTOLUENES, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3447	NITROXYLENES, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3448	TEAR GAS SUBSTANCE, SOLID, N.O.S.	6.1		I	274	0	E0	P002		T6	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3448	TEAR GAS SUBSTANCE, SOLID, N.O.S.	6.1		II	274	0	E0	P002 IBC08	B2, B4	T3	TP33
3449	BROMOBENZYL CYANIDES, SOLID	6.1		I	138	0	E5	P002		T6	TP33
3450	DIPHENYLCHLOROARSINE, SOLID	6.1		I		0	E0	P002 IBC07	B1	T6	TP33
3451	TOLUIDINES, SOLID	6.1		II	279	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3452	XYLIDINES, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3453	PHOSPHORIC ACID, SOLID	8		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3454	DINITROTOLUENES, SOLID	6.1		II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3455	CRESOLS, SOLID	6.1	8	II		500 g	E4	P002 IBC08	B2, B4	T3	TP33
3456	NITROSYLSULPHURIC ACID, SOLID	8		II		1 kg	E2	P002 IBC08	B2, B4	T3	TP33
3457	CHLORONITROTOLUENES, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3458	NITROANISOLES, SOLID	6.1		III	279	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3459	NITROBROMOBENZENES, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3460	N-ETHYLBENZYLTOLUIDINES, SOLID	6.1		III		5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3462	TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.	6.1		I	210 274	0	E5	P002 IBC07	B1	T6	TP33
3462	TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.	6.1		II	210 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3462	TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.	6.1		III	210 223 274	5 kg	E1	P002 IBC08	B3	T1	TP33
3463	PROPIONIC ACID with not less than 90 % acid by mass	8	3	II		1 L	E2	P001 IBC02		T7	TP2
3464	ORGANOPHOSPHORUS COMPOUND, SOLID, TOXIC, N.O.S.	6.1		I	43 274	0	E5	P002 IBC07	B1	T6	TP33
3464	ORGANOPHOSPHORUS COMPOUND, SOLID, TOXIC, N.O.S.	6.1		II	43 274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3464	ORGANOPHOSPHORUS COMPOUND, SOLID, TOXIC, N.O.S.	6.1		III	43 223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3465	ORGANOARSENIC COMPOUND, SOLID, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
3465	ORGANOARSENIC COMPOUND, SOLID, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3465	ORGANOARSENIC COMPOUND, SOLID, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3466	METAL CARBONYLS, SOLID, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3466	METAL CARBONYLS, SOLID, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3466	METAL CARBONYLS, SOLID, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3467	ORGANOMETALLIC COMPOUND, SOLID, TOXIC, N.O.S.	6.1		I	274	0	E5	P002 IBC07	B1	T6	TP33
3467	ORGANOMETALLIC COMPOUND, SOLID, TOXIC, N.O.S.	6.1		II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3467	ORGANOMETALLIC COMPOUND, SOLID, TOXIC, N.O.S.	6.1		III	223 274	5 kg	E1	P002 IBC08 LP02	B3	T1	TP33
3468	HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM or HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM CONTAINED IN EQUIPMENT or HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM PACKED WITH EQUIPMENT	2.1			321 356	0	E0	P205			
3469	PAINT, FLAMMABLE, CORROSIVE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint thinning or reducing compound)	3	8	I	163 367	0	E0	P001		T11	TP2 TP27
3469	PAINT, FLAMMABLE, CORROSIVE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint thinning or reducing compound)	3	8	II	163 367	1 L	E2	P001 IBC02		T7	TP2 TP8 TP28
3469	PAINT, FLAMMABLE, CORROSIVE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint thinning or reducing compound)	3	8	III	163 223 367	5 L	E1	P001 IBC03		T4	TP1 TP29
3470	PAINT, CORROSIVE, FLAMMABLE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL CORROSIVE, FLAMMABLE (including paint thinning or reducing compound)	8	3	II	163 367	1 L	E2	P001 IBC02		T7	TP2 TP8 TP28
3471	HYDROGENDIFLUORIDES SOLUTION, N.O.S.	8	6.1	II		1 L	E2	P001 IBC02		T7	TP2
3471	HYDROGENDIFLUORIDES SOLUTION, N.O.S.	8	6.1	III	223	5 L	E1	P001 IBC03		T4	TP1

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3472	CROTONIC ACID, LIQUID	8		III		5 L	E1	P001 IBC03 LP01		T4	TP1
3473	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing flammable liquids	3			328	1 L	E0	P004			
3474	1-HYDROXYBENZOTRIAZOLE MONOHYDRATE	4.1		I		0	E0	P406	PP48		
3475	ETHANOL AND GASOLINE MIXTURE or ETHANOL AND MOTOR SPIRIT MIXTURE or ETHANOL AND PETROL MIXTURE, with more than 10 % ethanol	3		II	333	1 L	E2	P001 IBC02		T4	TP1
3476	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing water-reactive substances	4.3			328 334	500 ml or 500 g	E0	P004			
3477	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing corrosive substances	8			328 334	1 *l* or 1 kg	E0	P004			
3478	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing liquefied flammable gas	2.1			328 338	120 ml	E0	P004			
3479	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing hydrogen in metal hydride	2.1			328 339	120 ml	E0	P004			
3480	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	9			188 230 310 348 376 377 384 387	0	E0	P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906			
3481	LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)	9			188 230 310 348 360 376 377 384 387 390	0	E0	P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906			
3482	ALKALI METAL DISPERSION, FLAMMABLE or ALKALINE EARTH METAL DISPERSION, FLAMMABLE	4.3	3	I	182 183	0	E0	P402			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3483	MOTOR FUEL ANTI-KNOCK MIXTURE, FLAMMABLE	6.1	3	I		0	E0	P602		T14	TP2 TP13
3484	HYDRAZINE AQUEOUS SOLUTION, FLAMMABLE with more than 37 % hydrazine, by mass	8	3 6.1	I		0	E0	P001		T10	TP2 TP13
3485	CALCIUM HYPOCHLORITE, DRY, CORROSIVE or CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 39 % available chlorine (8.8 % available oxygen)	5.1	8	II	314	1 kg	E2	P002 IBC08	PP85 B2, B4, B13		
3486	CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 10 % but not more than 39 % available chlorine	5.1	8	III	314	5 kg	E1	P002 IBC08 LP02	PP85 B3, B13 L3		
3487	CALCIUM HYPOCHLORITE, HYDRATED, CORROSIVE or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, CORROSIVE with not less than 5.5 % but not more than 16 % water	5.1	8	II	314 322	1 kg	E2	P002 IBC08	PP85 B2, B4, B13		
3487	CALCIUM HYPOCHLORITE, HYDRATED, CORROSIVE or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, CORROSIVE with not less than 5.5 % but not more than 16 % water	5.1	8	III	223 314	5 kg	E1	P002 IBC08	PP85 B4, B13		
3488	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3 8	I	274	0	E0	P601		T22	TP2 TP13
3489	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3 8	I	274	0	E0	P602		T20	TP2 TP13
3490	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	4.3 3	I	274	0	E0	P601		T22	TP2 TP13
3491	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	4.3 3	I	274	0	E0	P602		T20	TP2 TP13
3494	PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	6.1	I	343	0	E0	P001		T14	TP2 TP13
3494	PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	6.1	II	343	1 L	E2	P001 IBC02		T7	TP2
3494	PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	6.1	III	343	5 L	E1	P001 IBC03		T4	TP1
3495	IODINE	8	6.1	III	279	5 kg	E1	P002 IBC08	B3	T1	TP33
3496	BATTERIES, NICKEL-METAL HYDRIDE	9			117	0	E0	N/A			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3497	KRILL MEAL	4.2		II	300	0	E2	P410 IBC06	B2	T3	TP33
3497	KRILL MEAL	4.2		III	223 300	0	E1	P002 IBC08 LP02	B3	T1	TP33
3498	IODINE MONOCHLORIDE, LIQUID	8		II		1 L	E0	P001 IBC02		T7	TP2
3499	CAPACITOR, ELECTRIC DOUBLE LAYER (with an energy storage capacity greater than 0.3Wh)	9			361	0	E0	P003			
3500	CHEMICAL UNDER PRESSURE, N.O.S.	2.2			274 362	0	E0	P206	PP97	T50	TP4 TP40
3501	CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S.	2.1			274 362	0	E0	P206	PP89	T50	TP4 TP40
3502	CHEMICAL UNDER PRESSURE, TOXIC, N.O.S.	2.2	6.1		274 362	0	E0	P206	PP89	T50	TP4 TP40
3503	CHEMICAL UNDER PRESSURE, CORROSIVE, N.O.S.	2.2	8		274 362	0	E0	P206	PP89	T50	TP4 TP40
3504	CHEMICAL UNDER PRESSURE, FLAMMABLE, TOXIC, N.O.S.	2.1	6.1		274 362	0	E0	P206	PP89	T50	TP4 TP40
3505	CHEMICAL UNDER PRESSURE, FLAMMABLE, CORROSIVE, N.O.S.	2.1	8		274 362	0	E0	P206	PP89	T50	TP4 TP40
3506	MERCURY CONTAINED IN MANUFACTURED ARTICLES	8	6.1		366	5 kg	E0	P003	PP90		
3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile-excepted	6.1	7 8	I	317 369	0	E0	P603			
3508	CAPACITOR, ASYMMETRIC (with an energy storage capacity greater than 0.3Wh)	9			372	0	E0	P003			
3509	PACKAGINGS, DISCARDED, EMPTY, UNCLEANED	9			374	0	E0				
3510	ADSORBED GAS, FLAMMABLE, N.O.S.	2.1			274	0	E0	P208			
3511	ADSORBED GAS, N.O.S.	2.2			274	0	E0	P208			
3512	ADSORBED GAS, TOXIC, N.O.S.	2.3			274	0	E0	P208			
3513	ADSORBED GAS, OXIDIZING, N.O.S.	2.2	5.1		274	0	E0	P208			
3514	ADSORBED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1		274	0	E0	P208			
3515	ADSORBED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	5.1		274	0	E0	P208			
3516	ADSORBED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	8		274 379	0	E0	P208			
3517	ADSORBED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	2.1 8		274	0	E0	P208			
3518	ADSORBED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	5.1 8		274	0	E0	P208			
3519	BORON TRIFLUORIDE, ADSORBED	2.3	8			0	E0	P208			
3520	CHLORINE, ADSORBED	2.3	5.1 8			0	E0	P208			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3521	SILICON TETRAFLUORIDE, ADSORBED	2.3	8			0	E0	P208			
3522	ARSINE, ADSORBED	2.3	2.1			0	E0	P208			
3523	GERMANE, ADSORBED	2.3	2.1			0	E0	P208			
3524	PHOSPHORUS PENTAFLUORIDE, ADSORBED	2.3	8			0	E0	P208			
3525	PHOSPHINE, ADSORBED	2.3	2.1			0	E0	P208			
3526	HYDROGEN SELENIDE, ADSORBED	2.3	2.1			0	E0	P208			
3527	POLYESTER RESIN KIT, solid base material	4.1		II	236 340	5 kg	See SP 340 in Chapter 3.3	P412			
3527	POLYESTER RESIN KIT, solid base material	4.1		III	236 340	5 kg	See SP 340 in Chapter 3.3	P412			
3528	ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED	3			363	0	E0	P005			
3529	ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED	2.1			356 363	0	E0	P005			
3530	ENGINE, INTERNAL COMBUSTION or MACHINERY, INTERNAL COMBUSTION	9			363	0	E0	P005			
3531	POLYMERIZING SUBSTANCE, SOLID, STABILIZED, N.O.S.	4.1		III	274 386	0	E0	P002 IBC07	PP92 B18	T7	TP4 TP6 TP33
3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.	4.1		III	274 386	0	E0	P001 IBC03	PP93 B19	T7	TP4 TP6
3533	POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.	4.1		III	274 386	0	E0	P002 IBC07	PP92 B18	T7	TP4 TP6 TP33
3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.	4.1		III	274 386	0	E0	P001 IBC03	PP93 B19	T7	TP4 TP6
3535	TOXIC SOLID, FLAMMABLE, INORGANIC, N.O.S.	6.1	4.1	I	274	0	E5	P002 IBC99		T6	TP33
3535	TOXIC SOLID, FLAMMABLE, INORGANIC, N.O.S.	6.1	4.1	II	274	500 g	E4	P002 IBC08	B2, B4	T3	TP33
3536	LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT lithium ion batteries or lithium metal batteries	9			389	0	E0				
3537	ARTICLES CONTAINING FLAMMABLE GAS, N.O.S.	2.1	See 2.0.5.6		274 391	0	E0	P006 LP03			

UN No.	Name and description	Class or division	Subsi-diary hazard	UN packing group	Special provi-sions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.0	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
3538	ARTICLES CONTAINING NON-FLAMMABLE, NON TOXIC GAS, N.O.S.	2.2	See 2.0.5.6		274 391 396	0	E0	P006 LP03			
3539	ARTICLES CONTAINING TOXIC GAS, N.O.S.	2.3	See 2.0.5.6		274 391	0	E0				
3540	ARTICLES CONTAINING FLAMMABLE LIQUID, N.O.S.	3	See 2.0.5.6		274 391	0	E0	P006 LP03			
3541	ARTICLES CONTAINING FLAMMABLE SOLID, N.O.S.	4.1	See 2.0.5.6		274 391	0	E0	P006 LP03			
3542	ARTICLES CONTAINING A SUBSTANCE LIABLE TO SPONTANEOUS COMBUSTION, N.O.S.	4.2	See 2.0.5.6		274 391	0	E0				
3543	ARTICLES CONTAINING A SUBSTANCE WHICH IN CONTACT WITH WATER EMITS FLAMMABLE GASES, N.O.S.	4.3	See 2.0.5.6		274 391	0	E0				
3544	ARTICLES CONTAINING OXIDIZING SUBSTANCE, N.O.S.	5.1	See 2.0.5.6		274 391	0	E0				
3545	ARTICLES CONTAINING ORGANIC PEROXIDE, N.O.S.	5.2	See 2.0.5.6		274 391	0	E0				
3546	ARTICLES CONTAINING TOXIC SUBSTANCE, N.O.S.	6.1	See 2.0.5.6		274 391	0	E0	P006 LP03			
3547	ARTICLES CONTAINING CORROSIVE SUBSTANCE, N.O.S.	8	See 2.0.5.6		274 391	0	E0	P006 LP03			
3548	ARTICLES CONTAINING MISCELLANEOUS DANGEROUS GOODS, N.O.S.	9	See 2.0.5.6		274 391	0	E0	P006 LP03			
3549	MEDICAL WASTE, CATEGORY A, AFFECTING HUMANS, solid or MEDICAL WASTE, CATEGORY A, AFFECTING ANIMALS only, solid	6.2			395	0	E0	P622 LP622			
3550	COBALT DIHYDROXIDE POWDER, containing not less than 10 % respirable particles	6.1		I		0	E5	P002 IBC07	B1, B20	T6	TP33

CHAPTER 3.3

SPECIAL PROVISIONS APPLICABLE TO CERTAIN ARTICLES OR SUBSTANCES

3.3.1 When Column 6 of the Dangerous Goods List of Chapter 3.2 indicates that a special provision is relevant to a substance or article, the meaning and requirements of that special provision are as set forth below. Where a special provision includes a requirement for package marking, the provisions of 5.2.1.2 (a) to (d) shall be met. If the required mark is in the form of specific wording indicated in quotation marks, such as "LITHIUM BATTERIES FOR DISPOSAL", the size of the mark shall be at least 12 mm, unless otherwise indicated in the special provision or elsewhere in these Regulations.

16 Samples of new or existing explosive substances or articles may be transported as directed by the competent authorities for purposes including: testing, classification, research and development, quality control, or as a commercial sample. Explosive samples which are not wetted or desensitized shall be limited to 10 kg in small packages as specified by the competent authorities. Explosive samples which are wetted or desensitized shall be limited to 25 kg.

23 Even though this substance has a flammability hazard, it only exhibits such hazard under extreme fire conditions in confined areas.

26 This substance is not permitted for transport in portable tanks, or intermediate bulk containers with a capacity exceeding 450 litres, due to potential initiation of explosion when transported in large volumes.

28 This substance may be transported under the provisions of Division 4.1 only if it is so packed that the percentage of diluent will not fall below that stated, at any time during transport (see 2.4.2.4).

29 This substance is exempt from labelling, but shall be marked with the appropriate class or division.

32 This substance is not subject to these Regulations when in any other form.

37 This substance is not subject to these Regulations when coated.

38 This substance is not subject to these Regulations when it contains not more than 0.1 % calcium carbide.

39 This substance is not subject to these Regulations when it contains less than 30 % or not less than 90 % silicon.

43 When offered for carriage as pesticides, these substances shall be carried under the relevant pesticide entry and in accordance with the relevant pesticide provisions (see 2.6.2.3 and 2.6.2.4).

45 Antimony sulphides and oxides which contain not more than 0.5 % of arsenic calculated on the total mass are not subject to these Regulations.

47 Ferricyanides and ferrocyanides are not subject to these Regulations.

48 The transport of this substance, when it contains more than 20 % hydrocyanic acid, is prohibited except with special authorization granted by the competent authorities.

59 These substances are not subject to these Regulations when they contain not more than 50 % magnesium.

60 If the concentration is more than 72 %, the transport of this substance is prohibited except with special authorization granted by the competent authorities.

61 The technical name which shall supplement the proper shipping name shall be the ISO common name, other name listed in the WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification or the name of the active substance (see also 3.1.2.8.1.1).

62 This substance is not subject to these Regulations when it contains not more than 4 % sodium hydroxide.

63 The division of Class 2 and the subsidiary hazards depend on the nature of the contents of the aerosol dispenser. The following provisions shall apply:

(a) Division 2.1 applies if the contents include 85 % by mass or more flammable components and the chemical heat of combustion is 30 kJ/g or more;

(b) Division 2.2 applies if the contents contain 1 % by mass or less flammable components and the heat of combustion is less than 20 kJ/g;

(c) Otherwise the product shall be classified as tested by the tests described in the *Manual of Tests and Criteria*, Part III, section 31. Extremely flammable and flammable aerosols shall be classified in Division 2.1; non-flammable in Division 2.2;

(d) Gases of Division 2.3 shall not be used as a propellant in an aerosol dispenser;

(e) Where the contents other than the propellant of aerosol dispensers to be ejected are classified as Division 6.1 packing groups II or III or Class 8 packing groups II or III, the aerosol shall have a subsidiary hazard of Division 6.1 or Class 8;

(f) Aerosols with contents meeting the criteria for packing group I for toxicity or corrosivity shall be prohibited from transport;

(g) Subsidiary hazard labels may be required for air transport.

Flammable components are flammable liquids, flammable solids or flammable gases and gas mixtures as defined in Notes 1 to 3 of sub-section 31.1.3 of Part III of the *Manual of Tests and Criteria.* This designation does not cover pyrophoric, self-heating or water-reactive substances. The chemical heat of combustion shall be determined by one of the following methods ASTM D 240, ISO/FDIS 13943: 1999 (E/F) 86.1 to 86.3 or NFPA 30B.

65 Hydrogen peroxide aqueous solutions with less than 8 % hydrogen peroxide are not subject to these Regulations.

66 Cinnabar is not subject to these Regulations.

103 Ammonium nitrites and mixtures of an inorganic nitrite with an ammonium salt are prohibited.

105 Nitrocellulose meeting the descriptions of UN 2556 or UN 2557 may be classified in Division 4.1.

106 Subject to these Regulations only when transported by air.

113 The carriage of chemically unstable mixtures is prohibited.

117 Subject to these Regulations only when transported by sea.

119 Refrigerating machines include machines or other appliances which have been designed for the specific purpose of keeping food or other items at a low temperature in an internal compartment, and air conditioning units. Refrigerating machines and refrigerating machine components are not subject to these Regulations if they contain less than 12 kg of gas in Division 2.2 or less than 12 litres ammonia solution (UN 2672).

122 The subsidiary hazards, control and emergency temperatures if any, and the generic entry number for each of the currently assigned organic peroxide formulations are given in 2.5.3.2.4, 4.1.4.2 packing instruction IBC520 and 4.2.5.2.6 portable tank instruction T23.

123 Subject to these Regulations only when transported by air or by sea.

127 Other inert material or inert material mixture may be used at the discretion of the competent authority, provided this inert material has identical phlegmatizing properties.

131 The phlegmatized substance shall be significantly less sensitive than dry PETN.

132 During the course of transport, this substance shall be protected from direct sunshine and stored (or kept) in a cool and well-ventilated place, away from all sources of heat.

133 If over-confined in packagings, this substance may exhibit explosive behaviour. Packagings authorized under packing instruction P409 are intended to prevent over-confinement. When a packaging other than those prescribed under packing instruction P409 is authorized by the competent authority of the country of origin in accordance with 4.1.3.7, the package shall bear an “EXPLOSIVE” subsidiary hazard label (Model No 1, see 5.2.2.2.2) unless the competent authority of the country of origin has permitted this label to be dispensed with for the specific packaging employed because test data have proved that the substance in this packaging does not exhibit explosive behaviour (see 5.4.1.5.5.1). The provisions of 7.1.3.1 shall also be then considered.

135 The dihydrated sodium salt of dichloroisocyanuric acid does not meet the criteria for inclusion in Division 5.1 and is not subject to these Regulations unless meeting the criteria for inclusion in another Class or Division.

138 p-Bromobenzyl cyanide is not subject to these Regulations.

141 Products which have undergone sufficient heat treatment so that they present no hazard during transport are not subject to these Regulations.

142 Solvent extracted soya bean meal containing not more than 1.5 % oil and 11 % moisture, which is substantially free of flammable solvent, is not subject to these Regulations.

144 An aqueous solution containing not more than 24 % alcohol by volume is not subject to these Regulations.

145 Other than for air transport, alcoholic beverages of packing group III, when carried in receptacles of 250 litres or less, are not subject to these Regulations.

146 Other than for air and sea transport, alcoholic beverages of packing group II, when carried in receptacles of 5 litres or less, are not subject to these Regulations.

152 The classification of this substance will vary with particle size and packaging, but borderlines have not been experimentally determined. Appropriate classifications shall be made as required by 2.1.3.

153 This entry applies only if it is demonstrated, on the basis of tests, that the substances when in contact with water are not combustible nor show a tendency to auto-ignition and that the mixture of gases evolved is not flammable.

163 A substance specifically listed by name in the Dangerous Goods List of Chapter 3.2 shall not be transported under this entry. Materials transported under this entry may contain 20 % or less nitrocellulose provided the nitrocellulose contains not more than 12.6 % nitrogen (by dry mass).

168 Asbestos which is immersed or fixed in a natural or artificial binder (such as cement, plastics, asphalt, resins or mineral ore) in such a way that no escape of hazardous quantities of respirable asbestos fibres can occur during transport is not subject to these Regulations. Manufactured articles containing asbestos and not meeting this provision are nevertheless not subject to these Regulations when packed so that no escape of hazardous quantities of respirable asbestos fibres can occur during transport.

169 Phthalic anhydride in the solid state and tetrahydrophthalic anhydrides, with not more than 0.05 % maleic anhydride, are not subject to these Regulations. Phthalic anhydride molten at a temperature above its flash point, with not more than 0.05 % maleic anhydride, shall be classified under UN 3256.

172 Where a radioactive material has (a) subsidiary hazard(s):

(a) The substance shall be allocated to Packing Group I, II or III, if appropriate, by application of the packing group criteria provided in Part 2 corresponding to the nature of the predominant subsidiary hazard;

(b) Packages shall be labelled with subsidiary hazard labels corresponding to each subsidiary hazard exhibited by the material; corresponding placards shall be affixed to cargo transport units in accordance with the relevant provisions of 5.3.1;

(c) For the purposes of documentation and package marking, the proper shipping name shall be supplemented with the name of the constituents which most predominantly contribute to this (these) subsidiary hazard(s) and which shall be enclosed in parenthesis;

(d) The dangerous goods transport document shall indicate the class or division of the subsidiary hazard and, where assigned the packing group as required by 5.4.1.4.1(d) and (e).

For packing, see also 4.1.9.1.5.

177 Barium sulphate is not subject to these Regulations.

178 This designation shall be used only when no other appropriate designation exists in the Dangerous Goods List of Chapter 3.2, and only with the approval of the competent authority of the country of origin.

179 *Deleted.*

181 Packages containing this type of substance shall bear the “EXPLOSIVE” subsidiary hazard label (Model No 1, see 5.2.2.2.2) unless the competent authority of the country of origin has permitted this label to be dispensed with for the specific packaging employed because test data have proved that the substance in this packaging does not exhibit explosive behaviour (see 5.4.1.5.5.1). The provisions of 7.1.3.1 shall also be considered.

182 The group of alkali metals includes lithium, sodium, potassium, rubidium and caesium.

183 The group of alkaline earth metals includes magnesium, calcium, strontium and barium.

186 *Deleted.*

188 Cells and batteries offered for transport are not subject to other provisions of these Regulations if they meet the following:

(a) For a lithium metal or lithium alloy cell, the lithium content is not more than 1 g, and for a lithium ion cell, the Watt-hour rating is not more than 20 Wh;

(b) For a lithium metal or lithium alloy battery the aggregate lithium content is not more than 2 g, and for a lithium ion battery, the Watt-hour rating is not more than 100 Wh. Lithium ion batteries subject to this provision shall be marked with the Watt-hour rating on the outside case, except those manufactured before 1 January 2009;

(c) Each cell or battery meets the provisions of 2.9.4 (a), (e), (f) if applicable and (g);

(d) Cells and batteries, except when installed in equipment, shall be packed in inner packagings that completely enclose the cell or battery. Cells and batteries shall be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material within the same packaging that could lead to a short circuit. The inner packagings shall be packed in strong outer packagings which conform to the provisions of 4.1.1.1, 4.1.1.2, and 4.1.1.5;

(e) Cells and batteries when installed in equipment shall be protected from damage and short circuit, and the equipment shall be equipped with an effective means of preventing accidental activation. This requirement does not apply to devices which are intentionally active in transport (radio frequency identification (RFID) transmitters, watches, sensors, etc.) and which are not capable of generating a dangerous evolution of heat. When batteries are installed in equipment, the equipment shall be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained;

(f) Each package shall be marked with the appropriate lithium battery mark, as illustrated at 5.2.1.9;

NOTE: *Packages containing lithium batteries packed in conformity with the provisions of Part 4, Chapter 11, packing instructions 965 or 968, Section IB of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air that bear the mark as shown in 5.2.1.9 (lithium battery mark) and the label shown in 5.2.2.2.2, Model No.9A shall be deemed to meet the provisions of this special provision.*

This requirement does not apply to:

(i) packages containing only button cell batteries installed in equipment (including circuit boards); and

(ii) packages containing no more than four cells or two batteries installed in equipment, where there are not more than two packages in the consignment.

When packages are placed in an overpack, the lithium battery mark shall either be clearly visible or be reproduced on the outside of the overpack and the overpack shall be marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high.

(g) Except when cells or batteries are installed in equipment, each package shall be capable of withstanding a 1.2 m drop test in any orientation without damage to

cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents; and

(h) Except when cells or batteries are installed in or packed with equipment, packages shall not exceed 30 kg gross mass.

As used above and elsewhere in these Regulations, “lithium content” means the mass of lithium in the anode of a lithium metal or lithium alloy cell. As used in this special provision “equipment” means apparatus for which the lithium cells or batteries will provide electrical power for its operation.

Separate entries exist for lithium metal batteries and lithium ion batteries to facilitate the transport of these batteries for specific modes of transport and to enable the application of different emergency response actions.

A single cell battery as defined in Part III, sub-section 38.3.2.3 of the *Manual of Tests and Criteria* is considered a “cell” and shall be transported according to the requirements for “cells” for the purpose of this special provision.

190 Aerosol dispensers shall be provided with protection against inadvertent discharge. Aerosols with a capacity not exceeding 50 ml containing only non-toxic constituents are not subject to these Regulations.

191 Receptacles, small, containing gas are not fitted with a release device. Receptacles with a capacity not exceeding 50 ml containing only non-toxic constituents are not subject to these Regulations.

193 This entry may only be used for ammonium nitrate based compound fertilizers. They shall be classified in accordance with the procedure as set out in the Manual of Tests and Criteria, Part III, Section 39. Fertilizers meeting the criteria for this UN number are only subject to these Regulations when transported by air or sea.

194 The control and emergency temperatures, if any, and the generic entry number for each of the currently assigned self-reactive substances are given in 2.4.2.3.2.3.

195 For certain organic peroxides types B or C, a smaller packaging than that allowed by packing methods OP5 or OP6 respectively has to be used (see 4.1.7 and 2.5.3.2.4).

196 Formulations which in laboratory testing neither detonate in the cavitated state nor deflagrate, which show no effect when heated under confinement and which exhibit no explosive power may be transported under this entry. The formulation must also be thermally stable (i.e. the SADT is 60 °C or higher for a 50 kg package). Formulations not meeting these criteria shall be transported under the provisions of Division 5.2; see 2.5.3.2.4.

198 Nitrocellulose solutions containing not more than 20 % nitrocellulose may be transported as paint, perfumery products or printing ink, as applicable. See UN Nos. 1210, 1263, 1266, 3066, 3469 and 3470.

199 Lead compounds which, when mixed in a ratio of 1:1000 with 0.07M hydrochloric acid and stirred for one hour at a temperature of 23 °C ± 2 °C, exhibit a solubility of 5 % or less (see ISO 3711:1990 *“Lead chromate pigments and lead chromate-molybdate pigments – Specifications and methods of test”*) are considered insoluble and are not subject to these Regulations unless they meet the criteria for inclusion in another hazard class or division.

201 Lighters and lighter refills shall comply with the provisions of the country in which they were filled. They shall be provided with protection against inadvertent discharge. The liquid portion of the gas shall not exceed 85 % of the capacity of the receptacle at 15 °C. The receptacles, including the closures, shall be capable of withstanding an internal

pressure of twice the pressure of the liquefied petroleum gas at 55 °C. The valve mechanisms and ignition devices shall be securely sealed, taped or otherwise fastened or designed to prevent operation or leakage of the contents during transport. Lighters shall not contain more than 10 g of liquefied petroleum gas. Lighter refills shall not contain more than 65 g of liquefied petroleum gas.

203 This entry shall not be used for polychlorinated biphenyls, UN 2315.

204 Articles containing smoke-producing substance(s) corrosive according to the criteria for Class 8 shall be labelled with a “CORROSIVE” subsidiary hazard label (Model No 8, see 5.2.2.2.2).

Articles containing smoke-producing substance(s) toxic by inhalation according to the criteria for Division 6.1 shall be labelled with a “TOXIC” subsidiary hazard label (Model No 6.1, see 5.2.2.2.2), except that those manufactured before 31 December 2016 may be transported until 1 January 2019 without a “TOXIC” subsidiary hazard label.

205 This entry shall not be used for UN 3155 PENTACHLOROPHENOL.

206 This entry is not intended to include ammonium permanganate, the transport of which is prohibited except with special authorization granted by the competent authorities.

207 Plastics moulding compounds may be made from polystyrene, poly (methyl methacrylate) or other polymeric material.

208 The commercial grade of calcium nitrate fertilizer, when consisting mainly of a double salt (calcium nitrate and ammonium nitrate) containing not more than 10 % ammonium nitrate and at least 12 % water of crystallization, is not subject to these Regulations.

209 The gas shall be at a pressure corresponding to ambient atmospheric pressure at the time the containment system is closed and this shall not exceed 105 kPa absolute.

210 Toxins from plant, animal or bacterial sources which contain infectious substances, or toxins that are contained in infectious substances, shall be classified in Division 6.2.

215 This entry only applies to the technically pure substance or to formulations derived from it having an SADT higher than 75 °C and therefore does not apply to formulations which are self-reactive substances. (For self-reactive substances, see 2.4.2.3.2.3). Homogeneous mixtures containing not more than 35 % by mass of azodicarbonamide and at least 65 % of inert substance are not subject to these Regulations unless criteria of other classes or divisions are met.

216 Mixtures of solids which are not subject to these Regulations and flammable liquids may be transported under this entry without first applying the classification criteria of Division 4.1, provided there is no free liquid visible at the time the substance is loaded or at the time the packaging or cargo transport unit is closed. Each cargo transport unit shall be leakproof when used as a bulk packaging. Sealed packets and articles containing less than 10 ml of a packing group II or III flammable liquid absorbed into a solid material are not subject to these Regulations provided there is no free liquid in the packet or article.

217 Mixtures of solids which are not subject to these Regulations and toxic liquids may be transported under this entry without first applying the classification criteria of Division 6.1, provided there is no free liquid visible at the time the substance is loaded or at the time the packaging or cargo transport unit is closed. Each cargo transport unit shall be leakproof when used as a bulk packaging. This entry shall not be used for solids containing a packing group I liquid.

218 Mixtures of solids which are not subject to these Regulations and corrosive liquids may be transported under this entry without first applying the classification criteria of Class 8, provided there is no free liquid visible at the time the substance is loaded or at

the time the packaging or cargo transport unit is closed. Each cargo transport unit shall be leakproof when used as a bulk packaging.

219 Genetically modified microorganisms (GMMOs) and genetically modified organisms (GMOs) packed and marked in accordance with packing instruction P904 are not subject to any other requirements in these Regulations.

If GMMOs or GMOs meet the definition in Chapter 2.6 of a toxic substance or an infectious substance and the criteria for inclusion in Division 6.1 or 6.2 the requirements in these Regulations for transporting toxic substances or infectious substances apply.

220 The technical name of the flammable liquid component only of this solution or mixture shall be shown in parentheses immediately following the proper shipping name.

221 Substances included under this entry shall not be of packing group I.

223 If the chemical or physical properties of a substance covered by this description are such that when tested it does not meet the established defining criteria for the class or division listed in Column 3 of the Dangerous Goods List of Chapter 3.2, or any other class or division, it is not subject to these Regulations.

224 Unless it can be demonstrated by testing that the sensitivity of the substance in its frozen state is no greater than in its liquid state, the substance shall remain liquid during normal transport conditions. It shall not freeze at temperatures above -15 °C.

225 Fire extinguishers under this entry may include installed actuating cartridges (cartridges, power device of Division 1.4C or 1.4S), without changing the classification of Division 2.2 provided the total quantity of deflagrating (propellant) explosives does not exceed 3.2 g per extinguishing unit. Fire extinguishers shall be manufactured, tested, approved and labelled according to the provisions applied in the country of manufacture.

NOTE: *"Provisions applied in the country of manufacture" means the provisions applicable in the country of manufacture or those applicable in the country of use.*

Fire extinguishers under this entry include:

(a) Portable fire extinguishers for manual handling and operation;

NOTE: *This entry applies to portable fire extinguishers, even if some components that are necessary for their proper functioning (e.g. hoses and nozzles) are temporarily detached, as long as the safety of the pressurized extinguishing agent containers is not compromised and the fire extinguishers continue to be identified as a portable fire extinguisher.*

(b) Fire extinguishers for installation in aircraft;

(c) Fire extinguishers mounted on wheels for manual handling;

(d) Fire extinguishing equipment or machinery mounted on wheels or wheeled platforms or units transported similar to (small) trailers, and

(e) Fire extinguishers composed of a non-rollable pressure drum and equipment, and handled e.g. by fork lift or crane when loaded or unloaded.

NOTE: *Pressure receptacles which contain gases for use in the above-mentioned extinguishers or for use in stationary fire-fighting installations shall meet the requirements in Chapter 6.2 and all requirements applicable to the relevant dangerous goods when these pressure receptacles are transported separately.*

226 Formulations of these substances containing not less than 30 % non-volatile, non-flammable phlegmatizer are not subject to these Regulations.

227 When phlegmatized with water and inorganic inert material the content of urea nitrate may not exceed 75 % by mass and the mixture shall not be capable of being detonated by the Series 1, type (a), test in the *Manual of Tests and Criteria*, Part I.

228 Mixtures not meeting the criteria for flammable gases (Division 2.1) shall be transported under UN 3163.

230 Lithium cells and batteries may be transported under this entry if they meet the provisions of 2.9.4.

232 This designation shall only be used when the substance does not meet the criteria of any other class. Transport in cargo transport units other than in multimodal tanks shall be in accordance with standards specified by the competent authorities of the country of origin.

235 This entry applies to articles which contain Class 1 explosive substances and which may also contain dangerous goods of other classes. These articles are used to enhance safety in vehicles, vessels or aircraft – e.g. air bag inflators, air bag modules, seat-belt pretensioners, and pyromechanical devices.

236 Polyester resin kits consist of two components: a base material (either Class 3 or Division 4.1, packing group II or III) and an activator (organic peroxide). The organic peroxide shall be type D, E, or F, not requiring temperature control. The packing group shall be II or III, according to the criteria of either Class 3 or Division 4.1, as appropriate, applied to the base material. The quantity limit shown in column 7a of the Dangerous Goods List of Chapter 3.2 applies to the base material.

237 The membrane filters, including paper separators, coating or backing materials, etc., that are present in transport, shall not be liable to propagate a detonation as tested by one of the tests described in the *Manual of Tests and Criteria*, Part I, test series 1(a).

In addition, the competent authority may determine, on the basis of the results of suitable burning rate tests taking account of the standard tests in the *Manual of Tests and Criteria*, Part III, sub-section 33.2, that nitrocellulose membrane filters in the form in which they are to be transported are not subject to the provisions of these Regulations applicable to flammable solids in Division 4.1.

238 (a) Batteries can be considered as non-spillable provided that they are capable of withstanding the vibration and pressure differential tests given below, without leakage of battery fluid.

Vibration test: The battery is rigidly clamped to the platform of a vibration machine and a simple harmonic motion having an amplitude of 0.8 mm (1.6 mm maximum total excursion) is applied. The frequency is varied at the rate of 1 Hz/min between the limits of 10 Hz and 55 Hz. The entire range of frequencies and return is traversed in 95 ± 5 minutes for each mounting position (direction of vibration) of the battery. The battery is tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

Pressure differential test: Following the vibration test, the battery is stored for six hours at 24 °C ± 4 °C while subjected to a pressure differential of at least 88 kPa. The battery is tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

NOTE:*Non-spillable type batteries which are an integral part of and necessary for the operation of mechanical or electronic equipment, shall be securely fastened in the battery holder on the equipment and protected in such a manner as to prevent damage and short circuits.*

(b) Non-spillable batteries are not subject to these Regulations if, at a temperature of 55 °C, the electrolyte will not flow from a ruptured or cracked case and there is no free liquid to flow and if, when packaged for transport, the terminals are protected from short circuit.

239 Batteries or cells shall not contain dangerous goods other than sodium, sulphur or sodium compounds (e.g. sodium polysulphides and sodium tetrachloroaluminate). Batteries or cells shall not be offered for transport at a temperature such that liquid elemental sodium is present in the battery or cell unless approved and under the conditions established by the competent authority.

Cells shall consist of hermetically sealed metal casings which fully enclose the dangerous goods and which are so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport.

Batteries shall consist of cells secured within and fully enclosed by a metal casing so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport.

240 *Deleted.*

241 The formulation shall be prepared so that it remains homogeneous and does not separate during transport. Formulations with low nitrocellulose contents and not showing dangerous properties when tested for their liability to detonate, deflagrate or explode when heated under defined confinement by tests of test series 1 (a), 2 (b) and 2 (c) respectively in the *Manual of Tests and Criteria*, Part I and not being a flammable solid when tested in accordance with test N.1 in the *Manual of Tests and Criteria*, Part III, sub-section 33.2.4 (chips, if necessary, crushed and sieved to a particle size of less than 1.25 mm) are not subject to these Regulations.

242 Sulphur is not subject to these Regulations when it has been formed to a specific shape (e.g. prills, granules, pellets, pastilles or flakes).

243 Gasoline, motor spirit and petrol for use in spark-ignition engines (e.g. in automobiles, stationary engines and other engines) shall be assigned to this entry regardless of variations in volatility.

244 This entry includes e.g. aluminium dross, aluminium skimmings, spent cathodes, spent potliner, and aluminium salt slags.

Before loading, these by-products shall be cooled to ambient temperature, unless they have been calcined to remove moisture. Cargo transport units containing bulk loads shall be adequately ventilated and protected against ingress of water throughout the journey.

Notwithstanding the provisions of 4.3.2.2, sheeted bulk containers (BK1) may be used for inland transport.

246 This substance shall be packed in accordance with packing method OP6 (see applicable packing instruction). During transport, it shall be protected from direct sunshine and stored (or kept) in a cool and well-ventilated place, away from all sources of heat.

247 Alcoholic beverages containing more than 24 % alcohol but not more than 70 % by volume, when transported as part of the manufacturing process, may be transported in wooden barrels with a capacity of more than 250 litres and not more than 500 litres meeting the general requirements of 4.1.1, as appropriate, on the following conditions:

(a) The wooden barrels shall be checked and tightened before filling;

(b) Sufficient ullage (not less than 3 %) shall be left to allow for the expansion of the liquid;

(c) The wooden barrels shall be transported with the bungholes pointing upwards;

(d) The wooden barrels shall be transported in containers meeting the requirements of the International Convention for Safe Containers (CSC), 1972, as amended. Each wooden barrel shall be secured in custom-made cradles and be wedged by appropriate means to prevent it from being displaced in any way during transport.

249 Ferrocerium, stabilized against corrosion, with a minimum iron content of 10 % is not subject to these Regulations.

250 This entry may only be used for samples of chemicals taken for analysis in connection with the implementation of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction. The transport of substances under this entry shall be in accordance with the chain of custody and security procedures specified by the Organisation for the Prohibition of Chemical Weapons.

The chemical sample may only be transported providing prior approval has been granted by the competent authority or the Director General of the Organisation for the Prohibition of Chemical Weapons and providing the sample complies with the following provisions:

(a) It shall be packed according to Packing Instruction 623 in the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air; and

(b) During transport it shall be accompanied by a copy of the document of approval for transport, showing the quantity limitations and the packing provisions.

251 The entry CHEMICAL KIT or FIRST AID KIT is intended to apply to boxes, cases etc. containing small quantities of various dangerous goods which are used for example for medical, analytical or testing or repair purposes.

Such kits shall only contain dangerous goods that are permitted as:

(a) Excepted quantities not exceeding the quantity indicated by the code in column (7b) of the Dangerous Goods List of Chapter 3.2, provided that the net quantity per inner packaging and net quantity per package are as prescribed in 3.5.1.2 and 3.5.1.3; or;

(b) Limited quantities as indicated in column (7a) of the Dangerous Goods List of Chapter 3.2, provided that the net quantity per inner packaging does not exceed 250 ml or 250 g.

Components shall not react dangerously (see 4.1.1.6). The total quantity of dangerous goods in any one kit shall not exceed either 1 *l* or 1 kg.

For the purposes of completion of the dangerous goods transport document as set out in 5.4.1.4.1, the packing group shown on the document shall be the most stringent packing group assigned to any individual substance in the kit. Where the kit contains only dangerous goods to which no packing group is assigned, no packing group need be indicated on the dangerous goods transport document.

Kits which are carried on board vehicles for first-aid or operating purposes are not subject to these Regulations.

Chemical kits and first aid kits containing dangerous goods in inner packagings which do not exceed the quantity limits for limited quantities applicable to individual substances as specified in Column 7a of the Dangerous Goods List of Chapter 3.2 may be transported in accordance with Chapter 3.4.

252 Provided the ammonium nitrate remains in solution under all conditions of transport, aqueous solutions of ammonium nitrate, with not more than 0.2 % combustible material, in a concentration not exceeding 80 %, are not subject to these Regulations.

266 This substance, when containing less alcohol, water or phlegmatizer than specified, shall not be transported unless specifically authorized by the competent authority.

267 Any explosives, blasting, type C containing chlorates shall be segregated from explosives containing ammonium nitrate or other ammonium salts.

270 Aqueous solutions of Division 5.1 inorganic solid nitrate substances are considered as not meeting the criteria of Division 5.1 if the concentration of the substances in solution at the minimum temperature encountered in transport is not greater than 80 % of the saturation limit.

271 Lactose or glucose or similar materials, may be used as a phlegmatizer provided that the substance contains not less than 90 %, by mass, of phlegmatizer. The competent authority may authorize these mixtures to be classified in Division 4.1 on the basis of a test series 6(c) of Section 16 of Part I of the *Manual of Tests and Criteria* on at least three packages as prepared for transport. Mixtures containing at least 98 %, by mass, of phlegmatizer are not subject to these Regulations. Packages containing mixtures with not less than 90 %, by mass, of phlegmatizer need not bear a TOXIC subsidiary hazard label.

272 This substance shall not be transported under the provisions of Division 4.1 unless specifically authorized by the competent authority (see UN 0143 or UN 0150 as appropriate).

273 Maneb and maneb preparations stabilized against self-heating need not be classified in Division 4.2 when it can be demonstrated by testing that a cubic volume of 1 m^3 of substance does not self-ignite and that the temperature at the centre of the sample does not exceed 200 °C, when the sample is maintained at a temperature of not less than 75 °C ± 2 °C for a period of 24 hours.

274 For the purposes of documentation and package marking, the proper shipping name shall be supplemented with the technical name (see 3.1.2.8).

For UN 3077 and UN 3082 only, the technical name may be a name shown in capital letters in column 2 of the Dangerous Goods List, provided that this name does not include “N.O.S.” and that special provision 274 is not assigned. The name which most appropriately describes the substance or mixture shall be used, e.g.:

UN 3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (PAINT)

UN 3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (PERFUMERY PRODUCTS)

276 This includes any substance which is not covered by any of the other classes but which has narcotic, noxious or other properties such that, in the event of spillage or leakage on an aircraft, annoyance or discomfort could be caused to crew members so as to prevent the correct performance of assigned duties.

277 For aerosols or receptacles containing toxic substances the limited quantity value is 120 ml. For all other aerosols or receptacles the limited quantity value is 1 000 ml.

278 These substances shall not be classified and transported unless authorized by the competent authority on the basis of results from Series 2 tests and a Series 6(c) test of Part I of the *Manual of Tests and Criteria* on packages as prepared for transport (see 2.1.3.1). The competent authority shall assign the packing group on the basis of the Chapter 2.3 criteria and the package type used for the Series 6(c) test.

279 The substance is assigned to this classification or packing group based on human experience rather than the strict application of classification criteria set out in these regulations.

280 This entry applies to safety devices for vehicles, vessels or aircraft, e.g. air bag inflators, air bag modules, seat-belt pretensioners, and pyromechanical devices, which contain dangerous goods of Class 1 or of other classes, when transported as component parts and if these articles as presented for transport have been tested in accordance with test series 6(c) of Part 1 of the Manual of Tests and Criteria, with no explosion of the device, no fragmentation of device casing or pressure receptacle, and no projection hazard nor thermal effect which would significantly hinder fire-fighting or emergency response efforts in the immediate vicinity. This entry does not apply to life saving appliances described in special provision 296 (UN Nos. 2990 and 3072).

281 The transport by sea of hay, straw or bhusa, wet, damp or contaminated with oil shall be prohibited. Transport by other modes is also prohibited except with special authorization by the competent authorities.

Hay, straw and bhusa, when not wet, damp or contaminated with oil, are subject to these Regulations only when transported by sea.

283 Articles, containing gas, intended to function as shock absorbers, including impact energy-absorbing devices, or pneumatic springs are not subject to these Regulations provided:

(a) Each article has a gas space capacity not exceeding 1.6 litres and a charge pressure not exceeding 280 bar where the product of the capacity (litres) and charge pressure (bars) does not exceed 80 (i.e. 0.5 litre gas space and 160 bar charge pressure, 1 litre gas space and 80 bar charge pressure, 1.6 litre gas space and 50 bar charge pressure, 0.28 litre gas space and 280 bar charge pressure);

(b) Each article has a minimum burst pressure of 4 times the charge pressure at 20°C for products not exceeding 0.5 litre gas space capacity and 5 times charge pressure for products greater than 0.5 litre gas space capacity;

(c) Each article is manufactured from material which will not fragment upon rupture;

(d) Each article is manufactured in accordance with a quality assurance standard acceptable to the competent authority; and

(e) The design type has been subjected to a fire test demonstrating that pressure in the article is relieved by means of a fire degradable seal or other pressure relief device, such that the article will not fragment and that the article does not rocket.

284 An oxygen generator, chemical, containing oxidizing substances shall meet the following conditions:

(a) The generator when containing an explosive actuating device shall only be transported under this entry when excluded from Class 1 in accordance with 2.1.1.1 (b) of these Regulations;

(b) The generator, without its packaging, shall be capable of withstanding a 1.8 m drop test onto a rigid, non-resilient, flat and horizontal surface, in the position

most likely to cause damage, without loss of its contents and without actuation; and

(c) When a generator is equipped with an actuating device, it shall have at least two positive means of preventing unintentional actuation.

286 Nitrocellulose membrane filters covered by this entry, each with a mass not exceeding 0.5 g, are not subject to these Regulations when contained individually in an article or a sealed packet.

288 These substances shall not be classified and transported unless authorized by the competent authority on the basis of results from Series 2 tests and a Series 6(c) test of the *Manual of Tests and Criteria* on packages as prepared for transport (see 2.1.3.1).

289 Safety devices, electrically initiated and safety devices, pyrotechnic installed in vehicles, vessels or aircraft or in completed components such as steering columns, door panels, seats, etc. are not subject to these Regulations.

290 When this radioactive material meets the definitions and criteria of other classes or divisions as defined in Part 2, it shall be classified in accordance with the following:

(a) Where the substance meets the criteria for dangerous goods in excepted quantities as set out in Chapter 3.5, the packagings shall be in accordance with 3.5.2 and meet the testing requirements of 3.5.3. All other requirements applicable to radioactive material, excepted packages as set out in 1.5.1.5 shall apply without reference to the other class or division;

(b) Where the quantity exceeds the limits specified in 3.5.1.2 the substance shall be classified in accordance with the predominant subsidiary hazard. The dangerous goods transport document shall describe the substance with the UN number and proper shipping name applicable to the other class supplemented with the name applicable to the radioactive excepted package according to Column 2 in the Dangerous Goods List of Chapter 3.2, and the substance shall be transported in accordance with the provisions applicable to that UN number. An example of the information shown on the dangerous goods transport document is:

UN 1993, Flammable liquid, n.o.s. (ethanol and toluene mixture), Radioactive material, excepted package – limited quantity of material, Class 3, PG II.

In addition, the requirements of 2.7.2.4.1 shall apply.

(c) The provisions of Chapter 3.4 for the transport of dangerous goods packed in limited quantities shall not apply to substances classified in accordance with sub-paragraph (b);

(d) When the substance meets a special provision that exempts this substance from all dangerous goods provisions of the other classes it shall be classified in accordance with the applicable UN number of class 7 and all requirements specified in 1.5.1.5 shall apply.

291 Flammable liquefied gases shall be contained within refrigerating machine components. These components shall be designed and tested to at least three times the working pressure of the machinery. The refrigerating machines shall be designed and constructed to contain the liquefied gas and preclude the risk of bursting or cracking of the pressure retaining components during normal conditions of transport. Refrigerating machines and refrigerating-machine components are considered not subject to these Regulations if they contain less than 12 kg of gas.

292 *Deleted.*

293 The following definitions apply to matches:

(a) Fusee matches are matches the heads of which are prepared with a friction-sensitive igniter composition and a pyrotechnic composition which burns with little or no flame, but with intense heat;

(b) Safety matches are matches that combined with or attached to the box, book or card that can be ignited by friction only on a prepared surface;

(c) Strike anywhere matches are matches that can be ignited by friction on a solid surface;

(d) Wax Vesta matches are matches that can be ignited by friction either on a prepared surface or on a solid surface.

294 Safety matches and wax "Vesta" matches in outer packagings not exceeding 25 kg net mass are not subject to any other requirement (except marking) of these Regulations when packaged in accordance with packing instruction P407.

295 Batteries need not be individually marked and labelled if the pallet bears the appropriate mark and label.

296 These entries apply for life-saving appliances such as life rafts, personal flotation devices and self-inflating slides. UN 2990 applies for self-inflating appliances and UN 3072 applies for life-saving appliances that are not self-inflating. Life-saving appliances may contain:

(a) Signal devices (Class 1) which may include smoke and illumination signal flares packed in packagings that prevent them from being inadvertently activated;

(b) For UN 2990 only, cartridges, power device of Division 1.4, compatibility group S, may be contained for purposes of the self-inflating mechanism and provided that the quantity of explosives per appliance does not exceed 3.2 g;

(c) Division 2.2 compressed or liquefied gases;

(d) Electric storage batteries (Class 8) and lithium batteries (Class 9);

(e) First aid kits or repair kits containing small quantities of dangerous goods (e.g.: Class 3, Division 4.1, Division 5.2, Class 8 or Class 9 substances); or

(f) "Strike anywhere" matches packed in packagings that prevent them from being inadvertently activated.

Life-saving appliances packed in strong rigid outer packagings with a total maximum gross mass of 40 kg, containing no dangerous goods other than Division 2.2 compressed or liquefied gases with no subsidiary risk in receptacles with a capacity not exceeding 120 ml, installed solely for the purpose of the activation of the appliance, are not subject to these Regulations.

297 *Deleted.*

299 Consignments of COTTON, DRY having a density not less than 360 kg/m^3 according to ISO 8115:1986 "Cotton bales – Dimensions and density" are not subject to these Regulations when transported in closed cargo transport units.

300 Fish meal, fish scrap and krill meal shall not be transported if the temperature at the time of loading exceeds 35 °C or 5 °C above the ambient temperature whichever is higher.

301 This entry only applies to articles such as machinery, apparatus or devices containing dangerous goods as a residue or an integral element of the articles. It shall not be used for articles for which a proper shipping name already exists in the Dangerous Goods List of Chapter 3.2. Articles transported under this entry shall only contain dangerous goods which are authorized to be transported in accordance with the provisions of Chapter 3.4 (Limited quantities). The quantity of dangerous goods in articles shall not exceed the quantity specified in Column 7a of the Dangerous Goods List of Chapter 3.2 for each item of dangerous goods contained. If the articles contain more than one item of dangerous goods, the individual dangerous goods shall be enclosed to prevent them reacting dangerously with one another during transport (see 4.1.1.6). When it is required to ensure liquid dangerous goods remain in their intended orientation, orientation arrows shall be displayed on at least two opposite vertical sides with the arrows pointing in the correct direction in accordance with 5.2.1.7.1.

The competent authority may exempt from regulation articles which would otherwise be transported under this entry.

302 Fumigated cargo transport units containing no other dangerous goods are only subject to the provisions of 5.5.2.

303 Receptacles shall be assigned to the division and, if any, subsidiary hazard of the gas or mixture of gases contained therein determined in accordance with the provisions of Chapter 2.2.

304 This entry may only be used for the transport of non-activated batteries which contain dry potassium hydroxide and which are intended to be activated prior to use by the addition of an appropriate amount of water to the individual cells.

305 These substances are not subject to these Regulations when in concentrations of not more than 50 mg/kg.

306 This entry may only be used for substances that are too insensitive for acceptance into Class 1 when tested in accordance with test series 2 (see Manual of Tests and Criteria, Part I).

307 This entry may only be used for ammonium nitrate based fertilizers. They shall be classified in accordance with the procedure as set out in the Manual of Tests and Criteria, Part III, Section 39.

308 Stabilization of fishmeal shall be achieved to prevent spontaneous combustion by effective application of ethoxyquin, BHT (butylated hydroxytoluene) or tocopherols (also used in a blend with rosemary extract) at the time of production. The said application shall occur within twelve months prior to shipment. Fish scrap or fish meal shall contain at least 50 ppm (mg/kg) of ethoxyquin, 100 ppm (mg/kg) of BHT or 250 ppm (mg/kg) of tocopherol based antioxidant at the time of consignment.

309 This entry applies to non sensitized emulsions, suspensions and gels consisting primarily of a mixture of ammonium nitrate and fuel, intended to produce a Type E blasting explosive only after further processing prior to use.

The mixture for emulsions typically has the following composition: 60-85 % ammonium nitrate; 5-30 % water; 2-8 % fuel; 0.5-4 % emulsifier agent; 0-10 % soluble flame supressants and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate.

The mixture for suspensions and gels typically has the following composition: 60-85 % ammonium nitrate, 0-5 % sodium or potassium perchlorate, 0-17 % hexamine nitrate or monomethylamine nitrate, 5-30 % water, 2-15 % fuel, 0.5-4 % thickening agent, 0-10 % soluble flame suppressants, and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate.

Substances shall satisfy the criteria for classification as an ammonium nitrate emulsion, suspension or gel, intermediate for blasting explosives (ANE) of test series 8 of the *Manual of Tests and Criteria*, Part I, Section 18 and be approved by the competent authority.

310 The testing requirements in the Manual of Tests and Criteria, part III sub-section 38.3 do not apply to production runs, consisting of not more than 100 cells or batteries, or to pre-production prototypes of cells or batteries when these prototypes are transported for testing when packaged in accordance with packing instruction P910 of 4.1.4.1 or LP905 of 4.1.4.3, as applicable.

The transport document shall include the following statement: "Transport in accordance with special provision 310".

Damaged or defective cells, batteries, or cells and batteries contained in equipment shall be transported in accordance with special provision 376.

Cells, batteries or cells and batteries contained in equipment transported for disposal or recycling may be packaged in accordance with special provision 377 and packing instruction P909 of 4.1.4.1.

311 Substances shall not be transported under this entry unless approved by the competent authority on the basis of the results of appropriate tests according to Part I of the *Manual of Tests and Criteria*. Packaging shall ensure that the percentage of diluent does not fall below that stated in the competent authority approval, at any time during transport.

312 *Deleted.*

313 *Deleted.*

314 (a) These substances are liable to exothermic decomposition at elevated temperatures. Decomposition can be initiated by heat or by impurities (e.g. powdered metals (iron, manganese, cobalt, magnesium) and their compounds);

(b) During the course of transport, these substances shall be shaded from direct sunlight and all sources of heat and be placed in adequately ventilated areas.

315 This entry shall not be used for Division 6.1 substances which meet the inhalation toxicity criteria for packing group I described in 2.6.2.2.4.3.

316 This entry applies only to calcium hypochlorite, dry, when transported in non friable tablet form.

317 "Fissile-excepted" applies only to those fissile material and packages containing fissile material which are excepted in accordance with 2.7.2.3.5.

318 For the purposes of documentation, the proper shipping name shall be supplemented with the technical name (see 3.1.2.8). Technical names need not be shown on the package. When the infectious substances to be transported are unknown, but suspected of meeting the criteria for inclusion in category A and assignment to UN 2814 or UN 2900, the words "suspected category A infectious substance" shall be shown, in parentheses, following the proper shipping name on the transport document, but not on the outer packagings.

319 Substances packed and marked in accordance with packing instruction P650 are not subject to any other requirements in these Regulations.

320 *Deleted.*

321 These storage systems shall always be considered as containing hydrogen.

322 When transported in non-friable tablet form, these goods are assigned to packing group III.

323 *Deleted.*

324 This substance needs to be stabilized when in concentrations of not more than 99 %.

325 In the case of non-fissile or fissile excepted uranium hexafluoride, the material shall be classified under UN 2978.

326 In the case of fissile uranium hexafluoride, the material shall be classified under UN 2977.

327 Waste aerosols and waste gas cartridges consigned in accordance with 5.4.1.4.3 (c) may be transported under UN 1950 or UN 2037, as appropriate, for the purposes of reprocessing or disposal. They need not be protected against movement and inadvertent discharge provided that measures to prevent dangerous build up of pressure and dangerous atmospheres are addressed. Waste aerosols, other than those leaking or severely deformed, shall be packed in accordance with packing instruction P207 and special provision PP87, or packing instruction LP200 and special packing provision L2. Waste gas cartridges, other than those leaking or severely deformed, shall be packed in accordance with packing instruction P003 and special packing provisions PP17 and PP96, or packing instruction LP200 and special packing provision L2. Leaking or severely deformed aerosols and gas cartridges shall be transported in salvage pressure receptacles or salvage packagings provided appropriate measures are taken to ensure there is no dangerous build up of pressure. Waste aerosols and waste gas cartridges shall not be transported in closed freight containers.

Waste gas cartridges that were filled with gases of Division 2.2 and have been pierced are not subject to these Regulations.

328 This entry applies to fuel cell cartridges including when contained in equipment or packed with equipment. Fuel cell cartridges installed in or integral to a fuel cell system are regarded as contained in equipment. Fuel cell cartridge means an article that stores fuel for discharge into the fuel cell through a valve(s) that controls the discharge of fuel into the fuel cell. Fuel cell cartridges, including when contained in equipment, shall be designed and constructed to prevent fuel leakage under normal conditions of transport.

Fuel cell cartridge design types using liquids as fuels shall pass an internal pressure test at a pressure of 100 kPa (gauge) without leakage.

Except for fuel cell cartridges containing hydrogen in metal hydride which shall be in compliance with special provision 339, each fuel cell cartridge design type shall be shown to pass a 1.2 meter drop test onto an unyielding surface in the orientation most likely to result in failure of the containment system with no loss of contents.

When lithium metal or lithium ion batteries are contained in the fuel cell system, the consignment shall be consigned under this entry and under the appropriate entries for UN 3091 LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or UN 3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT.

329 *Deleted.*

330 *Deleted.*

331 For environmentally hazardous substances meeting the criteria of 2.9.3, an additional mark as specified in 5.2.1.6 and 5.3.2.3 shall be applied.

332 Magnesium nitrate hexahydrate is not subject to these Regulations.

333 Ethanol and gasoline, motor spirit or petrol mixtures for use in spark-ignition engines (e.g. in automobiles, stationary engines and other engines) shall be assigned to this entry regardless of variations in volatility.

334 A fuel cell cartridge may contain an activator provided it is fitted with two independent means of preventing unintended mixing with the fuel during transport.

335 Mixtures of solids which are not subject to these Regulations and environmentally hazardous liquids or solids shall be classified as UN 3077 and may be transported under this entry, provided there is no free liquid visible at the time the substance is loaded or at the time the packaging or cargo transport unit is closed. Each cargo transport unit shall be leakproof when used as a bulk container. If free liquid is visible at the time the mixture is loaded or at the time the packaging or cargo transport unit is closed, the mixture shall be classified as UN 3082. Sealed packets and articles containing less than 10 ml of an environmentally hazardous liquid, absorbed into a solid material but with no free liquid in the packet or article, or containing less than 10 g of an environmentally hazardous solid, are not subject to these Regulations.

336 A single package of non-combustible solid LSA-II or LSA-III material, if carried by air, shall not contain an activity greater than 3 000 A_2.

337 Type B(U) and Type B(M) packages, if transported by air, shall not contain activities greater than the following:

(a) For low dispersible radioactive material: as authorized for the package design as specified in the certificate of approval;

(b) For special form radioactive material: 3 000 A_1 or 100 000 A_2, whichever is the lower; or

(c) For all other radioactive material: 3 000 A_2.

338 Each fuel cell cartridge transported under this entry and designed to contain a liquefied flammable gas shall:

(a) Be capable of withstanding, without leakage or bursting, a pressure of at least two times the equilibrium pressure of the contents at 55 ºC;

(b) Not contain more than 200 ml liquefied flammable gas, the vapour pressure of which shall not exceed 1 000 kPa at 55 °C; and

(c) Pass the hot water bath test prescribed in 6.2.4.1.

339 Fuel cell cartridges containing hydrogen in a metal hydride transported under this entry shall have a water capacity less than or equal to 120 ml.

The pressure in the fuel cell cartridge shall not exceed 5 MPa at 55 °C. The design type shall withstand, without leaking or bursting, a pressure of two times the design pressure of the cartridge at 55 °C or 200 kPa more than the design pressure of the cartridge at 55 °C, whichever is greater. The pressure at which this test is conducted is referred to in the Drop Test and the Hydrogen Cycling Test as the “minimum shell burst pressure”.

Fuel cell cartridges shall be filled in accordance with procedures provided by the manufacturer. The manufacturer shall provide the following information with each fuel cell cartridge:

(a) Inspection procedures to be carried out before initial filling and before refilling of the fuel cell cartridge;

(b) Safety precautions and potential hazards to be aware of;

(c) Method for determining when the rated capacity has been achieved;

(d) Minimum and maximum pressure range;

(e) Minimum and maximum temperature range; and

(f) Any other requirements to be met for initial filling and refilling including the type of equipment to be used for initial filling and refilling.

The fuel cell cartridges shall be designed and constructed to prevent fuel leakage under normal conditions of transport. Each cartridge design type, including cartridges integral to a fuel cell, shall be subjected to and shall pass the following tests:

Drop test

A 1.8 metre drop test onto an unyielding surface in four different orientations:

(a) Vertically, on the end containing the shut-off valve assembly;

(b) Vertically, on the end opposite to the shut-off valve assembly;

(c) Horizontally, onto a steel apex with a diameter of 38 mm, with the steel apex in the upward position; and

(d) At a 45° angle on the end containing the shut-off valve assembly.

There shall be no leakage, determined by using a soap bubble solution or other equivalent means on all possible leak locations, when the cartridge is charged to its rated charging pressure. The fuel cell cartridge shall then be hydrostatically pressurized to destruction. The recorded burst pressure shall exceed 85 % of the minimum shell burst pressure.

Fire test

A fuel cell cartridge filled to rated capacity with hydrogen shall be subjected to a fire engulfment test. The cartridge design, which may include a vent feature integral to it, is deemed to have passed the fire test if :

(a) The internal pressure vents to zero gauge pressure without rupture of the cartridge; or

(b) The cartridge withstands the fire for a minimum of 20 minutes without rupture.

Hydrogen cycling test

This test is intended to ensure that fuel cell cartridge design stress limits are not exceeded during use.

The fuel cell cartridge shall be cycled from not more than 5 % rated hydrogen capacity to not less than 95 % rated hydrogen capacity and back to not more than 5 % rated hydrogen capacity. The rated charging pressure shall be used for charging and temperatures shall be held within the operating temperature range. The cycling shall be continued for at least 100 cycles.

Following the cycling test, the fuel cell cartridge shall be charged and the water volume displaced by the cartridge shall be measured. The cartridge design is deemed to have

passed the hydrogen cycling test if the water volume displaced by the cycled cartridge does not exceed the water volume displaced by an uncycled cartridge charged to 95 % rated capacity and pressurized to 75 % of its minimum shell burst pressure.

Production leak test

Each fuel cell cartridge shall be tested for leaks at 15 °C ± 5 °C, while pressurized to its rated charging pressure. There shall be no leakage, determined by using a soap bubble solution or other equivalent means on all possible leak locations.

Each fuel cell cartridge shall be permanently marked with the following information:

(a) The rated charging pressure in megapascals (MPa);

(b) The manufacturer's serial number of the fuel cell cartridges or unique identification number; and

(c) The date of expiry based on the maximum service life (year in four digits; month in two digits).

340 Chemical kits, first aid kits and polyester resin kits containing dangerous substances in inner packagings which do not exceed the quantity limits for excepted quantities applicable to individual substances as specified in column 7b of the Dangerous Goods List of Chapter 3.2 may be transported in accordance with Chapter 3.5. Division 5.2 substances, although not individually authorized as excepted quantities in the Dangerous Goods List of Chapter 3.2, are authorized in such kits and are assigned Code E2 (see 3.5.1.2).

341 Bulk transport of infectious substances in BK1 and BK2 bulk containers is only permitted for infectious substances contained in animal material as defined in 1.2.1 (see 4.3.2.4.1).

342 Glass inner receptacles (such as ampoules or capsules) intended only for use in sterilization devices, when containing less than 30 ml of ethylene oxide per inner packaging with not more than 300 ml per outer packaging, may be transported in accordance with the provisions in Chapter 3.5, irrespective of the indication of “E0” in column 7b of the Dangerous Goods List provided that:

(a) After filling, each glass inner receptacle has been determined to be leak-tight by placing the glass inner receptacle in a hot water bath at a temperature, and for a period of time, sufficient to ensure that an internal pressure equal to the vapour pressure of ethylene oxide at 55 °C is achieved. Any glass inner receptacle showing evidence of leakage, distortion or other defect under this test shall not be transported under the terms of this special provision;

(b) In addition to the packaging required by 3.5.2, each glass inner receptacle is placed in a sealed plastics bag compatible with ethylene oxide and capable of containing the contents in the event of breakage or leakage of the glass inner receptacle; and

(c) Each glass inner receptacle is protected by a means of preventing puncture of the plastics bag (e.g. sleeves or cushioning) in the event of damage to the packaging (e.g. by crushing).

343 This entry applies to crude oil containing hydrogen sulphide in sufficient concentration that vapours evolved from the crude oil can present an inhalation hazard. The packing group assigned shall be determined by the flammability hazard and inhalation hazard, in accordance with the degree of danger presented.

344 The provisions of 6.2.4 shall be met.

345 This gas contained in open cryogenic receptacles with a maximum capacity of 1 litre constructed with glass double walls having the space between the inner and outer wall evacuated (vacuum insulated) is not subject to these Regulations provided each receptacle is transported in an outer packaging with suitable cushioning or absorbent materials to protect it from impact damage.

346 Open cryogenic receptacles conforming to the requirements of packing instruction P203 and containing no dangerous goods except for UN 1977, nitrogen, refrigerated liquid, which is fully absorbed in a porous material are not subject to any other requirements of these Regulations.

347 This entry shall only be used if the results of test series 6 (d) of Part I of the Manual of Tests and Criteria have demonstrated that any hazardous effects arising from functioning are confined within the package.

348 Batteries manufactured after 31 December 2011 shall be marked with the Watt-hour rating on the outside case.

349 Mixtures of a hypochlorite with an ammonium salt are not to be accepted for transport. UN No. 1791 hypochlorite solution is a substance of Class 8.

350 Ammonium bromate and its aqueous solutions and mixtures of a bromate with an ammonium salt are not to be accepted for transport.

351 Ammonium chlorate and its aqueous solutions and mixtures of a chlorate with an ammonium salt are not to be accepted for transport.

352 Ammonium chlorite and its aqueous solutions and mixtures of a chlorite with an ammonium salt are not to be accepted for transport.

353 Ammonium permanganate and its aqueous solutions and mixtures of a permanganate with an ammonium salt are not to be accepted for transport.

354 This substance is toxic by inhalation.

355 Oxygen cylinders for emergency use transported under this entry may include installed actuating cartridges (cartridges, power device of Division 1.4, Compatibility Group C or S), without changing the classification of Division 2.2 provided the total quantity of deflagrating (propellant) explosives does not exceed 3.2 g per oxygen cylinder. The cylinders with the installed actuating cartridges as prepared for transport shall have an effective means of preventing inadvertent activation.

356 Metal hydride storage systems installed in vehicles, vessels, machinery, engines or aircraft or in completed components or intended to be installed in vehicles, vessels, machinery, engines or aircraft shall be approved by the competent authority before acceptance for transport. The transport document shall include an indication that the package was approved by the competent authority or a copy of the competent authority approval shall accompany each consignment.

357 Petroleum crude oil containing hydrogen sulphide in sufficient concentration that vapours evolved from the crude oil can present an inhalation hazard shall be consigned under the entry UN 3494 PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC.

358 Nitroglycerin solution in alcohol with more than 1 % but not more than 5 % nitroglycerin may be classified in Class 3 and assigned to UN 3064 provided all the requirements of packing instruction P300 are complied with.

359 Nitroglycerin solution in alcohol with more than 1 % but not more than 5 % nitroglycerin shall be classified in Class 1 and assigned to UN 0144 if not all the requirements of packing instruction P300 are complied with.

360 Vehicles only powered by lithium metal batteries or lithium ion batteries shall be assigned to the entry UN 3171 BATTERY-POWERED VEHICLE. Lithium batteries installed in cargo transport units, designed only to provide power external to the transport unit shall be assigned to entry UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT.

361 This entry applies to electric double layer capacitors with an energy storage capacity greater than 0.3 Wh. Capacitors with an energy storage capacity of 0.3 Wh or less are not subject to these Regulations. Energy storage capacity means the energy held by a capacitor, as calculated using the nominal voltage and capacitance. All capacitors to which this entry applies, including capacitors containing an electrolyte that does not meet the classification criteria of any class or division of dangerous goods, shall meet the following conditions:

(a) Capacitors not installed in equipment shall be transported in an uncharged state. Capacitors installed in equipment shall be transported either in an uncharged state or protected against short circuit;

(b) Each capacitor shall be protected against a potential short circuit hazard in transport as follows:

(i) When a capacitor's energy storage capacity is less than or equal to 10Wh or when the energy storage capacity of each capacitor in a module is less than or equal to 10 Wh , the capacitor or module shall be protected against short circuit or be fitted with a metal strap connecting the terminals; and

(ii) When the energy storage capacity of a capacitor or a capacitor in a module is more than 10 Wh, the capacitor or module shall be fitted with a metal strap connecting the terminals;

(c) Capacitors containing dangerous goods shall be designed to withstand a 95 kPa pressure differential;

(d) Capacitors shall be designed and constructed to safely relieve pressure that may build up in use, through a vent or a weak point in the capacitor casing. Any liquid which is released upon venting shall be contained by the packaging or by the equipment in which a capacitor is installed; and

(e) Capacitors manufactured after 31 December 2013, shall be marked with the energy storage capacity in Wh.

Capacitors containing an electrolyte not meeting the classification criteria of any class or division of dangerous goods, including when installed in equipment, are not subject to other provisions of these Regulations.

Capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods, with an energy storage capacity of 10 Wh or less are not subject to other provisions of these Regulations when they are capable of withstanding a 1.2 metre drop test unpackaged on an unyielding surface without loss of contents.

Capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods that are not installed in equipment and with an energy storage capacity of more than 10 Wh are subject to these Regulations.

Capacitors installed in equipment and containing an electrolyte meeting the classification criteria of any class or division of dangerous goods, are not subject to other provisions of these Regulations provided the equipment is packaged in a strong outer packaging constructed of suitable material, and of adequate strength and design in relation to the packaging's intended use and in such a manner as to prevent accidental functioning of capacitors during transport. Large robust equipment containing

capacitors may be offered for transport unpackaged or on pallets when capacitors are afforded equivalent protection by the equipment in which they are contained.

NOTE: *Capacitors which by design maintain a terminal voltage (e.g. asymmetrical capacitors) do not belong to this entry.*

362 This entry applies to liquids, pastes or powders, pressurized with a propellant which meets the definition of a gas in 2.2.1.1 and 2.2.1.2 (a) or (b).

NOTE: *A chemical under pressure in an aerosol dispenser shall be transported under UN 1950.*

The following provisions shall apply:

(a) The chemical under pressure shall be classified based on the hazard characteristics of the components in the different states:

- The propellant;
- The liquid; or
- The solid.

If one of these components, which can be a pure substance or a mixture, needs to be classified as flammable, the chemical under pressure shall be classified as flammable in Division 2.1. Flammable components are flammable liquids and liquid mixtures, flammable solids and solid mixtures or flammable gases and gas mixtures meeting the following criteria:

(i) A flammable liquid is a liquid having a flashpoint of not more than 93 °C;

(ii) A flammable solid is a solid which meets the criteria in 2.4.2.2 of these Regulations;

(iii) A flammable gas is a gas which meets the criteria in 2.2.2.1 of these Regulations;

(b) Gases of Division 2.3 and gases with a subsidiary hazard of 5.1 shall not be used as a propellant in a chemical under pressure;

(c) Where the liquid or solid components are classified as dangerous goods of Division 6.1, packing groups II or III, or Class 8, packing groups II or III, the chemical under pressure shall be assigned a subsidiary hazard of Division 6.1 or Class 8 and the appropriate UN number shall be assigned. Components classified in Division 6.1, packing group I, or Class 8, packing group I, shall not be used for transport under this proper shipping name;

(d) In addition, chemicals under pressure with components meeting the properties of : Class 1, explosives; Class 3, liquid desensitized explosives; Division 4.1, self-reactive substances and solid desensitized explosives; Division 4.2, substances liable to spontaneous combustion; Division 4.3, substances which, in contact with water, emit flammable gases; Division 5.1 oxidizing substances; Division 5.2, organic peroxides; Division 6.2, Infectious substances or Class 7, Radioactive material, shall not be used for transport under this proper shipping name;

(e) Substances to which PP86 or TP7 are assigned in Column 9 and Column 11 of the Dangerous Goods List in Chapter 3.2 and therefore require air to be eliminated from the vapour space, shall not be used for transport under this UN number but shall be transported under their respective UN numbers as listed in the Dangerous Goods List of Chapter 3.2.

363 This entry may only be used when the conditions of this special provision are met. No other requirements of these Regulations apply.

(a) This entry applies to engines or machinery, powered by fuels classified as dangerous goods via internal combustion systems or fuel cells (e.g. combustion engines, generators, compressors, turbines, heating units, etc.), except those which are assigned under UN No. 3166 or UN No. 3363.

(b) Engines or machinery which are empty of liquid or gaseous fuels and which do not contain other dangerous goods, are not subject to these Regulations.

NOTE 1*: An engine or machinery is considered to be empty of liquid fuel when the liquid fuel tank has been drained and the engine or machinery cannot be operated due to a lack of fuel. Engine or machinery components such as fuel lines, fuel filters and injectors do not need to be cleaned, drained or purged to be considered empty of liquid fuels. In addition, the liquid fuel tank does not need to be cleaned or purged.*

NOTE 2*: An engine or machinery is considered to be empty of gaseous fuels when the gaseous fuel tanks are empty of liquid (for liquefied gases), the positive pressure in the tanks does not exceed 2 bar and the fuel shut-off or isolation valve is closed and secured.*

(c) Engines and machinery containing fuels meeting the classification criteria of Class 3, shall be consigned under the entries UN No. 3528 ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or UN No. 3528 ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or UN No. 3528 MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or UN No. 3528 MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate.

(d) Engines and machinery containing fuels meeting the classification criteria of Division 2.1, shall be consigned under the entries UN No. 3529 ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or UN No. 3529 ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or UN No. 3529 MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or UN No. 3529 MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED, as appropriate.

Engines and machinery powered by both a flammable gas and a flammable liquid shall be consigned under the appropriate UN No. 3529 entry.

(e) Engines and machinery containing liquid fuels meeting the classification criteria of 2.9.3 for environmentally hazardous substances and not meeting the classification criteria of any other Class or Division, shall be consigned under the entries UN No. 3530 ENGINE, INTERNAL COMBUSTION or UN No. 3530 MACHINERY, INTERNAL COMBUSTION, as appropriate.

(f) Engines or machinery may contain other dangerous goods than fuels (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for their functioning or safe operation without being subject to any additional requirements for these other dangerous goods, unless otherwise specified in these Regulations. However, lithium batteries shall meet the provisions of 2.9.4, except that 2.9.4 (a) does not apply when pre-production prototype batteries or batteries of a small production run, consisting of not more than 100 batteries, are installed in machinery or engines.

Where a lithium battery installed in a machinery or an engine is damaged or defective, the machinery or engine shall be transported as defined by the competent authority.

(g) The engine or machinery, including the means of containment containing dangerous goods, shall be in compliance with the construction requirements specified by the competent authority;

(h) Any valves or openings (e.g. venting devices) shall be closed during transport;

(i) The engines or machinery shall be oriented to prevent inadvertent leakage of dangerous goods and secured by means capable of restraining the engines or machinery to prevent any movement during transport which would change the orientation or cause them to be damaged;

(j) For UN No. 3528 and UN No. 3530:

Where the engine or machinery contains more than 60 *l* of liquid fuel and has a capacity of not more than 450 *l*, the labelling requirements of 5.2.2 shall apply.

Where the engine or machinery contains more than 60 *l* of liquid fuel and has a capacity of more than 450 *l* but not more than 3 000 *l*, it shall be labelled on two opposing sides in accordance with 5.2.2.

Where the engine or machinery contains more than 60 *l* of liquid fuel and has a capacity of more than 3 000 *l*, it shall be placarded on two opposing sides. Placards shall correspond to the class indicated in Column 3 of the Dangerous Goods List of Chapter 3.2 and shall conform to the specifications given in 5.3.1.2.1;

(k) For UN No. 3529:

Where the fuel tank of the engine or machinery has a water capacity of not more than 450 *l*, the labelling requirements of 5.2.2 shall apply.

Where the fuel tank of the engine or machinery has a water capacity of more than 450 *l* but not more than 1 000 *l*, it shall be labelled on two opposing sides in accordance with 5.2.2.

Where the fuel tank of the engine or machinery has a water capacity of more than 1 000 *l*, it shall be placarded on two opposing sides. Placards shall correspond to the class indicated in Column 3 of the Dangerous Goods List in Chapter 3.2 and shall conform to the specifications given in 5.3.1.2.1;

(l) A transport document in accordance with 5.4 is required, except for UN No. 3528 and UN No. 3530, where a transport document is only required when the engine or machinery contains more than 60 *l* of liquid fuels. This transport document shall contain the following additional statement “Transport in accordance with special provision 363”;

(m) The requirements specified in packing instruction P005 of 4.1.4.1 shall be met.

364 This article may only be transported under the provisions of Chapter 3.4 if, as presented for transport, the package is capable of passing the test in accordance with test series 6 (d) of Part I of the *Manual of Tests and Criteria* as determined by the competent authority.

365 For manufactured instruments and articles containing mercury, see UN 3506.

366 For land and sea transport, manufactured instruments and articles containing not more than 1 kg of mercury are not subject to these Regulations. For air transport, articles containing not more than 15 g of mercury are not subject to these Regulations.

367 For the purposes of documentation and package marking:

The proper shipping name “Paint related material” may be used for consignments of packages containing “Paint” and “Paint related material” in the same package;

The proper shipping name “Paint related material, corrosive, flammable” may be used for consignments of packages containing “Paint, corrosive, flammable” and “Paint related material, corrosive, flammable” in the same package;

The proper shipping name “Paint related material, flammable, corrosive” may be used for consignments of packages containing “Paint, flammable, corrosive” and “Paint related material, flammable, corrosive” in the same package; and

The proper shipping name “Printing ink related material” may be used for consignments of packages containing “Printing Ink” and “Printing ink related material” in the same package.

368 In the case of non-fissile or fissile-excepted uranium hexafluoride, the material shall be classified under UN 3507 or UN 2978.

369 In accordance with 2.0.3.2, this radioactive material in an excepted package possessing toxic and corrosive properties is classified in Division 6.1 with radioactivity and corrosivity subsidiary hazards.

Uranium hexafluoride may be classified under this entry only if the conditions of 2.7.2.4.1.2, 2.7.2.4.1.5, 2.7.2.4.5.2 and, for fissile-excepted material, of 2.7.2.3.5 are met.

In addition to the provisions applicable to the transport of Division 6.1 substances with a corrosivity subsidiary hazard, the provisions of 5.1.3.2, 5.1.5.2.2, 5.1.5.4.1 (b), 7.1.8.5.1 to 7.1.8.5.4 and 7.1.8.6.1 shall apply.

No Class 7 label is required to be displayed.

370 This entry only applies to ammonium nitrate that meets one of the following criteria:

(a) Ammonium nitrate with more than 0.2 % combustible substances, including any organic substance calculated as carbon, to the exclusion of any added substance; or

(b) Ammonium nitrate with not more than 0.2 % combustible substances, including any organic substance calculated as carbon, to the exclusion of any added substance, that gives a positive result when tested in accordance with test series 2 (see Manual of Tests and Criteria, Part I). See also UN No. 1942.

This entry shall not be used for ammonium nitrate for which a proper shipping name already exists in the Dangerous Goods List of Chapter 3.2 including ammonium nitrate mixed with fuel oil (ANFO) or any of the commercial grades of ammonium nitrate.

371 (1) This entry also applies to articles, containing a small pressure receptacle with a release device. Such articles shall comply with the following requirements:

(a) The water capacity of the pressure receptacle shall not exceed 0.5 litres and the working pressure shall not exceed 25 bar at 15 °C;

(b) The minimum burst pressure of the pressure receptacle shall be at least four times the pressure of the gas at 15 °C;

(c) Each article shall be manufactured in such a way that unintentional firing or release is avoided under normal conditions of handling, packing, transport and use. This may be fulfilled by an additional locking device linked to the activator;

(d) Each article shall be manufactured in such a way as to prevent hazardous projections of the pressure receptacle or parts of the pressure receptacle;

(e) Each pressure receptacle shall be manufactured from material which will not fragment upon rupture;

(f) The design type of the article shall be subjected to a fire test. For this test, the provisions of paragraphs 16.6.1.2 except letter g, 16.6.1.3.1 to 16.6.1.3.6, 16.6.1.3.7 (b) and 16.6.1.3.8 of the Manual of Tests and Criteria shall be applied. It shall be demonstrated that the article relieves its pressure by means of a fire degradable seal or other pressure relief device, in such a way that the pressure receptacle will not fragment and that the article or fragments of the article do not rocket more than 10 metres;

(g) The design type of the article shall be subjected to the following test. A stimulating mechanism shall be used to initiate one article in the middle of the packaging. There shall be no hazardous effects outside the package such as disruption of the package, metal fragments or a receptacle which passes through the packaging.

(2) The manufacturer shall produce technical documentation of the design type, manufacture as well as the tests and their results. The manufacturer shall apply procedures to ensure that articles produced in series are made of good quality, conform to the design type and are able to meet the requirements in (1). The manufacturer shall provide such information to the competent authority on request.

372 This entry applies to asymmetric capacitors with an energy storage capacity greater than 0.3 Wh. Capacitors with an energy storage capacity of 0.3 Wh or less are not subject to these Regulations.

Energy storage capacity means the energy stored in a capacitor, as calculated according to the following equation,

$$Wh = 1/2C_N(U_R^2-U_L^2) \times (1/3600),$$

using the nominal capacitance (C_N), rated voltage (U_R) and rated lower limit voltage (U_L).

All asymmetric capacitors to which this entry applies shall meet the following conditions:

(a) Capacitors or modules shall be protected against short circuit;

(b) Capacitors shall be designed and constructed to safely relieve pressure that may build up in use, through a vent or a weak point in the capacitor casing. Any liquid which is released upon venting shall be contained by packaging or by equipment in which a capacitor is installed;

(c) Capacitors manufactured after 31 December 2015, shall be marked with the energy storage capacity in Wh.

(d) Capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods shall be designed to withstand a 95 kPa pressure differential;

Capacitors containing an electrolyte not meeting the classification criteria of any class or division of dangerous goods, including when configured in a module or when installed in equipment are not subject to other provisions of these Regulations.

Capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods, with an energy storage capacity of 20 Wh or less, including when configured in a module, are not subject to other provisions of these Regulations when the capacitors are capable of withstanding a 1.2 metre drop test unpackaged on an unyielding surface without loss of contents.

Capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods that are not installed in equipment and with an energy storage capacity of more than 20 Wh are subject to these Regulations.

Capacitors installed in equipment and containing an electrolyte meeting the classification criteria of any class or division of dangerous goods, are not subject to other provisions of these Regulations provided that the equipment is packaged in a strong outer packaging constructed of suitable material, and of adequate strength and design, in relation to the packaging's intended use and in such a manner as to prevent accidental functioning of capacitors during transport. Large robust equipment containing capacitors may be offered for transport unpackaged or on pallets when capacitors are afforded equivalent protection by the equipment in which they are contained.

***NOTE**: Notwithstanding the provisions of this special provision, nickel-carbon asymmetric capacitors containing Class 8 alkaline electrolytes shall be transported as UN 2795, BATTERIES, WET, FILLED WITH ALKALI, electric storage.*

373 Neutron radiation detectors containing non-pressurized boron trifluoride gas may be transported under this entry provided that the following conditions are met.

(a) Each radiation detector shall meet the following conditions.

(i) The pressure in each detector shall not exceed 105 kPa absolute at 20°C;

(ii) The amount of gas shall not exceed 13 g per detector;

(iii) Each detector shall be manufactured under a registered quality assurance programme;

***NOTE**: The application of ISO 9001:2008 may be considered acceptable for this purpose.*

(iv) Each neutron radiation detector shall be of welded metal construction with brazed metal to ceramic feed through assemblies. These detectors shall have a minimum burst pressure of 1800 kPa as demonstrated by design type qualification testing; and

(v) Each detector shall be tested to a 1×10^{-10} cm^3/s leaktightness standard before filling.

(b) Radiation detectors transported as individual components shall be transported as follows:

(i) Detectors shall be packed in a sealed intermediate plastics liner with sufficient absorbent or adsorbent material to absorb or adsorb the entire gas contents;

(ii) They shall be packed in strong outer packaging. The completed package shall be capable of withstanding a 1.8 m drop test without leakage of gas contents from detectors;

(iii) The total amount of gas from all detectors per outer packaging shall not exceed 52 g.

(c) Completed neutron radiation detection systems containing detectors meeting the conditions of paragraph (a) shall be transported as follows:

(i) The detectors shall be contained in a strong sealed outer casing;

(ii) The casing shall contain sufficient absorbent or adsorbent material to absorb or adsorb the entire gas contents;

(iii) The completed systems shall be packed in strong outer packagings capable of withstanding a 1.8 m drop test without leakage unless a system's outer casing affords equivalent protection.

Packing instruction P200 of 4.1.4.1 is not applicable.

The transport document shall include the following statement "Transport in accordance with special provision 373".

Neutron radiation detectors containing not more than 1 g of boron trifluoride, including those with solder glass joints, are not subject to these Regulations provided they meet the requirements in paragraph (a) and are packed in accordance with paragraph (b). Radiation detection systems containing such detectors are not subject to these Regulations provided they are packed in accordance with paragraph (c).

374 This entry may only be used, as authorized by the competent authority, for packagings, large packagings or intermediate bulk containers (IBC), or parts thereof, which have contained dangerous goods, other than radioactive material, which are transported for disposal, recycling or recovery of their material, other than reconditioning, repair, routine maintenance, remanufacturing or reuse, and which have been emptied to the extent that only residues of dangerous goods adhering to the packaging parts are present when they are handed over for transport.

375 These substances when transported in single or combination packagings containing a net quantity per single or inner packaging of 5 *l* or less for liquids or having a net mass per single or inner packaging of 5 kg or less for solids, are not subject to any other provisions of these Regulations provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

376 Lithium ion cells or batteries and lithium metal cells or batteries identified as being damaged or defective such that they do not conform to the type tested according to the applicable provisions of the Manual of Tests and Criteria shall comply with the requirements of this special provision.

For the purposes of this special provision, these may include, but are not limited to:

- Cells or batteries identified as being defective for safety reasons;
- Cells or batteries that have leaked or vented;
- Cells or batteries that cannot be diagnosed prior to transport; or
- Cells or batteries that have sustained physical or mechanical damage.

NOTE: *In assessing a cell or battery as damaged or defective, an assessment or evaluation shall be performed based on safety criteria from the cell, battery or product manufacturer or by a technical expert with knowledge of the cell's or battery's safety features. An assessment or evaluation may include, but is not limited to, the following criteria:*

(a) Acute hazard, such as gas, fire, or electrolyte leaking;

(b) The use or misuse of the cell or battery;

(c) Signs of physical damage, such as deformation to cell or battery casing, or colours on the casing;

(d) External and internal short circuit protection, such as voltage or isolation measures;

(e) The condition of the cell or battery safety features; or

(f) Damage to any internal safety components, such as the battery management system.

Cells and batteries shall be transported according to the provisions applicable to UN 3090, UN 3091, UN 3480 and UN 3481, except Special Provision 230 and as otherwise stated in this special provision.

Cells and batteries shall be packed in accordance with packing instructions P908 of 4.1.4.1 or LP904 of 4.1.4.3, as applicable.

Cells and batteries identified as damaged or defective and liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours under normal conditions of transport shall be packed and transported in accordance with packing instruction P911 of 4.1.4.1 or LP906 of 4.1.4.3, as applicable. Alternative packing and/or transport conditions may be authorized by the competent authority.

Packages shall be marked "DAMAGED/DEFECTIVE" in addition to the proper shipping name, as stated in 5.2.1.

The transport document shall include the following statement "Transport in accordance with special provision 376".

If applicable, a copy of the competent authority approval shall accompany the transport.

377 Lithium ion and lithium metal cells and batteries and equipment containing such cells and batteries transported for disposal or recycling, either packed together with or packed without non-lithium batteries, may be packaged in accordance with packing instruction P909 of 4.1.4.1.

These cells and batteries are not subject to the requirements of section 2.9.4. Additional exemptions may be provided under the conditions defined by modal transport regulations.

Packages shall be marked "LITHIUM BATTERIES FOR DISPOSAL" or "LITHIUM BATTERIES FOR RECYCLING".

Identified damaged or defective batteries shall be transported in accordance with special provision 376.

378 Radiation detectors containing this gas in non-refillable pressure receptacles not meeting the requirements of Chapter 6.2 and packing instruction P200 of 4.1.4.1 may be transported under this entry provided:

(a) The working pressure in each receptacle does not exceed 50 bar;

(b) The receptacle capacity does not exceed 12 litres;

(c) Each receptacle has a minimum burst pressure of at least 3 times the working pressure when a relief device is fitted and at least 4 times the working pressure when no relief device is fitted;

(d) Each receptacle is manufactured from material which will not fragment upon rupture;

(e) Each detector is manufactured under a registered quality assurance programme;

NOTE: *ISO 9001:2008 may be used for this purpose.*

(f) Detectors are transported in strong outer packagings. The complete package shall be capable of withstanding a 1.2 metre drop test without breakage of the detector or rupture of the outer packaging. Equipment that includes a detector shall be packed in a strong outer packaging unless the detector is afforded equivalent protection by the equipment in which it is contained; and

(g) The transport document includes the following statement "Transport in accordance with special provision 378".

Radiation detectors, including detectors in radiation detection systems, are not subject to any other requirements of these Regulations if the detectors meet the requirements in (a) to (f) above and the capacity of detector receptacles does not exceed 50 ml.

379 Anhydrous ammonia adsorbed or absorbed on a solid contained in ammonia dispensing systems or receptacles intended to form part of such systems are not subject to the other provisions of these Regulations if the following conditions are observed:

(a) The adsorption or absorption presents the following properties:

(i) The pressure at a temperature of 20 °C in the receptacle is less than 0.6 bar;

(ii) The pressure at a temperature of 35 °C in the receptacle is less than 1 bar;

(iii) The pressure at a temperature of 85 °C in the receptacle is less than 12 bar.

(b) The adsorbent or absorbent material shall not have dangerous properties listed in Classes 1 to 8;

(c) The maximum contents of a receptacle shall be 10 kg of ammonia; and

(d) Receptacles containing adsorbed or absorbed ammonia shall meet the following conditions:

(i) Receptacles shall be made of a material compatible with ammonia as specified in ISO 11114-1:2012 + A1:2017;

(ii) Receptacles and their means of closure shall be hermetically sealed and able to contain the generated ammonia;

(iii) Each receptacle shall be able to withstand the pressure generated at 85 °C with a volumetric expansion no greater than 0.1 %;

(iv) Each receptacle shall be fitted with a device that allows for gas evacuation once pressure exceeds 15 bar without violent rupture, explosion or projection; and

(v) Each receptacle shall be able to withstand a pressure of 20 bar without leakage when the pressure relief device is deactivated.

When transported in an ammonia dispenser, the receptacles shall be connected to the dispenser in such a way that the assembly is guaranteed to have the same strength as a single receptacle.

The properties of mechanical strength mentioned in this special provision shall be tested using a prototype of a receptacle and/or dispenser filled to nominal capacity, by increasing the temperature until the specified pressures are reached.

The test results shall be documented, shall be traceable and shall be communicated to the relevant authorities upon request.

380 *Deleted.*

381 Large packagings conforming to the packing group III performance level used in accordance with packing instruction LP02 of 4.1.4.3, as prescribed in the 18th revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations, may be used until 31 December 2022.

382 Polymeric beads may be made from polystyrene, poly (methyl methacrylate) or other polymeric material. When it can be demonstrated that no flammable vapour, resulting in a flammable atmosphere, is evolved according to test U1 (Test method for substances liable to evolve flammable vapours) of Part III, sub-section 38.4.4 of the Manual of Tests and Criteria, polymeric beads, expandable need not be classified under this UN number. This test should only be performed when de-classification of a substance is considered.

383 Table tennis balls manufactured from celluloid are not subject to these Regulations where the net mass of each table tennis ball does not exceed 3.0 g and the total net mass of table tennis balls does not exceed 500 g per package.

384 The label to be used is Model No 9A, see 5.2.2.2.2. However, for placarding of cargo transport units, the placard shall correspond to Model No 9.

NOTE: *The Class 9 label (Model No 9) may continue to be used until 31 December 2018.*

385 *Deleted.*

386 When substances are stabilized by temperature control, the provisions of 7.1.5 apply. When chemical stabilization is employed, the person offering the packaging, IBC or tank for transport shall ensure that the level of stabilization is sufficient to prevent the substance in the packaging, IBC or tank from dangerous polymerization at a bulk mean temperature of 50 °C, or, in the case of a portable tank, 45 °C. Where chemical stabilization becomes ineffective at lower temperatures within the anticipated duration of transport, temperature control is required. In making this determination factors to be taken into consideration include, but are not limited to, the capacity and geometry of the packaging, IBC or tank and the effect of any insulation present, the temperature of the substance when offered for transport, the duration of the journey and the ambient temperature conditions typically encountered in the journey (considering also the season of year), the effectiveness and other properties of the stabilizer employed, applicable operational controls imposed by regulation (e.g. requirements to protect from sources of heat, including other cargo transported at a temperature above ambient) and any other relevant factors.

387 Lithium batteries in conformity with 2.9.4 (f) containing both primary lithium metal cells and rechargeable lithium ion cells shall be assigned to UN Nos. 3090 or 3091 as appropriate. When such batteries are transported in accordance with special provision 188, the total lithium content of all lithium metal cells contained in the battery shall not exceed 1.5 g and the total capacity of all lithium ion cells contained in the battery shall not exceed 10 Wh.

388 UN No. 3166 entries apply to vehicles powered by flammable liquid or gas internal combustion engines or fuel cells.

Vehicles powered by a fuel cell engine shall be assigned to the entries UN 3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate. These entries include hybrid electric vehicles powered by both a fuel cell and an internal combustion engine with wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the battery(ies) installed.

Other vehicles which contain an internal combustion engine shall be assigned to the entries UN 3166 VEHICLE, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FLAMMABLE LIQUID POWERED, as appropriate. These entries include hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the battery(ies) installed.

If a vehicle is powered by a flammable liquid and a flammable gas internal combustion engine, it shall be assigned to UN 3166 VEHICLE, FLAMMABLE GAS POWERED.

Entry UN 3171 only applies to vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries and equipment powered by wet batteries or sodium batteries transported with these batteries installed.

For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, bicycles (pedal cycles with a motor) and other vehicles of this type (e.g. self-balancing vehicles or vehicles not equipped with at least one seating position), wheelchairs, lawn tractors, self-propelled farming and construction equipment, boats and aircraft. This includes vehicles transported in a packaging. In this case some parts of the vehicle may be detached from its frame to fit into the packaging.

Examples of equipment are lawnmowers, cleaning machines or model boats and model aircraft. Equipment powered by lithium metal batteries or lithium ion batteries shall be assigned to the entries UN 3091 LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or UN 3091 LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT or UN 3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or UN 3481 LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, as appropriate. Lithium ion batteries or lithium metal batteries installed in a cargo transport unit and designed only to provide power external to the cargo transport unit shall be assigned to the entry UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT lithium ion batteries or lithium metal batteries.

Dangerous goods, such as batteries, airbags, fire extinguishers, compressed gas accumulators, safety devices and other integral components of the vehicle that are necessary for the operation of the vehicle or for the safety of its operator or passengers, shall be securely installed in the vehicle and are not otherwise subject to these Regulations. However, lithium batteries shall meet the provisions of 2.9.4, except that 2.9.4 (a) does not apply when pre-production prototype batteries or batteries of a small production run, consisting of not more than 100 batteries, are installed in vehicles or equipment.

Where a lithium battery installed in a vehicle or equipment is damaged or defective, the vehicle or equipment shall be transported as defined by the competent authority.

389 This entry only applies to lithium ion batteries or lithium metal batteries installed in a cargo transport unit and designed only to provide power external to the cargo transport unit. The lithium batteries shall meet the requirements of 2.9.4 (a) to (g) and contain the necessary systems to prevent overcharge and over discharge between the batteries.

The batteries shall be securely attached to the interior structure of the cargo transport unit (e.g., by means of placement in racks, cabinets, etc.) in such a manner as to prevent short circuits, accidental operation, and significant movement relative to the cargo transport unit under the shocks, loadings and vibrations normally incident to transport. Dangerous goods necessary for the safe and proper operation of the cargo transport unit (e.g., fire extinguishing systems and air conditioning systems), shall be properly secured to or installed in the cargo transport unit and are not otherwise subject to these Regulations. Dangerous goods not necessary for the safe and proper operation of the cargo transport unit shall not be transported within the cargo transport unit.

The batteries inside the cargo transport unit are not subject to marking or labelling requirements. The cargo transport unit shall display the UN number in accordance with 5.3.2.1.2 and be placarded on two opposing sides in accordance with 5.3.1.1.2.

390 When a package contains a combination of lithium batteries contained in equipment and lithium batteries packed with equipment, the following requirements apply for the purposes of package marking and documentation:

(a) the package shall be marked “UN 3091 Lithium metal batteries packed with equipment”, or “UN 3481 Lithium ion batteries packed with equipment”, as appropriate. If a package contains both lithium ion batteries and lithium metal batteries packed with and contained in equipment, the package shall be marked as required for both battery types. However, button cell batteries installed in equipment (including circuit boards) need not be considered.

(b) the transport document shall indicate “UN 3091 Lithium metal batteries packed with equipment” or “UN 3481 Lithium ion batteries packed with equipment”, as appropriate. If a package contains both lithium metal batteries and lithium ion batteries packed with and contained in equipment, then the transport document shall indicate both “UN 3091 Lithium metal batteries packed with equipment” and “UN 3481 Lithium ion batteries packed with equipment”.

391 Articles containing dangerous goods of Division 2.3, or Division 4.2, or Division 4.3, or Division 5.1, or Division 5.2 or Division 6.1 for substances of inhalation toxicity requiring Packing Group I and articles containing more than one of the hazards listed in 2.0.3.1 (b), (c), or (d) shall be transported under conditions approved by the competent authority.

392 For the transport of fuel gas containment systems designed and approved to be fitted in motor vehicles containing this gas the provisions of sub-section 4.1.4.1 and Chapter 6.2 of these Regulations need not be applied when transported for disposal, recycling, repair, inspection, maintenance or from where they are manufactured to a vehicle assembly plant, provided the following conditions are met:

(a) The fuel gas containment systems shall meet the requirements of the standards or regulations for fuel tanks for vehicles, as applicable. Examples of applicable standards and regulations are:

LPG tanks	
ECE Regulation No. 67 Revision 2	Uniform provisions concerning: I. Approval of specific equipment of vehicles of category M and N using liquefied petroleum gases in their propulsion system; II. Approval of vehicles of category M and N fitted with specific equipment for the use of liquefied petroleum gases in their propulsion system with regard to the installation of such equipment
ECE Regulation No. 115	Uniform provisions concerning the approval of: I. Specific LPG (liquefied petroleum gases) retrofit systems to be installed in motor vehicles for the use of LPG in their propulsion systems; II Specific CNG (compressed natural gas) retrofit systems to be installed in motor vehicles for the use of CNG in their propulsion system
CNG tanks	
ECE Regulation No. 110	Uniform provisions concerning the approval of: I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system; II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system
ECE Regulation No. 115	(Uniform provisions concerning the approval of: I. Specific LPG (liquefied petroleum gases) retrofit systems to be installed in motor vehicles for the use of LPG in their propulsion systems; II Specific CNG (compressed natural gas) retrofit systems to be installed in motor vehicles for the use of CNG in their propulsion system)
ISO 11439:2013	Gas cylinders — High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles
ISO 15500-Series	ISO 15500: Road vehicles -- Compressed natural gas (CNG) fuel system components – several parts as applicable
ANSI NGV 2	Compressed natural gas vehicle fuel containers
CSA B51 Part 2: 2014	Boiler, pressure vessel, and pressure piping code Part 2 Requirements for high-pressure cylinders for on-board storage of fuels for automotive vehicles
Hydrogen pressure tanks	
Global Technical Regulation (GTR) No. 13	Global technical regulation on hydrogen and fuel cell vehicles (ECE/TRANS/180/Add.13).
ISO/TS 15869:2009	Gaseous hydrogen and hydrogen blends - Land vehicle fuel tanks
Regulation (EC) No.79/2009	Regulation (EC) No. 79/2009 of the European Parliament and of the Council of 14 January 2009 on type approval of hydrogen-powered motor vehicles, and amending Directive 2007/46/EC
Regulation (EU) No. 406/2010	Commission Regulation (EU) No 406/2010 of 26 April 2010 implementing Regulation (EC) No 79/2009 of the European Parliament and of the Council on type-approval of hydrogen-powered motor vehicles.
ECE Regulation No. 134	Uniform provisions concerning the approval of motor vehicles and their components with regards to the safety-related performance of hydrogen and fuel cell vehicles (HFCV)
CSA B51 Part 2: 2014	Boiler, pressure vessel, and pressure piping code Part 2 Requirements for high-pressure cylinders for on-board storage of fuels for automotive vehicles

Gas tanks designed and constructed in accordance with previous versions of relevant standards or regulations for gas tanks for motor vehicles, which were applicable at the time of the certification of the vehicles for which the gas tanks were designed and constructed may continue to be transported;

(b) The fuel gas containment systems shall be leakproof and shall not exhibit any signs of external damage which may affect their safety;

NOTE 1: *Criteria may be found in standard ISO 11623:2015 Gas cylinders – Composite construction – Periodic inspection and testing (or ISO 19078:2013 Gas cylinders – Inspection of the cylinder installation, and requalification of high pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles).*

NOTE 2: *If the fuel gas containment systems are not leakproof or are overfilled or if they exhibit damage that could affect their safety (e.g. in case of a safety related recall), they shall only be carried in salvage pressure receptacles in conformity with these Regulations.*

(c) If a fuel gas containment system is equipped with two valves or more integrated in line, the two valves shall be closed as to be gastight under normal conditions of transport. If only one valve exists or only one valve works, all openings with the exception of the opening of the pressure relief device shall be closed as to be gastight under normal conditions of transport;

(d) Fuel gas containment systems shall be transported in such a way as to prevent obstruction of the pressure relief device or any damage to the valves and any other pressurised part of the fuel gas containment systems and unintentional release of the gas under normal conditions of transport. The fuel gas containment system shall be secured in order to prevent slipping, rolling or vertical movement;

(e) Valves shall be protected by one of the methods described in 4.1.6.1.8 (a) to (e);

(f) Except for the case of fuel gas containment systems removed for disposal, recycling, repair, inspection or maintenance, they shall be filled with not more than 20 % of their nominal filling ratio or nominal working pressure, as applicable;

(g) Notwithstanding the provisions of Chapter 5.2, when fuel gas containment systems are consigned in a handling device, markings and labels may be affixed to the handling device; and

(h) Notwithstanding the provisions of 5.4.1.5 the information on the total quantity of dangerous goods may be replaced by the following information:

(i) The number of fuel gas containment systems; and

(ii) In the case of liquefied gases the total net mass (kg) of gas of each fuel gas containment system and, in the case of compressed gases, the total water capacity (l) of each fuel gas containment system followed by the nominal working pressure.

Examples for information in the transport document:

Example 1: “UN 1971 natural gas, compressed, 2.1, 1 fuel gas containment system of 50 *l* in total, 200 bar”.

Example 2: “UN 1965 hydrocarbon gas mixture, liquefied, n.o.s., 2.1, 3 fuel gas containment systems, each of 15 kg net mass of gas”.

393 The nitrocellulose shall meet the criteria of the Bergmann-Junk test or methyl violet paper test in the Manual of Tests and Criteria Appendix 10. Tests of type 3 (c) need not be applied.

394 The nitrocellulose shall meet the criteria of the Bergmann-Junk test or methyl violet paper test in the Manual of Tests and Criteria Appendix 10.

395 This entry shall only be used for solid medical waste of Category A transported for disposal.

396 Large and robust articles may be transported with connected gas cylinders with the valves open regardless of 4.1.6.1.5 provided:

(a) The gas cylinders contain nitrogen of UN 1066 or compressed gas of UN 1956 or compressed air of UN 1002;

(b) The gas cylinders are connected with the article through pressure regulators and fixed piping in such a way that the pressure of the gas (gauge pressure) in the article does not exceed 35 kPa (0.35 bar);

(c) The gas cylinders are properly secured so that they cannot move in relation to the article and are fitted with strong and pressure resistant hoses and pipes;

(d) The gas cylinders, pressure regulators, piping and other components are protected from damage and impacts during transport by wooden crates or other suitable means;

(e) The transport document includes the following statement “Transport in accordance with special provision 396”;

(f) Cargo transport units containing articles transported with cylinders with open valves containing a gas presenting a risk of asphyxiation are well ventilated and are marked in accordance with 5.5.3.6.

397 Mixtures of nitrogen and oxygen containing not less than 19.5 % and not more than 23.5 % oxygen by volume may be transported under this entry when no other oxidizing gases are present. A Division 5.1 subsidiary hazard label is not required for any concentrations within this limit.

398 This entry applies to mixtures of butylenes, 1-butylene, cis-2-butylene and trans-2-butylene. For isobutylene, see UN 1055.

CHAPTER 3.4

DANGEROUS GOODS PACKED IN LIMITED QUANTITIES

3.4.1 This Chapter provides the provisions applicable to the transport of dangerous goods of certain classes packed in limited quantities. The applicable quantity limit for the inner packaging or article is specified for each substance in Column 7a of the Dangerous Goods List of Chapter 3.2. In addition, the quantity "0" has been indicated in this column for each entry not permitted to be transported in accordance with this Chapter.

Limited quantities of dangerous goods packed in such limited quantities, meeting the provisions of this Chapter, are not subject to any other provisions of these Regulations except the relevant provisions of:

(a) Part 1, Chapters 1.1, 1.2 and 1.3;

(b) Part 2;

(c) Part 3, Chapters 3.1, 3.2, 3.3;

(d) Part 4, paragraphs 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8;

NOTE: *For air transport, additional provisions apply; refer to Part 3, Chapter 4 of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air.*

(e) Part 5:

(i) For air transport: chapters 5.1, 5.2 and 5.4;

(ii) For sea transport: 5.1.1.2, 5.1.2.3, 5.2.1.7 and chapter 5.4;

(iii) For transport by road, rail or inland waterway: 5.1.1.2, 5.1.2.3, 5.2.1.7 and section 5.4.2.

(f) Part 6, construction requirements of 6.1.4, paragraph 6.2.1.2 and section 6.2.4;

(g) Part 7, section 7.1.1 except first sentence of 7.1.1.7, paragraph 7.1.3.1.4 and sub-section 7.1.3.2.

3.4.2 Dangerous goods shall be packed only in inner packagings placed in suitable outer packagings. Intermediate packagings may be used. In addition, for articles of Division 1.4, Compatibility Group S, the provisions of section 4.1.5 shall be fully complied with. The use of inner packagings is not necessary for the transport of articles such as aerosols or "receptacles, small, containing gas". The total gross mass of the package shall not exceed 30 kg.

3.4.3 Except for articles of Division 1.4, Compatibility Group S, shrink-wrapped or stretch-wrapped trays meeting the conditions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8 are acceptable as outer packagings for articles or inner packagings containing dangerous goods transported in accordance with this Chapter. Inner packagings that are liable to break or be easily punctured, such as those made of glass, porcelain, stoneware or certain plastics, shall be placed in suitable intermediate packagings meeting the provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8, and be so designed that they meet the construction requirements of 6.1.4. The total gross mass of the package shall not exceed 20 kg.

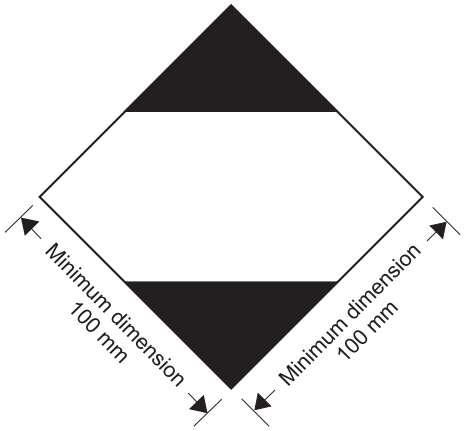
3.4.4 Liquid goods of Class 8, packing group II in glass, porcelain or stoneware inner packagings shall be enclosed in a compatible and rigid intermediate packaging.

3.4.5 and 3.4.6 *Deleted.*

3.4.7 Marking of packages containing limited quantities

3.4.7.1 Except for air transport, packages containing dangerous goods in limited quantities shall bear the mark shown in Figure 3.4.1:

Figure 3.4.1: Mark for packages containing limited quantities



The mark shall be readily visible, legible and able to withstand open weather exposure without a substantial reduction in effectiveness.

The mark shall be in the form of a square set at an angle of 45 degrees (diamond-shaped). The top and bottom portions and the surrounding line shall be black. The centre area shall be white or a suitable contrasting background. The minimum dimensions shall be 100 mm × 100 mm and the minimum width of line forming the diamond shall be 2 mm. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

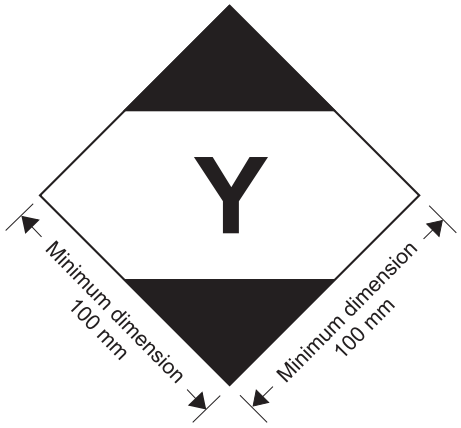
3.4.7.2 If the size of the package so requires, the minimum outer dimensions shown in Figure 3.4.1 may be reduced to be not less than 50 mm × 50 mm provided the mark remains clearly visible. The minimum width of the line forming the diamond may be reduced to a minimum of 1 mm.

***NOTE**: The provisions of 3.4.7 from the seventeenth revised edition of the Model Regulations may continue to be applied until 31 December 2016.*

3.4.8 Marking of packages containing limited quantities conforming to Part 3, Chapter 4 of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air

3.4.8.1 Packages containing dangerous goods packed in conformity with the provisions of Part 3, Chapter 4 of the ICAO Technical Instructions for the Transport of Dangerous Goods may bear the mark shown in Figure 3.4.2 to certify conformity with these provisions:

Figure 3.4.2: Mark for packages containing limited quantities conforming to Part 3, Chapter 4 of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air



The mark shall be readily visible, legible and able to withstand open weather exposure without a substantial reduction in effectiveness.

The mark shall be in the form of a square set at an angle of 45 degrees (diamond-shaped). The top and bottom portions and the surrounding line shall be black. The centre area shall be white or a suitable contrasting background. The minimum dimensions shall be 100 mm × 100 mm and the minimum width of the line forming the diamond shall be 2 mm. The symbol "Y" shall be placed in the centre of the mark and shall be clearly visible. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

3.4.8.2 If the size of the package so requires, the minimum outer dimensions shown in Figure 3.4.2 may be reduced to be not less than 50 mm × 50 mm provided the mark remains clearly visible. The minimum width of the line forming the diamond may be reduced to a minimum of 1 mm. The symbol "Y" shall remain in approximate proportion to that shown in Figure 3.4.2.

NOTE: *The provisions of 3.4.8 from the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016.*

3.4.9 Packages containing dangerous goods bearing the mark shown in 3.4.8 with or without the additional labels and marks for air transport shall be deemed to meet the provisions of section 3.4.1 as appropriate and of sections 3.4.2 to 3.4.4 of this Chapter and need not bear the mark shown in 3.4.7.

3.4.10 Packages containing dangerous goods in limited quantities bearing the mark shown in 3.4.7 and conforming with the provisions of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air, including all necessary marks and labels specified in Parts 5 and 6, shall be deemed to meet the provisions of section 3.4.1 as appropriate and of sections 3.4.2 to 3.4.4 when transported by land or by sea.

3.4.11 Use of overpacks

For an overpack containing dangerous goods packed in limited quantities, the following applies:

Unless the marks representative of all dangerous goods in an overpack are visible, the overpack shall be:

(a) marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high; and

(b) marked with the marks required by this chapter.

Except for air transport, the other provisions of 5.1.2.1 apply only if other dangerous goods which are not packed in limited quantities are contained in the overpack and only in relation to these other dangerous goods.

CHAPTER 3.5

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

3.5.1 Excepted quantities

3.5.1.1 Excepted quantities of dangerous goods of certain classes, other than articles, meeting the provisions of this Chapter are not subject to any other provisions of these Regulations except for:

(a) The training requirements in Chapter 1.3;

(b) The classification procedures and packing group criteria in Part 2;

(c) The packaging requirements of 4.1.1.1, 4.1.1.2, 4.1.1.4, 4.1.1.4.1 and 4.1.1.6.

***NOTE**: In the case of radioactive material, the requirements for radioactive material in excepted packages in 1.5.1.5 apply.*

3.5.1.2 Dangerous goods which may be carried as excepted quantities in accordance with the provisions of this Chapter are shown in column 7b of the dangerous goods list of Chapter 3.2 by means of an alphanumeric code as follows:

Code	**Maximum net quantity per inner packaging** (in grams for solids and ml for liquids and gases)	**Maximum net quantity per outer packaging** (in grams for solids and ml for liquids and gases, or sum of grams and ml in the case of mixed packing)
E0	Not permitted as Excepted Quantity	
E1	30	1000
E2	30	500
E3	30	300
E4	1	500
E5	1	300

For gases, the volume indicated for inner packagings refers to the water capacity of the inner receptacle and the volume indicated for outer packagings refers to the combined water capacity of all inner packagings within a single outer packaging.

3.5.1.3 Where dangerous goods in excepted quantities for which different codes are assigned are packaged together the total quantity per outer packaging shall be limited to that corresponding to the most restrictive code.

3.5.1.4 Excepted quantities of dangerous goods assigned to codes E1, E2, E4 and E5 are not subject to these Regulations provided that:

(a) The maximum net quantity of material per inner packaging is limited to 1 ml for liquids and gases and 1 g for solids;

(b) The provisions of 3.5.2 are met, except that an intermediate packaging is not required if the inner packagings are securely packed in an outer packaging with cushioning material in such a way that, under normal conditions of transport, they cannot break, be punctured, or leak their contents; and for liquids, the outer packaging contains sufficient absorbent material to absorb the entire contents of the inner packagings;

(c) The provisions of 3.5.3 are complied with; and

(d) The maximum net quantity of dangerous goods per outer packaging does not exceed 100 g for solids or 100 ml for liquids and gases.

3.5.2 Packagings

Packagings used for the transport of dangerous goods in excepted quantities shall be in compliance with the following:

(a) There shall be an inner packaging and each inner packaging shall be constructed of plastic (when used for liquid dangerous goods it shall have a thickness of not less than 0.2 mm), or of glass, porcelain, stoneware, earthenware or metal (see also 4.1.1.2) and the closure of each inner packaging shall be held securely in place with wire, tape or other positive means; any receptacle having a neck with moulded screw threads shall have a leak proof threaded type cap. The closure shall be resistant to the contents;

(b) Each inner packaging shall be securely packed in an intermediate packaging with cushioning material in such a way that, under normal conditions of transport, it cannot break, be punctured or leak its contents. For liquid dangerous goods, the intermediate or outer packaging shall contain sufficient absorbent material to absorb the entire contents of the inner packagings. When placed in the intermediate packaging, the absorbent material may be the cushioning material. Dangerous goods shall not react dangerously with cushioning, absorbent material and packaging material or reduce the integrity or function of the materials. Regardless of its orientation, the package shall completely contain the contents in case of breakage or leakage;

(c) The intermediate packaging shall be securely packed in a strong, rigid outer packaging (wooden, fibreboard or other equally strong material);

(d) Each package type shall be in compliance with the provisions in 3.5.3;

(e) Each package shall be of such a size that there is adequate space to apply all necessary marks; and

(f) Overpacks may be used and may also contain packages of dangerous goods or goods not subject to these Regulations.

3.5.3 Tests for packages

3.5.3.1 The complete package as prepared for transport, with inner packagings filled to not less than 95 % of their capacity for solids or 98 % for liquids, shall be capable of withstanding, as demonstrated by testing which is appropriately documented, without breakage or leakage of any inner packaging and without significant reduction in effectiveness:

(a) Drops onto a rigid, non-resilient, flat and horizontal surface from a height of 1.8 m:

(i) Where the sample is in the shape of a box, it shall be dropped in each of the following orientations:

- flat on the base;
- flat on the top;
- flat on the longest side;
- flat on the shortest side;
- on a corner;

(ii) Where the sample is in the shape of a drum, it shall be dropped in each of the following orientations:

- diagonally on the top chime, with the centre of gravity directly above the point of impact;
- diagonally on the base chime;
- flat on the side.

***NOTE**: Each of the above drops may be performed on different but identical packages.*

(b) A force applied to the top surface for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3 m (including the sample).

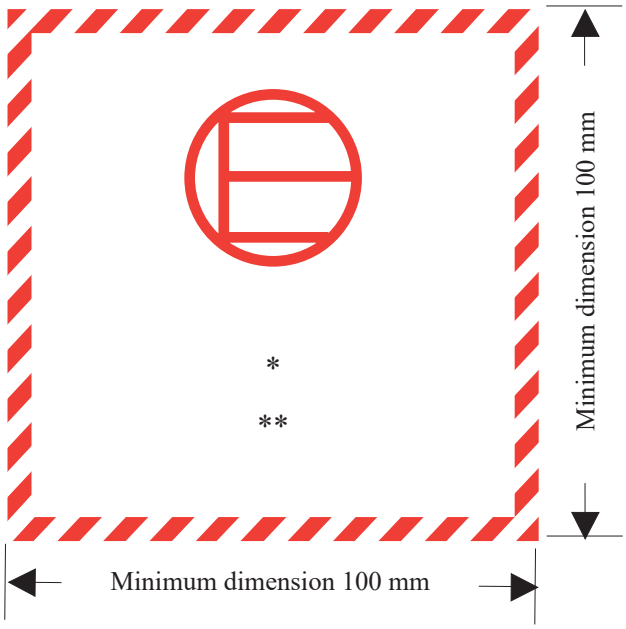
3.5.3.2 For the purposes of testing, the substances to be transported in the packaging may be replaced by other substances except where this would invalidate the results of the tests. For solids, when another substance is used, it must have the same physical characteristics (mass, grain size, etc.) as the substance to be carried. In the drop tests for liquids, when another substance is used, its relative density (specific gravity) and viscosity should be similar to those of the substance to be transported.

3.5.4 Marking of packages

3.5.4.1 Packages containing excepted quantities of dangerous goods prepared in accordance with this Chapter shall be durably and legibly marked with the mark shown in Figure 3.5.1. The primary hazard class or, when assigned, the division of each of the dangerous goods contained in the package shall be shown in the mark. Where the name of the consignor or consignee is not shown elsewhere on the package this information shall be included within the mark.

3.5.4.2 *Excepted quantities mark*

Figure 3.5.1: Excepted quantities mark



* The Class or, when assigned, the Division number(s) shall be shown in this location

** The name of the consignor or of the consignee shall be shown in this location if not shown elsewhere on the package

The mark shall be in the form of a square. The hatching and symbol shall be of the same colour, black or red, on white or suitable contrasting background. The minimum dimensions shall be 100 mm × 100 mm. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

3.5.4.3 ***Use of overpacks***

For an overpack containing dangerous goods packed in excepted quantities, the following applies:

Unless the marks representative of all dangerous goods in an overpack are visible, the overpack shall be:

(a) Marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high; and

(b) Marked with the marks required by this chapter.

The other provisions of 5.1.2.1 apply only if other dangerous goods which are not packed in excepted quantities are contained in the overpack and only in relation to these other dangerous goods.

NOTE: *The provisions of 3.5.4.2 and 3.5.4.3 from the seventeenth revised edition of the Model Regulations may continue to be applied until 31 December 2016.*

3.5.5 Maximum number of packages in any cargo transport unit

The number of packages in any cargo transport unit shall not exceed 1 000.

3.5.6 Documentation

If a document (such as a bill of lading or air waybill) accompanies dangerous goods in excepted quantities, it shall include the statement "Dangerous Goods in Excepted Quantities" and indicate the number of packages.

APPENDICES

APPENDIX A

LIST OF GENERIC AND N.O.S. PROPER SHIPPING NAMES

Substances or articles not mentioned specifically by name in the Dangerous Goods List in Chapter 3.2 must be classified in accordance with 3.1.1.2. Thus the name in the Dangerous Goods List which most appropriately describes the substance or article shall be used as the Proper Shipping Name. The main generic entries and all the N.O.S. entries given in the Dangerous Goods List are listed below. This proper shipping name shall be supplemented by the technical name when special provision 274 has been assigned to the entry in Column 6 of the Dangerous Goods List.

In this list generic and N.O.S. names are grouped according to their hazard class or division. Within each hazard class or division the names have been placed into three groups as follows:

- specific entries covering a group of substances or articles of a particular chemical or technical nature;

- pesticide entries, for Class 3 and Division 6.1;

- general entries covering a group of substances or articles having one or more general dangerous properties.

THE MOST SPECIFIC APPLICABLE NAME MUST ALWAYS BE USED.

APPENDIX A: LIST OF GENERIC OR N.O.S. PROPER SHIPPING NAMES

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 1
1		0190	SAMPLES, EXPLOSIVE, other than initiating explosive
			Division 1.1
1.1A		0473	SUBSTANCES, EXPLOSIVE, N.O.S.
1.1B		0461	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.1C		0462	ARTICLES, EXPLOSIVE, N.O.S.
1.1C		0474	SUBSTANCES, EXPLOSIVE, N.O.S.
1.1C		0497	PROPELLANT, LIQUID
1.1C		0498	PROPELLANT, SOLID
1.1D		0463	ARTICLES, EXPLOSIVE, N.O.S.
1.1D		0475	SUBSTANCES, EXPLOSIVE, N.O.S.
1.1E		0464	ARTICLES, EXPLOSIVE, N.O.S.
1.1F		0465	ARTICLES, EXPLOSIVE, N.O.S.
1.1G		0476	SUBSTANCES, EXPLOSIVE, N.O.S.
1.1L		0354	ARTICLES, EXPLOSIVE, N.O.S.
1.1L		0357	SUBSTANCES, EXPLOSIVE, N.O.S.
			Division 1.2
1.2B		0382	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.2C		0466	ARTICLES, EXPLOSIVE, N.O.S.
1.2D		0467	ARTICLES, EXPLOSIVE, N.O.S.
1.2E		0468	ARTICLES, EXPLOSIVE, N.O.S.
1.2F		0469	ARTICLES, EXPLOSIVE, N.O.S.
1.2K	6.1	0020	AMMUNITION, TOXIC with burster, expelling charge or propelling charge
1.2L		0248	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge
1.2L		0355	ARTICLES, EXPLOSIVE, N.O.S.
1.2L		0358	SUBSTANCES, EXPLOSIVE, N.O.S.
			Division 1.3
1.3C		0132	DEFLAGRATING METAL SALTS OF AROMATIC NITRODERIVATIVES, N.O.S.
1.3C		0470	ARTICLES, EXPLOSIVE, N.O.S.
1.3C		0477	SUBSTANCES, EXPLOSIVE, N.O.S.
1.3C		0495	PROPELLANT, LIQUID
1.3C		0499	PROPELLANT, SOLID
1.3G		0478	SUBSTANCES, EXPLOSIVE, N.O.S.
1.3K	6.1	0021	AMMUNITION, TOXIC with burster, expelling charge or propelling charge
1.3L		0249	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge
1.3L		0356	ARTICLES, EXPLOSIVE, N.O.S.
1.3L		0359	SUBSTANCES, EXPLOSIVE, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			Division 1.4
1.4B		0350	ARTICLES, EXPLOSIVE, N.O.S.
1.4B		0383	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.4C		0351	ARTICLES, EXPLOSIVE, N.O.S.
1.4C		0479	SUBSTANCES, EXPLOSIVE, N.O.S.
1.4C		0501	PROPELLANT, SOLID
1.4D		0352	ARTICLES, EXPLOSIVE, N.O.S.
1.4D		0480	SUBSTANCES, EXPLOSIVE, N.O.S.
1.4E		0471	ARTICLES, EXPLOSIVE, N.O.S.
1.4F		0472	ARTICLES, EXPLOSIVE, N.O.S.
1.4G		0353	ARTICLES, EXPLOSIVE, N.O.S.
1.4G		0485	SUBSTANCES, EXPLOSIVE, N.O.S.
1.4S		0349	ARTICLES, EXPLOSIVE, N.O.S.
1.4S		0384	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.4S		0481	SUBSTANCES, EXPLOSIVE, N.O.S.
			Division 1.5
1.5D		0482	SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE (SUBSTANCES, EVI), N.O.S.
			Division 1.6
1.6N		0486	ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES, EEI)

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 2
			Division 2.1
			Specific entries
2.1		1964	HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.
2.1		1965	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S.
2.1		3354	INSECTICIDE GAS, FLAMMABLE, N.O.S.
			General entries
2.1		1954	COMPRESSED GAS, FLAMMABLE, N.O.S.
2.1		3161	LIQUEFIED GAS, FLAMMABLE, N.O.S.
2.1		3167	GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, N.O.S., not refrigerated liquid
2.1		3312	GAS, REFRIGERATED LIQUID, FLAMMABLE, N.O.S.
2.1		3501	CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S.
2.1	6.1	3504	CHEMICAL UNDER PRESSURE, FLAMMABLE, TOXIC, N.O.S.
2.1	8	3505	CHEMICAL UNDER PRESSURE, FLAMMABLE, CORROSIVE, N.O.S.
2.1		3510	ADSORBED GAS, FLAMMABLE, N.O.S.
2.1	See 2.0.5.6	3537	ARTICLES CONTAINING FLAMMABLE GAS, N.O.S.
			Division 2.2
			Specific entries
2.2		1078	REFRIGERANT GAS, N.O.S.
2.2		1968	INSECTICIDE GAS, N.O.S.
			General entries
2.2		1956	COMPRESSED GAS, N.O.S.
2.2		3163	LIQUEFIED GAS, N.O.S.
2.2		3158	GAS, REFRIGERATED LIQUID, N.O.S.
2.2		3500	CHEMICAL UNDER PRESSURE, N.O.S.
2.2	5.1	3156	COMPRESSED GAS, OXIDIZING, N.O.S.
2.2	5.1	3157	LIQUEFIED GAS, OXIDIZING, N.O.S.
2.2	5.1	3311	GAS, REFRIGERATED LIQUID, OXIDIZING, N.O.S.
2.2	6.1	3502	CHEMICAL UNDER PRESSURE, TOXIC, N.O.S.
2.2	8	3503	CHEMICAL UNDER PRESSURE, CORROSIVE, N.O.S.
2.2		3511	ADSORBED GAS, N.O.S.
2.2	5.1	3513	ADSORBED GAS, OXIDIZING, N.O.S.
2.2	See 2.0.5.6	3538	ARTICLES CONTAINING NON-FLAMMABLE, NON TOXIC GAS, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			Division 2.3
			Specific entries
2.3		1967	INSECTICIDE GAS, TOXIC, N.O.S.
2.3	2.1	3355	INSECTICIDE GAS, TOXIC, FLAMMABLE, N.O.S.
			General entries
2.3		1955	COMPRESSED GAS, TOXIC, N.O.S.
2.3		3162	LIQUEFIED GAS, TOXIC, N.O.S.
2.3		3169	GAS SAMPLE, NON-PRESSURIZED, TOXIC, N.O.S., not refrigerated liquid
2.3	2.1	1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.
2.3	2.1	3160	LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S.
2.3	2.1	3168	GAS SAMPLE, NON-PRESSURIZED, TOXIC, FLAMMABLE, N.O.S., not refrigerated liquid
2.3	2.1 + 8	3305	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.
2.3	2.1 + 8	3309	LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.
2.3	5.1	3303	COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S.
2.3	5.1	3307	LIQUEFIED GAS, TOXIC, OXIDIZING, N.O.S.
2.3	5.1 + 8	3306	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.
2.3	5.1 + 8	3310	LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.
2.3	8	3304	COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.
2.3	8	3308	LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S.
2.3		3512	ADSORBED GAS, TOXIC, N.O.S.
2.3	2.1	3514	ADSORBED GAS, TOXIC, FLAMMABLE, N.O.S.
2.3	5.1	3515	ADSORBED GAS, TOXIC, OXIDIZING, N.O.S.
2.3	8	3516	ADSORBED GAS, TOXIC, CORROSIVE, N.O.S.
2.3	2.1 + 8	3517	ADSORBED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.
2.3	5.1 + 8	3518	ADSORBED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.
2.3	See 2.0.5.6	3539	ARTICLES CONTAINING TOXIC GAS, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 3
			Specific entries
3		1224	KETONES, LIQUID, N.O.S.
3		1268	PETROLEUM DISTILLATES, N.O.S. or PETROLEUM PRODUCTS, N.O.S.
3		1987	ALCOHOLS, N.O.S.
3		1989	ALDEHYDES, N.O.S.
3		2319	TERPENE HYDROCARBONS, N.O.S.
3		3271	ETHERS, N.O.S.
3		3272	ESTERS, N.O.S.
3		3295	HYDROCARBONS, LIQUID, N.O.S.
3		3336	MERCAPTANS, LIQUID, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S.
3		3343	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, FLAMMABLE, N.O.S. with not more than 30 % nitroglycerin, by mass
3		3357	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30 % nitroglycerin, by mass
3	6.1	1228	MERCAPTANS, LIQUID, FLAMMABLE, TOXIC, N.O.S. or MERCAPTAN MIXTURE, LIQUID,FLAMMABLE, TOXIC, N.O.S.
3	6.1	1986	ALCOHOLS, FLAMMABLE, TOXIC, N.O.S.
3	6.1	1988	ALDEHYDES, FLAMMABLE, TOXIC, N.O.S.
3	6.1	2478	ISOCYANATES, FLAMMABLE, TOXIC, N.O.S. or ISOCYANATE SOLUTION, FLAMMABLE, TOXIC, N.O.S.
3	6.1	3248	MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S.
3	6.1	3273	NITRILES, FLAMMABLE, TOXIC, N.O.S.
3	8	2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. or POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S.
3	8	2985	CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S.
3	8	3274	ALCOHOLATES SOLUTION, N.O.S., in alcohol
3		3379	DESENSITIZED EXPLOSIVE, LIQUID, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			Pesticides
3	6.1	2758	CARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2760	ARSENICAL PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2762	ORGANOCHLORINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2764	TRIAZINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2772	THIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2776	COPPER BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2778	MERCURY BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2780	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2782	BIPYRIDILIUM PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2784	ORGANOPHOSPHORUS PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	2787	ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	3021	PESTICIDE, LIQUID, FLAMMABLE, TOXIC, N.O.S., flash point < 23 °C
3	6.1	3024	COUMARIN DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	3346	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
3	6.1	3350	PYRETHROID PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash point < 23 °C
			General entries
3		1993	FLAMMABLE LIQUID, N.O.S.
3		3256	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S., with flash point above 60 °C, at or above its flash point
3	6.1	1992	FLAMMABLE LIQUID, TOXIC, N.O.S.
3	6.1+8	3286	FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S.
3	8	2924	FLAMMABLE LIQUID, CORROSIVE, N.O.S.
3	See 2.0.5.6	3540	ARTICLES CONTAINING FLAMMABLE LIQUID, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 4
			Division 4.1
			Specific entries
4.1		1353	FIBRES or FABRICS IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S.
4.1		3089	METAL POWDER, FLAMMABLE, N.O.S.
4.1		3182	METAL HYDRIDES, FLAMMABLE, N.O.S.
4.1		3221	SELF-REACTIVE LIQUID TYPE B
4.1		3222	SELF-REACTIVE SOLID TYPE B
4.1		3223	SELF-REACTIVE LIQUID TYPE C
4.1		3224	SELF-REACTIVE SOLID TYPE C
4.1		3225	SELF-REACTIVE LIQUID TYPE D
4.1		3226	SELF-REACTIVE SOLID TYPE D
4.1		3227	SELF-REACTIVE LIQUID TYPE E
4.1		3228	SELF-REACTIVE SOLID TYPE E
4.1		3229	SELF-REACTIVE LIQUID TYPE F
4.1		3230	SELF-REACTIVE SOLID TYPE F
4.1		3231	SELF-REACTIVE LIQUID TYPE B, TEMPERATURE CONTROLLED
4.1		3232	SELF-REACTIVE SOLID TYPE B, TEMPERATURE CONTROLLED
4.1		3233	SELF-REACTIVE LIQUID TYPE C, TEMPERATURE CONTROLLED
4.1		3234	SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED
4.1		3235	SELF-REACTIVE LIQUID TYPE D, TEMPERATURE CONTROLLED
4.1		3236	SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED
4.1		3237	SELF-REACTIVE LIQUID TYPE E, TEMPERATURE CONTROLLED
4.1		3238	SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED
4.1		3239	SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED
4.1		3240	SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED
4.1		3319	NITROGLYCERIN MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 2 % but not more than 10 % nitroglycerin, by mass
4.1		3344	PENTAERYTHRITE TETRANITRATE (PENTAERYTHRITOL TETRANITRATE; PETN) MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 10 % but not more than 20 % PETN, by mass
4.1		3380	DESENSITIZED EXPLOSIVE, SOLID, N.O.S.
			General entries
4.1		1325	FLAMMABLE SOLID, ORGANIC, N.O.S.
4.1		3175	SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S.
4.1		3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.
4.1		3178	FLAMMABLE SOLID, INORGANIC, N.O.S.
4.1		3181	METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S.
4.1	5.1	3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.
4.1	6.1	2926	FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.
4.1	6.1	3179	FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.
4.1	8	2925	FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.
4.1	8	3180	FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S.
4.1	See 2.0.5.6	3541	ARTICLES CONTAINING FLAMMABLE SOLID, N.O.S

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			Division 4.2
			Specific entries
4.2		1373	FIBRES or FABRICS, ANIMAL or VEGETABLE or SYNTHETIC, N.O.S., with oil
4.2		1378	METAL CATALYST, WETTED with a visible excess of liquid
4.2		1383	PYROPHORIC METAL, N.O.S. or PYROPHORIC ALLOY, N.O.S.
4.2		2006	PLASTICS, NITROCELLULOSE-BASED, SELF-HEATING, N.O.S.
4.2		2881	METAL CATALYST, DRY
4.2		3189	METAL POWDER, SELF-HEATING, N.O.S.
4.2		3205	ALKALINE EARTH METAL ALCOHOLATES, N.O.S.
4.2		3313	ORGANIC PIGMENTS, SELF-HEATING
4.2		3342	XANTHATES
4.2		3391	ORGANOMETALLIC SUBSTANCE, SOLID, PYROPHORIC
4.2		3392	ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC
4.2		3400	ORGANOMETALLIC SUBSTANCE, SOLID, SELF-HEATING
4.2	4.3	3393	ORGANOMETALLIC SUBSTANCE, SOLID, PYROPHORIC, WATER REACTIVE
4.2	4.3	3394	ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER REACTIVE
4.2	8	3206	ALKALI METAL ALCOHOLATES, SELF-HEATING, CORROSIVE, N.O.S.
			General entries
4.2		2845	PYROPHORIC LIQUID, ORGANIC, N.O.S.
4.2		2846	PYROPHORIC SOLID, ORGANIC, N.O.S.
4.2		3088	SELF-HEATING SOLID, ORGANIC, N.O.S.
4.2		3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.
4.2		3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.
4.2		3190	SELF-HEATING SOLID, INORGANIC, N.O.S.
4.2		3194	PYROPHORIC LIQUID, INORGANIC, N.O.S.
4.2		3200	PYROPHORIC SOLID, INORGANIC, N.O.S.
4.2	5.1	3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.
4.2	6.1	3128	SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S.
4.2	6.1	3184	SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.
4.2	6.1	3187	SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.
4.2	6.1	3191	SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S.
4.2	8	3126	SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S.
4.2	8	3185	SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.
4.2	8	3188	SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.
4.2	8	3192	SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S.
4.2	See 2.0.5.6	3542	ARTICLES CONTAINING A SUBSTANCE LIABLE TO SPONTANEOUS COMBUSTION, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			Division 4.3
			Specific entries
4.3		1389	ALKALI METAL AMALGAM, LIQUID
4.3		1390	ALKALI METAL AMIDES
4.3		1391	ALKALI METAL DISPERSION or ALKALI EARTH METAL DISPERSION
4.3		1392	ALKALINE EARTH METAL AMALGAM, LIQUID
4.3		1393	ALKALINE EARTH METAL ALLOY, N.O.S.
4.3		1409	METAL HYDRIDES, WATER-REACTIVE, N.O.S.
4.3		1421	ALKALI METAL ALLOY, LIQUID, N.O.S.
4.3		3208	METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S.
4.3		3395	ORGANOMETALLIC SUBSTANCE, SOLID, WATER REACTIVE
4.3		3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER REACTIVE
4.3		3401	ALKALI METAL AMALGAM, SOLID
4.3		3402	ALKALINE EARTH METAL AMALGAM, SOLID
4.3	3	3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER REACTIVE, FLAMMABLE
4.3	3	3482	ALKALI METAL DISPERSION, FLAMMABLE or ALKALINE EARTH METAL DISPERSION, FLAMMABLE
4.3	3+8	2988	CHLOROSILANES, WATER-REACTIVE, FLAMMABLE, CORROSIVE, N.O.S.
4.3	4.1	3396	ORGANOMETALLIC SUBSTANCE, SOLID, WATER REACTIVE, FLAMMABLE
4.3	4.2	3209	METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S.
4.3	4.2	3397	ORGANOMETALLIC SUBSTANCE, SOLID, WATER REACTIVE, SELF-HEATING
			General entries
4.3		3148	WATER-REACTIVE LIQUID, N.O.S.
4.3		2813	WATER-REACTIVE SOLID, N.O.S.
4.3	4.1	3132	WATER-REACTIVE SOLID, FLAMMABLE, N.O.S.
4.3	4.2	3135	WATER-REACTIVE SOLID, SELF-HEATING, N.O.S.
4.3	5.1	3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.
4.3	6.1	3130	WATER-REACTIVE LIQUID, TOXIC, N.O.S.
4.3	6.1	3134	WATER-REACTIVE SOLID, TOXIC, N.O.S.
4.3	8	3129	WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.
4.3	8	3131	WATER-REACTIVE SOLID, CORROSIVE, N.O.S.
4.3	See 2.0.5.6	3543	ARTICLES CONTAINING A SUBSTANCE WHICH IN CONTACT WITH WATER EMITS FLAMMABLE GASES, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 5
			Division 5.1
			Specific entries
5.1		1450	BROMATES, INORGANIC, N.O.S.
5.1		1461	CHLORATES, INORGANIC, N.O.S.
5.1		1462	CHLORITES, INORGANIC, N.O.S.
5.1		1477	NITRATES, INORGANIC, N.O.S.
5.1		1481	PERCHLORATES, INORGANIC, N.O.S.
5.1		1482	PERMANGANATES, INORGANIC, N.O.S.
5.1		1483	PEROXIDES, INORGANIC, N.O.S.
5.1		2627	NITRITES, INORGANIC, N.O.S.
5.1		3210	CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
5.1		3211	PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
5.1		3212	HYPOCHLORITES, INORGANIC, N.O.S.
5.1		3213	BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
5.1		3214	PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
5.1		3215	PERSULPHATES, INORGANIC, N.O.S.
5.1		3216	PERSULPHATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
5.1		3218	NITRATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
5.1		3219	NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
			General entries
5.1		1479	OXIDIZING SOLID, N.O.S.
5.1		3139	OXIDIZING LIQUID, N.O.S.
5.1	4.1	3137	OXIDIZING SOLID, FLAMMABLE, N.O.S.
5.1	4.2	3100	OXIDIZING SOLID, SELF-HEATING, N.O.S.
5.1	4.3	3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S.
5.1	6.1	3087	OXIDIZING SOLID, TOXIC, N.O.S.
5.1	6.1	3099	OXIDIZING LIQUID, TOXIC, N.O.S.
5.1	8	3085	OXIDIZING SOLID, CORROSIVE, N.O.S.
5.1	8	3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.
5.1	See 2.0.5.6	3544	ARTICLES CONTAINING OXIDIZING SUBSTANCE, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			Division 5.2
			Specific entries
5.2		3101	ORGANIC PEROXIDE TYPE B, LIQUID
5.2		3102	ORGANIC PEROXIDE TYPE B, SOLID
5.2		3103	ORGANIC PEROXIDE TYPE C, LIQUID
5.2		3104	ORGANIC PEROXIDE TYPE C, SOLID
5.2		3105	ORGANIC PEROXIDE TYPE D, LIQUID
5.2		3106	ORGANIC PEROXIDE TYPE D, SOLID
5.2		3107	ORGANIC PEROXIDE TYPE E, LIQUID
5.2		3108	ORGANIC PEROXIDE TYPE E, SOLID
5.2		3109	ORGANIC PEROXIDE TYPE F, LIQUID
5.2		3110	ORGANIC PEROXIDE TYPE F, SOLID
5.2		3111	ORGANIC PEROXIDE TYPE B, LIQUID, TEMPERATURE CONTROLLED
5.2		3112	ORGANIC PEROXIDE TYPE B, SOLID, TEMPERATURE CONTROLLED
5.2		3113	ORGANIC PEROXIDE TYPE C, LIQUID, TEMPERATURE CONTROLLED
5.2		3114	ORGANIC PEROXIDE TYPE C, SOLID, TEMPERATURE CONTROLLED
5.2		3115	ORGANIC PEROXIDE TYPE D, LIQUID, TEMPERATURE CONTROLLED
5.2		3116	ORGANIC PEROXIDE TYPE D, SOLID, TEMPERATURE CONTROLLED
5.2		3117	ORGANIC PEROXIDE TYPE E, LIQUID, TEMPERATURE CONTROLLED
5.2		3118	ORGANIC PEROXIDE TYPE E, SOLID, TEMPERATURE CONTROLLED
5.2		3119	ORGANIC PEROXIDE TYPE F, LIQUID, TEMPERATURE CONTROLLED
5.2		3120	ORGANIC PEROXIDE TYPE F, SOLID, TEMPERATURE CONTROLLED
			General entries
5.2	See 2.0.5.6	3545	ARTICLES CONTAINING ORGANIC PEROXIDE, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 6
			Division 6.1
			Specific entries
6.1		1544	ALKALOIDS, SOLID, N.O.S. or ALKALOID SALTS, SOLID, N.O.S.
6.1		1549	ANTIMONY COMPOUND, INORGANIC, SOLID, N.O.S.
6.1		1556	ARSENIC COMPOUND, LIQUID, N.O.S.
6.1		1557	ARSENIC COMPOUND, SOLID, N.O.S.
6.1		1564	BARIUM COMPOUND, N.O.S.
6.1		1566	BERYLLIUM COMPOUND, N.O.S.
6.1		1583	CHLOROPICRIN MIXTURE, N.O.S.
6.1		1588	CYANIDES, INORGANIC, SOLID, N.O.S.
6.1		1601	DISINFECTANT, SOLID, TOXIC, N.O.S.
6.1		1602	DYE, LIQUID, TOXIC, N.O.S. or DYE INTERMEDIATE, LIQUID, TOXIC, N.O.S.
6.1		1655	NICOTINE COMPOUND, SOLID, N.O.S. or NICOTINE PREPARATION, SOLID, N.O.S.
6.1		1693	TEAR GAS SUBSTANCE, LIQUID, N.O.S.
6.1		1707	THALLIUM COMPOUND, N.O.S.
6.1		1851	MEDICINE, LIQUID, TOXIC, N.O.S.
6.1		1935	CYANIDE SOLUTION, N.O.S.
6.1		2024	MERCURY COMPOUND, LIQUID, N.O.S.
6.1		2025	MERCURY COMPOUND, SOLID, N.O.S.
6.1		2026	PHENYLMERCURIC COMPOUND, N.O.S.
6.1		2206	ISOCYANATES, TOXIC, N.O.S. or ISOCYANATE SOLUTION, TOXIC, N.O.S.
6.1		2291	LEAD COMPOUND, SOLUBLE, N.O.S.
6.1		2570	CADMIUM COMPOUND
6.1		2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.
6.1		2856	FLUOROSILICATES, N.O.S.
6.1		3140	ALKALOIDS, LIQUID, N.O.S. or ALKALOID SALTS, LIQUID, N.O.S.
6.1		3141	ANTIMONY COMPOUND, INORGANIC, LIQUID, N.O.S.
6.1		3142	DISINFECTANT, LIQUID, TOXIC, N.O.S.
6.1		3143	DYE, SOLID, TOXIC, N.O.S. or DYE INTERMEDIATE, SOLID, TOXIC, N.O.S.
6.1		3144	NICOTINE COMPOUND, LIQUID, N.O.S. or NICOTINE PREPARATION, LIQUID, N.O.S.
6.1		3146	ORGANOTIN COMPOUND, SOLID, N.O.S.
6.1		3249	MEDICINE, SOLID, TOXIC, N.O.S.
6.1		3276	NITRILES, LIQUID, TOXIC, N.O.S.
6.1		3278	ORGANOPHOSPHORUS COMPOUND, LIQUID, TOXIC, N.O.S.
6.1		3280	ORGANOARSENIC COMPOUND LIQUID, N.O.S.
6.1		3281	METAL CARBONYLS LIQUID, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
6.1		3282	ORGANOMETALLIC COMPOUND, LIQUID, TOXIC, N.O.S.
6.1		3283	SELENIUM COMPOUND, SOLID, N.O.S.
6.1		3284	TELLURIUM COMPOUND, N.O.S.
6.1		3285	VANADIUM COMPOUND, N.O.S.
6.1		3439	NITRILES, SOLID, TOXIC, N.O.S.
6.1		3440	SELENIUM COMPOUND, LIQUID, N.O.S.
6.1		3448	TEAR GAS SUBSTANCE, SOLID, N.O.S.
6.1		3464	ORGANOPHOSPHORUS COMPOUND, SOLID, TOXIC, N.O.S.
6.1		3465	ORGANOARSENIC COMPOUND SOLID, N.O.S.
6.1		3466	METAL CARBONYLS SOLID, N.O.S.
6.1		3467	ORGANOMETALLIC COMPOUND, SOLID, TOXIC, N.O.S.
6.1	3	3071	MERCAPTANS, LIQUID, TOXIC, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURE, LIQUID, TOXIC, FLAMMABLE, N.O.S.
6.1	3	3080	ISOCYANATES, TOXIC, FLAMMABLE, N.O.S. or ISOCYANATE SOLUTION, TOXIC, FLAMMABLE, N.O.S.
6.1	3	3275	NITRILES, TOXIC, FLAMMABLE, N.O.S.
6.1	3	3279	ORGANOPHOSPHORUS COMPOUND, TOXIC, FLAMMABLE, N.O.S.
6.1	3 + 8	2742	CHLOROFORMATES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.
6.1	3 + 8	3362	CLOROSILANES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.
6.1	8	3277	CHLOROFORMATES, TOXIC, CORROSIVE, N.O.S.
6.1	8	3361	CLOROSILANES, TOXIC, CORROSIVE, N.O.S.
			Pesticides (solid)
6.1		2588	PESTICIDE, SOLID, TOXIC, N.O.S.
6.1		2757	CARBAMATE PESTICIDE, SOLID, TOXIC
6.1		2759	ARSENICAL PESTICIDE, SOLID, TOXIC
6.1		2761	ORGANOCHLORINE PESTICIDE, SOLID, TOXIC
6.1		2763	TRIAZINE PESTICIDE, SOLID, TOXIC
6.1		2771	THIOCARBAMATE PESTICIDE, SOLID, TOXIC
6.1		2775	COPPER BASED PESTICIDE, SOLID, TOXIC
6.1		2777	MERCURY BASED PESTICIDE, SOLID, TOXIC
6.1		2779	SUBSTITUTED NITROPHENOL PESTICIDE, SOLID, TOXIC
6.1		2781	BIPYRIDILIUM PESTICIDE, SOLID, TOXIC
6.1		2783	ORGANOPHOSPHORUS PESTICIDE, SOLID, TOXIC
6.1		2786	ORGANOTIN PESTICIDE, SOLID, TOXIC
6.1		3027	COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC
6.1		3345	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC
6.1		3349	PYRETHROID PESTICIDE, SOLID, TOXIC

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			Pesticides (liquid)
6.1		2902	PESTICIDE, LIQUID, TOXIC, N.O.S.
6.1		2992	CARBAMATE PESTICIDE, LIQUID, TOXIC
6.1		2994	ARSENICAL PESTICIDE, LIQUID, TOXIC
6.1		2996	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC
6.1		2998	TRIAZINE PESTICIDE, LIQUID, TOXIC
6.1		3006	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC
6.1		3010	COPPER BASED PESTICIDE, LIQUID, TOXIC
6.1		3012	MERCURY BASED PESTICIDE, LIQUID, TOXIC
6.1		3014	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC
6.1		3016	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC
6.1		3018	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC
6.1		3020	ORGANOTIN PESTICIDE, LIQUID, TOXIC
6.1		3026	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC
6.1		3348	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC
6.1		3352	PYRETHROID PESTICIDE, LIQUID, TOXIC
6.1	3	2903	PESTICIDE, LIQUID, TOXIC, FLAMMABLE, N.O.S., flash point 23 °C
6.1	3	2991	CARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	2993	ARSENICAL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	2995	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	2997	TRIAZINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3005	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3009	COPPER BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3011	MERCURY BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3013	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3015	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3017	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3019	ORGANOTIN PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3025	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3347	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C
6.1	3	3351	PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point 23 °C

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			General entries
6.1		2810	TOXIC LIQUID, ORGANIC, N.O.S.
6.1		2811	TOXIC SOLID, ORGANIC, N.O.S.
6.1		3172	TOXINS, EXTRACTED FROM LIVING SOURCES, LIQUID, N.O.S.
6.1		3243	SOLIDS CONTAINING TOXIC LIQUID, N.O.S.
6.1		3287	TOXIC LIQUID, INORGANIC, N.O.S.
6.1		3288	TOXIC SOLID, INORGANIC, N.O.S.
6.1		3315	CHEMICAL SAMPLE, TOXIC
6.1		3381	TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50}
6.1		3382	TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}
6.1		3462	TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.
6.1	3	2929	TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S.
6.1	3	3383	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50}
6.1	3	3384	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}
6.1	3 + 8	3488	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50}
6.1	3 + 8	3489	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}
6.1	4.1	2930	TOXIC SOLID, FLAMMABLE, ORGANIC, N.O.S.
6.1	4.1	3535	TOXIC SOLID, FLAMMABLE, INORGANIC, N.O.S.
6.1	4.2	3124	TOXIC SOLID, SELF-HEATING, N.O.S.
6.1	4.3	3123	TOXIC LIQUID, WATER-REACTIVE, N.O.S.
6.1	4.3	3125	TOXIC SOLID, WATER-REACTIVE, N.O.S.
6.1	4.3	3385	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50}
6.1	4.3	3386	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}
6.1	4.3 + 3	3490	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50}
6.1	4.3 + 3	3491	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}
6.1	5.1	3122	TOXIC LIQUID, OXIDIZING, N.O.S.
6.1	5.1	3086	TOXIC SOLID, OXIDIZING, N.O.S.
6.1	5.1	3387	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50}

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
6.1	5.1	3388	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}
6.1	8	2927	TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S.
6.1	8	2928	TOXIC SOLID, CORROSIVE, ORGANIC, N.O.S.
6.1	8	3289	TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S.
6.1	8	3290	TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S.
6.1	8	3389	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50}
6.1	8	3390	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}
6.1	See 2.0.5.6	3546	ARTICLES CONTAINING TOXIC SUBSTANCE, N.O.S.
			Division 6.2
			Specific entries
6.2		3291	CLINICAL WASTE, UNSPECIFIED, N.O.S. or (BIO) MEDICAL WASTE, N.O.S. or REGULATED MEDICAL WASTE, N.O.S.
6.2		3373	BIOLOGICAL SUBSTANCE, CATEGORY B
6.2		3549	MEDICAL WASTE, CATEGORY A, AFFECTING HUMANS, solid
6.2		3549	MEDICAL WASTE, CATEGORY A, AFFECTING ANIMALS only, solid
			General entries
6.2		2814	INFECTIOUS SUBSTANCE, AFFECTING HUMANS
6.2		2900	INFECTIOUS SUBSTANCE, AFFECTING ANIMALS only

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 7
			General entries
7		2908	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – EMPTY PACKAGING
7		2909	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM
7		2910	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – LIMITED QUANTITY OF MATERIAL
7		2911	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - INSTRUMENTS or ARTICLES
7		2912	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non fissile or fissile-excepted
7		2913	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I, SCO-II or SCO-III), non fissile or fissile-excepted
7		2915	RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non fissile or fissile-excepted
7		2916	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non fissile or fissile-excepted
7		2917	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non fissile or fissile-excepted
7		2919	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non fissile or fissile-excepted
7		3321	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non fissile or fissile-excepted
7		3322	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non fissile or fissile-excepted
7		3323	RADIOACTIVE MATERIAL, TYPE C PACKAGE, non fissile or fissile-excepted
7		3324	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE
7		3325	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), FISSILE
7		3326	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE
7		3327	RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE, non-special form
7		3328	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSILE
7		3329	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSILE
7		3330	RADIOACTIVE MATERIAL, TYPE C PACKAGE, FISSILE
7		3331	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE
7		3332	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, non fissile or fissile-excepted
7		3333	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSILE

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 8
			Specific entries
8		1719	CAUSTIC ALKALI LIQUID, N.O.S.
8		1740	HYDROGENDIFLUORIDES, SOLID, N.O.S.
8		1903	DISINFECTANT, LIQUID, CORROSIVE, N.O.S.
8		2430	ALKYLPHENOLS, SOLID, N.O.S.(including C2-C12 homologues)
8		2693	BISULPHITES, AQUEOUS SOLUTION, N.O.S.
8		2735	AMINES, LIQUID, CORROSIVE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, N.O.S.
8		2801	DYE, LIQUID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, LIQUID, CORROSIVE, N.O.S.
8		2837	BISULPHATES, AQUEOUS SOLUTION
8		2987	CHLOROSILANES, CORROSIVE, N.O.S.
8		3145	ALKYLPHENOLS, LIQUID, N.O.S.(including C2-C12 homologues)
8		3147	DYE, SOLID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, SOLID, CORROSIVE, N.O.S.
8		3259	AMINES, SOLID, CORROSIVE, N.O.S. or POLYAMINES, SOLID, CORROSIVE, N.O.S.
8	3	2734	AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S. or POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.
8	3	2986	CHLOROSILANES, CORROSIVE, FLAMMABLE, N.O.S.
8	6.1	3471	HYDROGENDIFLUORIDES SOLUTION, N.O.S.
			General entries
8		1759	CORROSIVE SOLID, N.O.S.
8		1760	CORROSIVE LIQUID, N.O.S.
8		3244	SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.
8		3260	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.
8		3261	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.
8		3262	CORROSIVE SOLID, BASIC, INORGANIC, N.O.S.
8		3263	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S.
8		3264	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
8		3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.
8		3266	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.
8		3267	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S.
8	3	2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
8	4.1	2921	CORROSIVE SOLID, FLAMMABLE, N.O.S.
8	4.2	3095	CORROSIVE SOLID, SELF-HEATING, N.O.S.
8	4.2	3301	CORROSIVE LIQUID, SELF-HEATING, N.O.S.
8	4.3	3094	CORROSIVE LIQUID, WATER-REACTIVE, N.O.S.
8	4.3	3096	CORROSIVE SOLID, WATER-REACTIVE, N.O.S.
8	5.1	3084	CORROSIVE SOLID, OXIDIZING, N.O.S.
8	5.1	3093	CORROSIVE LIQUID, OXIDIZING, N.O.S.
8	6.1	2922	CORROSIVE LIQUID, TOXIC, N.O.S.
8	6.1	2923	CORROSIVE SOLID, TOXIC, N.O.S.
8	See 2.0.5.6	3547	ARTICLES CONTAINING CORROSIVE SUBSTANCE, N.O.S.

Class or Division	Subsidiary Hazard	UN No	Proper Shipping Name
			CLASS 9
			General entries
9		3077	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
9		3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
9		3245	GENETICALLY MODIFIED MICROORGANISMS or GENETICALLY MODIFIED ORGANISMS
9		3257	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flash point (including molten metals, molten salts, etc.)
9		3258	ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C
9		3334	AVIATION REGULATED LIQUID, N.O.S.
9		3335	AVIATION REGULATED SOLID, N.O.S.
9	See 2.0.5.6	3548	ARTICLES CONTAINING MISCELLANEOUS DANGEROUS GOODS, N.O.S

APPENDIX B

GLOSSARY OF TERMS

Caution: The explanations in this Glossary are for information only and are not to be used for purposes of hazard classification.

Ammunition

Generic term related mainly to articles of military application consisting of all kind of bombs, grenades, rockets, mines, projectiles and other similar devices or contrivances.

AMMUNITION, ILLUMINATING with or without burster, expelling charge or propelling charge

Ammunition designed to produce a single source of intense light for lighting up an area. The term includes illuminating cartridges, grenades and projectiles; and illuminating and target identification bombs. The term excludes the following articles which are listed separately: CARTRIDGES, SIGNAL; SIGNAL DEVICES, HAND; SIGNALS, DISTRESS; FLARES, AERIAL and FLARES, SURFACE.

AMMUNITION, INCENDIARY

Ammunition containing incendiary substances which may be a solid, liquid or gel including white phosphorus. Except when the composition is an explosive per se, it also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes:

AMMUNITION, INCENDIARY, liquid or gel, with burster, expelling charge or propelling charge;
AMMUNITION, INCENDIARY with or without burster, expelling charge or propelling charge;
AMMUNITION, INCENDIARY, WHITE PHOSPHORUS with burster, expelling charge or propelling charge.

AMMUNITION, PRACTICE

Ammunition without a main bursting charge, containing a burster or expelling charge. Normally it also contains a fuze and a propelling charge. The term excludes the following articles which are listed separately: GRENADES, PRACTICE.

AMMUNITION, PROOF

Ammunition containing pyrotechnic substances, used to test the performance or strength of new ammunition, weapon component or assemblies.

AMMUNITION, SMOKE

Ammunition containing smoke-producing substance such as chlorosulphonic acid mixture, titanium tetrachloride or white phosphorus; or smoke-producing pyrotechnic composition based on hexachloroethane or red phosphorus. Except when the substance is an explosive per se, the ammunition also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes grenades, smoke but excludes SIGNALS, SMOKE which are listed separately. The term includes:

AMMUNITION, SMOKE with or without burster, expelling charge or propelling charge;

AMMUNITION, SMOKE, WHITE PHOSPHORUS with burster, expelling charge or propelling charge.

AMMUNITION, TEAR-PRODUCING with burster, expelling charge or propelling charge

Ammunition containing tear-producing substance. It also contains one or more of the following: a pyrotechnic substance; a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

AMMUNITION, TOXIC with burster, expelling charge or propelling charge

Ammunition containing toxic agent. It also contains one or more of the following: a pyrotechnic substance; a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES, EEI)

Articles that predominantly contain extremely insensitive substances and which demonstrate a negligible probability of accidental initiation or propagation (under normal conditions of transport) and which have passed test series 7.

ARTICLES, PYROPHORIC

Articles which contain a pyrophoric substance (capable of spontaneous ignition when exposed to air) and an explosive substance or component. The term excludes articles containing white phosphorus.

ARTICLES, PYROTECHNIC for technical purposes

Articles which contain pyrotechnic substances and are used for technical purposes such as heat generation, gas generation, theatrical effects, etc. The term excludes the following articles which are listed separately: all ammunition; CARTRIDGES, SIGNAL; CUTTERS, CABLE, EXPLOSIVE; FIREWORKS; FLARES, AERIAL; FLARES, SURFACE; RELEASE DEVICES, EXPLOSIVE; RIVETS, EXPLOSIVE; SIGNAL DEVICES, HAND; SIGNALS, DISTRESS; SIGNALS, RAILWAY TRACK, EXPLOSIVE; SIGNALS, SMOKE.

Auxiliary explosive component, isolated

An "isolated auxiliary explosive component" is a small device that explosively performs an operation related to the article’s functioning, other than its main explosive loads’ performance. Functioning of the component does not cause any reaction of the main explosive loads contained within the article.

BLACK POWDER (GUNPOWDER)

Substance consisting of an intimate mixture of charcoal or other carbon and either potassium nitrate or sodium nitrate, with or without sulphur. It may be meal, granular, compressed or pelletized.

Bombs

Explosive articles which are dropped from aircraft. They may contain a flammable liquid with bursting charge, a photo-flash composition or a bursting charge. The term excludes torpedoes (aerial) and includes:

BOMBS, PHOTO-FLASH;
BOMBS with bursting charge;
BOMBS WITH FLAMMABLE LIQUID with bursting charge.

BOOSTERS

Articles consisting of a charge of detonating explosive with or without means of initiation. They are used to increase the initiating power of detonators or detonating cord.

BURSTERS, explosive

Articles consisting of a small charge of explosive used to open projectiles, or other ammunition in order to disperse their contents.

Cartridges, blank

Articles which consist of a cartridge case with a centre or rim fire primer and a confined charge of smokeless or black powder but no projectile. Used for training, saluting or in starter pistols, tools, etc.

CARTRIDGES, FLASH

Articles consisting of a casing, a primer and flash powder, all assembled in one piece ready for firing.

Cartridges for Weapons

(1) Fixed (assembled) or semi-fixed (partially-assembled) ammunition designed to be fired from weapons. Each cartridge includes all the components necessary to function the weapon once. The name and description shall be used for small arms cartridges that cannot be described as “cartridges, small arms”. Separate loading ammunition is included under this name and description when the propelling charge and projectile are packed together (see also “Cartridges, blank”).

(2) Incendiary, smoke, toxic and tear-producing cartridges are described in this Glossary under AMMUNITION, INCENDIARY etc.

CARTRIDGES FOR WEAPONS, INERT PROJECTILE

Ammunition consisting of a projectile without bursting charge but with a propelling charge. The presence of a tracer can be disregarded for classification purposes provided that the predominant hazard is that of the propelling charge.

CARTRIDGES, OIL WELL

Articles consisting of a casing of thin fibre, metal or other material containing only propellant which projects a hardened projectile. The term excludes the following articles which are listed separately: CHARGES, SHAPED.

CARTRIDGES, POWER DEVICE

Articles designed to accomplish mechanical actions. They consist of a casing with a charge of deflagrating explosive and a means of ignition. The gaseous products of the deflagration produce inflation, or linear or rotary motion, or activate diaphragms, valves or switches or project fastening devices or extinguishing agents.

CARTRIDGES, SIGNAL

Articles designed to fire coloured flares or other signals from signal pistols, etc.

CARTRIDGES, SMALL ARMS

Ammunition consisting of a cartridge case fitted with a centre or rim fire primer and containing both a propelling charge and a solid projectile. They are designed to be fired in weapons of calibre not larger than 19.1 mm. Shot-gun cartridges of any calibre are included in this description. The term excludes: CARTRIDGES, SMALL ARMS, BLANK listed separately in the Dangerous Goods List; and some small arms cartridges which are listed under CARTRIDGES FOR WEAPONS, INERT PROJECTILE.

CASES, CARTRIDGE, EMPTY, WITH PRIMER

Articles consisting of a cartridge case made from metal, plastics or other non-flammable material, in which the only explosive component is the primer.

CASES, COMBUSTIBLE, EMPTY, WITHOUT PRIMER

Articles consisting of cartridge cases made partly or entirely from nitrocellulose.

Charges, bursting

Articles consisting of a charge of detonating explosive such as hexolite, octolite or plastics bonded explosive designed to produce effect by blast or fragmentation.

CHARGES, DEMOLITION

Articles containing a charge of a detonating explosive in a casing of fibreboard, plastics, metal or other material. The term excludes the following articles which are listed separately: bombs, mines, etc.

CHARGES, DEPTH

Articles consisting of a charge of detonating explosive contained in a drum or projectile. They are designed to detonate under water.

Charges, expelling

A charge of deflagrating explosive designed to eject the payload from the parent articles without damage.

CHARGES, EXPLOSIVE, COMMERCIAL without detonator

Articles consisting of a charge of detonating explosive without means of initiation, used for explosive welding, jointing, forming and other metallurgical processes.

CHARGES, PROPELLING

Articles consisting of a propellant charge in any physical form, with or without a casing, for use as a component of rocket motors or for reducing the drag of projectiles.

CHARGES, PROPELLING FOR CANNON

Articles consisting of a propellant charge in any physical form, with or without a casing, for use in a cannon.

CHARGES, SHAPED, without detonator

Articles consisting of a casing containing a charge of detonating explosive with a cavity lined with rigid material, without means of initiation. They are designed to produce a powerful, penetrating jet effect.

CHARGES, SHAPED, FLEXIBLE, LINEAR

Articles consisting of a V-shaped core of a detonating explosive clad by a flexible metal sheath.

CHARGES, SUPPLEMENTARY, EXPLOSIVE

Articles consisting of a small removable booster used in the cavity of a projectile between the fuze and the bursting charge.

COMPONENTS, EXPLOSIVE TRAIN, N.O.S.

Articles containing an explosive designed to transmit the detonation or deflagration within an explosive train.

CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge

Articles whose functioning depends upon physico-chemical reaction of their contents with water.

CORD, DETONATING, flexible

Article consisting of a core of detonating explosive enclosed in spun fabric, with plastics or other covering unless the spun fabric is sift-proof.

CORD (FUSE), DETONATING, metal clad

Article consisting of a core of detonating explosive clad by a soft metal tube with or without protective covering. When the core contains a sufficiently small quantity of explosive, the words “MILD EFFECT” are added.

CORD, IGNITER

Article consisting of textile yarns covered with black powder or another fast burning pyrotechnic composition and of a flexible protective covering; or it consists of a core of black powder surrounded by a flexible woven fabric. It burns progressively along its length with an external flame and is used to transmit ignition from a device to a charge or primer.

CUTTERS, CABLE, EXPLOSIVE

Articles consisting of a knife-edged device which is driven by a small charge of deflagrating explosive into an anvil.

DETONATOR ASSEMBLIES, NON-ELECTRIC for blasting

Non-electric detonators assembled with and activated by such means as safety fuse, shock tube, flash tube or detonating cord. They may be of instantaneous design or incorporate delay elements. Detonating relays incorporating detonating cord are included. Other detonating relays are included in “Detonators, non-electric”.

Detonators

Articles consisting of a small metal or plastics tube containing explosives such as lead azide, PETN or combinations of explosives. They are designed to start a detonation train. They may be constructed to detonate instantaneously, or may contain a delay element. The term includes:

DETONATORS FOR AMMUNITION and
DETONATORS for blasting, ELECTRIC, NON-ELECTRIC and ELECTRONIC programmable.

Detonating relays without flexible detonating cord are included.

DETONATORS, ELECTRONIC programmable for blasting

Detonators with enhanced safety and security features, utilizing electronic components to transmit a firing signal with validated commands and secure communications. Detonators of this type cannot be initiated by other means.

Entire load and total contents

The phrases “entire load” and “total contents” mean such a substantial proportion that the practical hazard shall be assessed by assuming simultaneous explosion of the whole of the explosive content of the load or package.

Explode

The verb used to indicate those explosive effects capable of endangering life and property through blast, heat and projection of missiles. It encompasses both deflagration and detonation.

Explosion of the total contents

The phrase “explosion of the total contents” is used in testing a single article or package or a small stack of articles or packages.

Explosive, blasting

Detonating explosive substances used in mining, construction and similar tasks. Blasting explosives are assigned to one of five types. In addition to the ingredients listed, blasting explosives may also contain inert components such as kieselguhr, and minor ingredients such as colouring agents and stabilizers.

EXPLOSIVE, BLASTING, TYPE A

Substances consisting of liquid organic nitrates such as nitroglycerin or a mixture of such ingredients with one or more of the following: nitrocellulose; ammonium nitrate or other inorganic nitrates; aromatic nitro-derivatives, or combustible materials, such as wood-meal and aluminium powder. Such explosives shall be in powdery, gelatinous or elastic form.

The term includes dynamite gelatine, blasting and gelatine dynamites.

EXPLOSIVE, BLASTING, TYPE B

Substances consisting of (a) a mixture of ammonium nitrate or other inorganic nitrates with an explosive such as trinitrotoluene, with or without other substances such as wood-meal and aluminium powder, or (b) a mixture of ammonium nitrate or other inorganic nitrates with other combustible substances which are not explosive ingredients. Such explosives shall not contain nitroglycerin, similar liquid organic nitrates, or chlorates.

EXPLOSIVE, BLASTING, TYPE C

Substances consisting of a mixture of either potassium or sodium chlorate or potassium, sodium or ammonium perchlorate with organic nitro-derivatives or combustible materials such as wood-meal or aluminium powder or a hydrocarbon. Such explosives shall not contain nitroglycerin or similar liquid organic nitrates.

EXPLOSIVE, BLASTING, TYPE D

Substances consisting of a mixture of organic nitrated compounds and combustible materials such as hydrocarbons and aluminium powder. Such explosives shall not contain nitroglycerin, similar liquid organic nitrates, chlorates or ammonium nitrate. The term generally includes plastic explosives.

EXPLOSIVE, BLASTING, TYPE E

Substances consisting of water as an essential ingredient and high proportions of ammonium nitrate or other oxidizers, some or all of which are in solution. The other constituents may include nitro-derivatives such as trinitrotoluene, hydrocarbons or aluminium powder.

The term includes explosives, emulsion; explosives slurry and explosives, water gel.

Explosive, deflagrating

A substance, e.g. propellant, which reacts by deflagration rather than detonation when ignited and used in its normal manner.

Explosive, detonating

A substance which reacts by detonation rather than deflagration when initiated and used in its normal manner.

Explosive, extremely insensitive substances (EIS)

A substance which has demonstrated through tests that it is so insensitive that there is very little probability of accidental initiation.

Explosive, primary

Explosive substance manufactured with a view to producing a practical effect by explosion which is very sensitive to heat, impact or friction and which, even in very small quantities, either detonates or burns very rapidly. It is able to transmit detonation (in the case of initiating explosive) or deflagration to secondary explosives close to it. The main primary explosives are mercury fulminate, lead azide and lead styphnate.

Explosive, secondary

Explosive substance which is relatively insensitive (when compared to primary explosives), which is usually initiated by primary explosives with or without the aid of boosters or supplementary charges. Such an explosive may react as a deflagrating or as a detonating explosive.

FIREWORKS

Pyrotechnic articles designed for entertainment.

Flares

Articles containing pyrotechnic substances which are designed for use to illuminate, identify, signal or warn. The term includes:

FLARES, AERIAL;
FLARES, SURFACE.

FLASH POWDER

Pyrotechnic substance which, when ignited, produces an intense light.

FRACTURING DEVICES, EXPLOSIVE for oil wells, without detonator

Articles consisting of a charge of detonating explosive contained in a casing without means of initiation. They are used to fracture the rock around a drill shaft to assist the flow of crude oil from the rock.

Fuse/Fuze (English text only)

Although these two words have a common origin (French fusée, fusil) and are sometimes considered to be different spellings, it is useful to maintain the convention that fuse refers to a cord-like igniting device whereas fuze refers to a device used in ammunition which incorporates mechanical, electrical, chemical or hydrostatic components to initiate a train by deflagration or detonation.

FUSE, IGNITER, tubular, metal clad

Article consisting of a metal tube with a core of deflagrating explosive.

FUSE, INSTANTANEOUS, NON-DETONATING (QUICKMATCH)

Article consisting of cotton yarns impregnated with fine black powder (Quickmatch). It burns with an external flame and is used in ignition trains for fireworks, etc.

FUSE, SAFETY

Article consisting of a core of fine-grained black powder surrounded by a flexible woven fabric with one or more protective outer coverings. When ignited, it burns at a predetermined rate without any external explosive effect.

Fuzes

Articles designed to start a detonation or a deflagration in ammunition. They incorporate mechanical, electrical, chemical or hydrostatic components and generally protective features. The term includes:

FUZES, DETONATING;
FUZES, DETONATING with protective features;
FUZES, IGNITING.

GRENADES, hand or rifle

Articles which are designed to be thrown by hand or to be projected by a rifle. The term includes:

GRENADES, hand or rifle, with bursting charge;
GRENADES, PRACTICE, hand or rifle.

The term excludes grenades, smoke which are listed under AMMUNITION, SMOKE.

IGNITERS

Articles containing one or more explosive substances used to start deflagration in an explosive train. They may be actuated chemically, electrically or mechanically. This term excludes the following articles which are listed separately: CORD, IGNITER; FUSE, IGNITER; FUSE, NON-DETONATING; FUZES, IGNITING; LIGHTERS, FUSE; PRIMERS, CAP TYPE; PRIMERS, TUBULAR.

Ignition, means of

A general term used in connection with the method employed to ignite a deflagrating train of explosive or pyrotechnic substances (for example: a primer for a propelling charge; an igniter for a rocket motor; an igniting fuze).

Initiation, means of

(1) A device intended to cause the detonation of an explosive (for example: detonator; detonator for ammunition; detonating fuze).

(2) The term "with its own means of initiation" means that the contrivance has its normal initiating device assembled to it and this device is considered to present a significant risk during transport but not one great enough to be unacceptable. The term does not apply, however, to a contrivance packed together with its means of initiation provided the device is packaged so as to eliminate the risk of causing detonation of the contrivance in the event of accidental functioning of the initiating device. The means of initiating can even be assembled to the contrivance provided there are protective features such that the device is very unlikely to cause detonation of the contrivance in conditions which are associated with transport.

(3) For the purposes of classification any means of initiation without two effective protective features shall be regarded as Compatibility Group B; an article with its own means of initiation, without two effective protective features, would be Compatibility Group F. On the other hand a means of initiation which itself possesses two effective protective features would be Compatibility Group D; and an article with a means of initiation which possesses two effective protective features would be Compatibility Group D or E. Means of initiation adjudged as having two effective protective features shall have been approved by the competent national authority. A common and effective way of achieving the necessary degree of protection is to use a means of initiation which incorporates two or more independent safety features.

JET PERFORATING GUNS, CHARGED, oil well, without detonator

Articles consisting of a steel tube or metallic strip, into which are inserted shaped charges connected by detonating cord, without means of initiation.

LIGHTERS, FUSE

Articles of various design actuated by friction, percussion or electricity and used to ignite a safety fuse.

Mass explosion

Explosion which affects almost the entire load virtually instantaneously.

MINES

Articles consisting normally of metal or composition receptacles and a bursting charge. They are designed to be operated by the passage of ships, vehicles or personnel. The term includes "Bangalore torpedoes".

OXYGEN GENERATORS, CHEMICAL

Oxygen generators, chemical, are devices containing chemicals which upon activation release oxygen as a product of chemical reaction. Chemical oxygen generators are used for the generation of oxygen for respiratory support, e.g. in aircraft, submarines, spacecraft, bomb shelters and breathing apparatus. Oxidizing salts such as chlorates and perchlorates of lithium, sodium and potassium, which are used in chemical oxygen generators, evolve oxygen when heated. These salts are mixed (compounded) with a fuel, usually iron powder, to form a chlorate candle, which produces oxygen by continuous reaction. The fuel is used to generate heat by oxidation. Once the reaction begins, oxygen is released from the hot salt by thermal decomposition (a thermal shield is used around the generator). A portion of the oxygen reacts with the fuel to produce more heat which produces more oxygen, and so on. Initiation of the reaction can be achieved by a percussion device, friction device or electric wire.

POWDER CAKE (POWDER PASTE), WETTED

Substance consisting of nitrocellulose impregnated with not more than 60 % of nitroglycerin or other liquid organic nitrates or a mixture of these.

POWDER, SMOKELESS

Substance based on nitrocellulose used as propellant. The term includes propellants with a single base (nitrocellulose (NC) alone), those with a double base (such as NC and nitroglycerin (NG)) and those with a triple base (such as NC/NG/nitroguanidine). Cast, pressed or bag-charges of smokeless powder are listed under "CHARGES, PROPELLING" or "CHARGES, PROPELLING FOR CANNON".

PRIMERS, CAP TYPE

Articles consisting of a metal or plastics cap containing a small amount of primary explosive mixture that is readily ignited by impact. They serve as igniting elements in small arms cartridges, and in percussion primers for propelling charges.

PRIMERS, TUBULAR

Articles consisting of a primer for ignition and an auxiliary charge of deflagrating explosive such as black powder used to ignite the propelling charge in a cartridge case for cannon, etc.

PROJECTILES

Articles such as a shell or bullet which are projected from a cannon or other artillery gun, rifle or other small arm. They may be inert, with or without tracer, or may contain a burster or expelling charge or a bursting charge. The term includes:

PROJECTILES, inert, with tracer;
PROJECTILES with burster or expelling charge;
PROJECTILES with bursting charge.

PROPELLANTS

Deflagrating explosive used for propulsion or for reducing the drag of projectiles.

PROPELLANTS, LIQUID

Substances consisting of a deflagrating liquid explosive, used for propulsion.

PROPELLANTS, SOLID

Substances onsisting of a deflagrating solid explosive, used for propulsion.

RELEASE DEVICES, EXPLOSIVE

Articles consisting of a small charge of explosive with means of initiation. They sever rods or links to release equipment quickly.

ROCKET MOTORS

Articles consisting of a solid, liquid or hypergolic fuel contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile. The term includes:

ROCKET MOTORS;
ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without expelling charge;
ROCKET MOTORS, LIQUID FUELLED.

ROCKETS

Articles consisting of a rocket motor and a payload which may be an explosive warhead or other device. The term includes guided missiles and:

ROCKETS, LINE-THROWING;
ROCKETS, LIQUID FUELLED with bursting charge;
ROCKETS with bursting charge;
ROCKETS with expelling charge;
ROCKETS with inert head.

SAFETY DEVICES, electrically initiated

Articles which contain pyrotechnic substances or dangerous goods of other classes and are used in vehicles, vessels or aircraft to enhance safety to persons. Examples are: air bag inflators, air bag modules, seat-belt pretensioners and pyromechanical devices. These pyromechanical devices are assembled components for tasks such as but not limited to separation, locking, or release-and-drive or occupant restraint. The term includes "SAFETY DEVICES, PYROTECHNIC".

SIGNALS

Articles containing pyrotechnic substances designed to produce signals by means of sound, flame or smoke or any combinations thereof. The term includes:

SIGNAL DEVICES, HAND;
SIGNALS, DISTRESS, ship;
SIGNALS, RAILWAY TRACK, EXPLOSIVE;
SIGNALS, SMOKE.

SOUNDING DEVICES, EXPLOSIVE

Articles consisting of a charge of detonating explosive. They are dropped from ships and function when they reach a predetermined depth or the sea-bed.

STABILIZED

Stabilized means that the substance is in a condition that precludes uncontrolled reaction. This may be achieved by methods such as the addition of an inhibiting chemical, degassing the substance to remove dissolved oxygen and inerting the air space in the package, or maintaining the substance under temperature control.

SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE (SUBSTANCES, EVI), N.O.S.

Substances which present a mass explosion hazard but which are so insensitive that there is very little probability of initiation, or of transition from burning to detonation (under normal conditions of transport) and which have passed test series 5.

TORPEDOES

Articles containing an explosive or non-explosive propulsion system and designed to be propelled through water. They may contain an inert head or a warhead. The term includes:

TORPEDOES, LIQUID FUELLED with inert head;
TORPEDOES, LIQUID FUELLED with or without bursting charge;
TORPEDOES with bursting charge.

TRACERS FOR AMMUNITION

Sealed articles containing pyrotechnic substances, designed to reveal the trajectory of a projectile.

Warheads

Articles consisting of detonating explosives. They are designed to be fitted to a rocket, guided missile or torpedo. They may contain a burster or expelling charge or bursting charge. The term includes:

WARHEADS, ROCKET with burster or expelling charge;
WARHEADS, ROCKET with bursting charge;
WARHEADS, TORPEDO with bursting charge.

ALPHABETICAL INDEX

OF

SUBSTANCES
AND ARTICLES

NOTES TO THE INDEX

1. This index is an alphabetical list of the substances and articles which are listed in numerical order in the Dangerous Goods List in Chapter 3.2.

2. For the purpose of determining the alphabetical order the following information has been ignored even when it forms part of the proper shipping name: numbers; Greek letters; the abbreviations “sec” and “tert”; the prefixes “cis” and “trans”; and the letters “N” (nitrogen), “n” (normal), “o” (ortho) “m” (meta), “p” (para) and “N.O.S.” (not otherwise specified).

3. The name of a substance or article in block capital letters indicates a proper shipping name.

4. The name of a substance or article in block capital letters followed by the word “see” indicates an alternative proper shipping name or part of a proper shipping name (except for PCBs).

5. An entry in lower case letters followed by the word “see” indicates that the entry is not a proper shipping name; it is a synonym.

6. Where an entry is partly in block capital letters and partly in lower case letters, the latter part is considered not to be part of the proper shipping name.

7. A proper shipping name may be used in the singular or plural, as appropriate, for the purposes of documentation and package marking.

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Name and description	Class	UN No.
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ARYLSULPHONIC ACIDS, LIQUID with not more than 5 % free sulphuric acid	8	2586
ARYLSULPHONIC ACIDS, SOLID with more than 5 % free sulphuric acid	8	2583
ARYLSULPHONIC ACIDS, SOLID with not more than 5 % free sulphuric acid	8	2585
ASBESTOS, AMPHIBOLE	9	2212
ASBESTOS, CHRYSOTILE	9	2590
AVIATION REGULATED LIQUID, N.O.S.	9	3334
AVIATION REGULATED SOLID, N.O.S.	9	3335
AZODICARBONAMIDE	4.1	3242
Bag charges, see	1.1C 1.2C 1.3C	0279 0414 0242
Ballistite, see	1.1C 1.3C	0160 0161
Bangalore torpedoes, see	1.1D 1.1F 1.2D 1.2F	0137 0136 0138 0294
BARIUM	4.3	1400
BARIUM ALLOYS, PYROPHORIC	4.2	1854
BARIUM AZIDE, dry or wetted with less than 50 % water, by mass	1.1A	0224
BARIUM AZIDE, WETTED with not less than 50 % water, by mass	4.1	1571
Barium binoxide, see	5.1	1449
BARIUM BROMATE	5.1	2719
BARIUM CHLORATE, SOLID	5.1	1445
BARIUM CHLORATE SOLUTION	5.1	3405
BARIUM COMPOUND, N.O.S.	6.1	1564
BARIUM CYANIDE	6.1	1565
Barium dioxide, see	5.1	1449

Name and description	Class	UN No.
BARIUM HYPOCHLORITE with more than 22 % available chlorine	5.1	2741
BARIUM NITRATE	5.1	1446
BARIUM OXIDE	6.1	1884
BARIUM PERCHLORATE, SOLID	5.1	1447
BARIUM PERCHLORATE SOLUTION	5.1	3406
BARIUM PERMANGANATE	5.1	1448
BARIUM PEROXIDE	5.1	1449
Barium selenate, see	6.1	2630
Barium selenite, see	6.1	2630
Barium superoxide, see	5.1	1449
BATTERIES, CONTAINING SODIUM	4.3	3292
BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE SOLID, electric storage	8	3028
BATTERIES, NICKEL-METAL HYDRIDE	9	3496
BATTERIES, WET, FILLED WITH ACID, electric storage	8	2794
BATTERIES, WET, FILLED WITH ALKALI, electric storage	8	2795
BATTERIES, WET, NON-SPILLABLE, electric storage	8	2800
BATTERY FLUID, ACID	8	2796
BATTERY FLUID, ALKALI	8	2797
Battery, lithium ion, see	9	3480
	9	3481
Battery, lithium metal, see	9	3090
	9	3091
BATTERY-POWERED EQUIPMENT	9	3171
BATTERY-POWERED VEHICLE	9	3171
BENZALDEHYDE	9	1990
BENZENE	3	1114
BENZENESULPHONYL CHLORIDE	8	2225
Benzenethiol, see	6.1	2337
BENZIDINE	6.1	1885
Benzol, see	3	1114
Benzolene, see	3	1268
BENZONITRILE	6.1	2224
BENZOQUINONE	6.1	2587
Benzosulphochloride, see	8	2225
BENZOTRICHLORIDE	8	2226
BENZOTRIFLUORIDE	3	2338
BENZOYL CHLORIDE	8	1736
BENZYL BROMIDE	6.1	1737
BENZYL CHLORIDE	6.1	1738
Benzyl chlorocarbonate, see	8	1739
BENZYL CHLOROFORMATE	8	1739
Benzyl cyanide, see	6.1	2470
BENZYLDIMETHYLAMINE	8	2619
BENZYLIDENE CHLORIDE	6.1	1886
BENZYL IODIDE	6.1	2653
BERYLLIUM COMPOUND, N.O.S.	6.1	1566
BERYLLIUM NITRATE	5.1	2464
BERYLLIUM POWDER	6.1	1567
BHUSA	4.1	1327
BICYCLO[2.2.1]HEPTA-2,5-DIENE, STABILIZED	3	2251
Bifluorides, n.o.s., see	8	1740
BIOLOGICAL SUBSTANCE, CATEGORY B	6.2	3373
(BIO) MEDICAL WASTE, N.O.S.	6.2	3291
BIPYRIDILIUM PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2782
BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC	6.1	3016
BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3015
BIPYRIDILIUM PESTICIDE, SOLID, TOXIC	6.1	2781

Name and description	Class	UN No.
BISULPHATES, AQUEOUS SOLUTION	8	2837
BISULPHITES, AQUEOUS SOLUTION, N.O.S.	8	2693
BLACK POWDER, COMPRESSED	1.1D	0028
BLACK POWDER, granular or as a meal	1.1D	0027
BLACK POWDER, IN PELLETS	1.1D	0028
Blasting cap assemblies, see	1.1B 1.4B	0360 0361
Blasting caps, electric, see	1.1B 1.4B 1.4S	0030 0255 0456
Blasting caps, non electric, see	1.1B 1.4B 1.4S	0029 0267 0455
Bleaching powder, see	5.1	2208
BOMBS with bursting charge	1.1D 1.1F 1.2D 1.2F	0034 0033 0035 0291
Bombs, illuminating, see	1.3G	0254
BOMBS, PHOTO-FLASH	1.1D 1.1F 1.2G 1.3G	0038 0037 0039 0299
BOMBS, SMOKE, NON-EXPLOSIVE with corrosive liquid, without initiating device	8	2028
Bombs, target identification, see	1.2G 1.3G 1.4G	0171 0254 0297
BOMBS WITH FLAMMABLE LIQUID with bursting charge	1.1J 1.2J	0399 0400
BOOSTERS without detonator	1.1D 1.2D	0042 0283
BOOSTERS WITH DETONATOR	1.1B 1.2B	0225 0268
Borate and chlorate mixture, see	5.1	1458
BORNEOL	4.1	1312
BORON TRIBROMIDE	8	2692
BORON TRICHLORIDE	2.3	1741
BORON TRIFLUORIDE	2.3	1008
BORON TRIFLUORIDE ACETIC ACID COMPLEX, LIQUID	8	1742
BORON TRIFLUORIDE ACETIC ACID COMPLEX, SOLID	8	3419
BORON TRIFLUORIDE, ADSORBED	2.3	3519
BORON TRIFLUORIDE DIETHYL ETHERATE	8	2604
BORON TRIFLUORIDE DIHYDRATE	8	2851
BORON TRIFLUORIDE DIMETHYL ETHERATE	4.3	2965
BORON TRIFLUORIDE PROPIONIC ACID COMPLEX, LIQUID	8	1743
BORON TRIFLUORIDE PROPIONIC ACID COMPLEX, SOLID	8	3420
BROMATES, INORGANIC, N.O.S.	5.1	1450
BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S	5.1	3213
BROMINE	8	1744
BROMINE CHLORIDE	2.3	2901
BROMINE PENTAFLUORIDE	5.1	1745
BROMINE SOLUTION	8	1744
BROMINE TRIFLUORIDE	5.1	1746
BROMOACETIC ACID SOLUTION	8	1938
BROMOACETIC ACID, SOLID	8	3425
BROMOACETONE	6.1	1569
omega-Bromoacetone, see	6.1	2645
BROMOACETYL BROMIDE	8	2513
BROMOBENZENE	3	2514
BROMOBENZYL CYANIDES, LIQUID	6.1	1694
BROMOBENZYL CYANIDES, SOLID	6.1	3449
1-BROMOBUTANE	3	1126
2-BROMOBUTANE	3	2339
BROMOCHLOROMETHANE	6.1	1887
1-BROMO-3-CHLOROPROPANE	6.1	2688

Name and description	Class	UN No.
1-Bromo-2,3-epoxypropane, see	6.1	2558
Bromoethane, see	6.1	1891
2-BROMOETHYL ETHYL ETHER	3	2340
BROMOFORM	6.1	2515
Bromomethane, see	2.3	1062
1-BROMO-3-METHYLBUTANE	3	2341
BROMOMETHYLPROPANES	3	2342
2-BROMO-2-NITROPROPANE-1,3-DIOL	4.1	3241
2-BROMOPENTANE	3	2343
BROMOPROPANES	3	2344
3-BROMOPROPYNE	3	2345
BROMOTRIFLUOROETHYLENE	2.1	2419
BROMOTRIFLUOROMETHANE	2.2	1009
BRUCINE	6.1	1570
BURSTERS, explosive	1.1D	0043
BUTADIENES, STABILIZED	2.1	1010
BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, containing more than 40 % butadienes	2.1	1010
BUTANE	2.1	1011
BUTANEDIONE	3	2346
Butane-1-thiol, see	3	2347
1-Butanol, see	3	1120
Butan-2-ol, see	3	1120
BUTANOLS	3	1120
Butanol, secondary, see	3	1120
Butanol, tertiary, see	3	1120
Butanone, see	3	1193
2-Butenal, see	6.1	1143
Butene, see	2.1	1012
But-1-ene-3-one, see	6.1	1251
1,2-Buteneoxide, see	3	3022
2-Buten-1-ol, see	3	2614
BUTYL ACETATES	3	1123
Butyl acetate, secondary, see	3	1123
BUTYL ACID PHOSPHATE	8	1718
BUTYL ACRYLATES, STABILIZED	3	2348
Butyl alcohols, see	3	1120
n-BUTYLAMINE	3	1125
N-BUTYLANILINE	6.1	2738
sec-Butyl benzene, see	3	2709
BUTYLBENZENES	3	2709
n-Butyl bromide, see	3	1126
n-Butyl chloride, see	3	1127
n-BUTYL CHLOROFORMATE	6.1	2743
tert-BUTYLCYCLOHEXYL CHLOROFORMATE	6.1	2747
BUTYLENE	2.1	1012
1-butylene, see	2.1	1012
cis-2-butylene, see	2.1	1012
trans-2-butylene, see	2.1	1012
1,2-BUTYLENE OXIDE, STABILIZED	3	3022
Butyl ethers, see	3	1149
Butyl ethyl ether, see	3	1179
n-BUTYL FORMATE	3	1128
tert-BUTYL HYPOCHLORITE	4.2	3255
N,n-BUTYLIMIDAZOLE	6.1	2690
N,n-Butyliminazole, see	6.1	2690
n-BUTYL ISOCYANATE	6.1	2485
tert-BUTYL ISOCYANATE	6.1	2484
Butyl lithium, see	4.2	3394
BUTYL MERCAPTAN	3	2347
n-BUTYL METHACRYLATE, STABILIZED	3	2227
BUTYL METHYL ETHER	3	2350
BUTYL NITRITES	3	2351

Name and description	Class	UN No.
Butylphenols, liquid, see	8	3145
Butylphenols, solid, see	8	2430
BUTYL PROPIONATES	3	1914
p-tert-Butyltoluene, see	6.1	2667
BUTYLTOLUENES	6.1	2667
BUTYLTRICHLOROSILANE	8	1747
5-tert-BUTYL-2,4,6-TRINITRO-m XYLENE	4.1	2956
BUTYL VINYL ETHER, STABILIZED	3	2352
But-1-yne, see	2.1	2452
1,4-BUTYNEDIOL	6.1	2716
2-Butyne-1,4-diol, see	6.1	2716
BUTYRALDEHYDE	3	1129
BUTYRALDOXIME	3	2840
BUTYRIC ACID	8	2820
BUTYRIC ANHYDRIDE	8	2739
Butyrone, see	3	2710
BUTYRONITRILE	3	2411
Butyroyl chloride, see	3	2353
BUTYRYL CHLORIDE	3	2353
Cable cutters, explosive, see	1.4S	0070
CACODYLIC ACID	6.1	1572
CADMIUM COMPOUND	6.1	2570
CAESIUM	4.3	1407
CAESIUM HYDROXIDE	8	2682
CAESIUM HYDROXIDE SOLUTION	8	2681
CAESIUM NITRATE	5.1	1451
Caffeine, see	6.1	1544
Cajeputene, see	3	2052
CALCIUM	4.3	1401
CALCIUM ALLOYS, PYROPHORIC	4.2	1855
CALCIUM ARSENATE	6.1	1573
CALCIUM ARSENATE AND CALCIUM ARSENITE MIXTURE, SOLID	6.1	1574
Calcium bisulphite solution, see	8	2693
CALCIUM CARBIDE	4.3	1402
CALCIUM CHLORATE	5.1	1452
CALCIUM CHLORATE, AQUEOUS SOLUTION	5.1	2429
CALCIUM CHLORITE	5.1	1453
CALCIUM CYANAMIDE with more than 0.1 % calcium carbide	4.3	1403
CALCIUM CYANIDE	6.1	1575
CALCIUM DITHIONITE	4.2	1923
CALCIUM HYDRIDE	4.3	1404
CALCIUM HYDROSULPHITE, see	4.2	1923
CALCIUM HYPOCHLORITE, DRY with more than 39 % available chlorine (8.8 % available oxygen)	5.1	1748
CALCIUM HYPOCHLORITE, DRY, CORROSIVE with more than 39 % available chlorine (8.8 % available oxygen)	5.1	3485
CALCIUM HYPOCHLORITE, HYDRATED with not less than 5.5 % but not more than 16 % water	5.1	2880
CALCIUM HYPOCHLORITE, HYDRATED, CORROSIVE with not less than 5.5 % but not more than 16 % water	5.1	3487
CALCIUM HYPOCHLORITE, HYDRATED MIXTURE with not less than 5.5 % but not more than 16 % water	5.1	2880
CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, CORROSIVE with not less than 5.5 % but not more than 16 % water	5.1	3487
CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 39 % available chlorine (8.8 % available oxygen)	5.1	1748

Name and description	Class	UN No.
CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 39 % available chlorine (8.8 % available oxygen)	5.1	3485
CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 10 % but not more than 39 % available chlorine	5.1	2208
CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 10 % but not more than 39 % available chlorine	5.1	3486
CALCIUM MANGANESE SILICON	4.3	2844
CALCIUM NITRATE	5.1	1454
CALCIUM OXIDE	8	1910
CALCIUM PERCHLORATE	5.1	1455
CALCIUM PERMANGANATE	5.1	1456
CALCIUM PEROXIDE	5.1	1457
CALCIUM PHOSPHIDE	4.3	1360
CALCIUM, PYROPHORIC	4.2	1855
CALCIUM RESINATE	4.1	1313
CALCIUM RESINATE, FUSED	4.1	1314
Calcium selenate, see	6.1	2630
CALCIUM SILICIDE	4.3	1405
Calcium silicon, see	4.3	1405
Calcium superoxide, see	5.1	1457
Camphanone, see	4.1	2717
CAMPHOR OIL	3	1130
CAMPHOR, synthetic	4.1	2717
CAPACITOR, ASYMMETRIC, (with an energy storage capacity greater than 0.3Wh)	9	3508
CAPACITOR, ELECTRIC DOUBLE LAYER (with an energy storage capacity greater than 0.3Wh)	9	3499
CAPROIC ACID	8	2829
CARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2758
CARBAMATE PESTICIDE, LIQUID, TOXIC	6.1	2992
CARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	2991
CARBAMATE PESTICIDE, SOLID, TOXIC	6.1	2757
Carbolic acid, see	6.1 6.1 6.1	1671 2312 2821
CARBON, animal or vegetable origin	4.2	1361
CARBON, ACTIVATED	4.2	1362
Carbon bisulphide, see	3	1131
Carbon black (animal or vegetable origin), see	4.2	1361
CARBON DIOXIDE	2.2	1013
Carbon dioxide and ethylene oxide mixture, see	2.1 2.2 2.3	1041 1952 3300
CARBON DIOXIDE, REFRIGERATED LIQUID	2.2	2187
CARBON DIOXIDE, SOLID	9	1845
CARBON DISULPHIDE	3	1131
Carbonic anhydride, see	2.2 9 2.2	1013 1845 2187
CARBON MONOXIDE, COMPRESSED	2.3	1016
Carbon oxysulphide, see	2.3	2204
CARBON TETRABROMIDE	6.1	2516
CARBON TETRACHLORIDE	6.1	1846
Carbonyl chloride, see	2.3	1076
CARBONYL FLUORIDE	2.3	2417
CARBONYL SULPHIDE	2.3	2204
Cartridge cases, empty, primed, see	1.4C 1.4S	0379 0055
Cartridges, actuating, for fire extinguisher or apparatus valve, see	1.2C 1.3C 1.4C 1.4S	0381 0275 0276 0323

Name and description	Class	UN No.
Cartridges, explosive, see	1.1D	0048
CARTRIDGES, FLASH	1.1G	0049
	1.3G	0050
CARTRIDGES FOR TOOLS, BLANK	1.4S	0014
CARTRIDGES FOR WEAPONS with bursting charge	1.1E	0006
	1.1F	0005
	1.2E	0321
	1.2F	0007
	1.4E	0412
	1.4F	0348
CARTRIDGES FOR WEAPONS, BLANK	1.1C	0326
	1.2C	0413
	1.3C	0327
	1.4C	0338
	1.4S	0014
CARTRIDGES FOR WEAPONS, INERT PROJECTILE	1.2C	0328
	1.3C	0417
	1.4C	0339
	1.4S	0012
Cartridges, illuminating, see	1.2G	0171
	1.3G	0254
	1.4G	0297
CARTRIDGES, OIL WELL	1.3C	0277
	1.4C	0278
CARTRIDGES, POWER DEVICE	1.2C	0381
	1.3C	0275
	1.4C	0276
	1.4S	0323
CARTRIDGES, SIGNAL	1.3G	0054
	1.4G	0312
	1.4S	0405
CARTRIDGES, SMALL ARMS	1.3C	0417
	1.4C	0339
	1.4S	0012
CARTRIDGES, SMALL ARMS, BLANK	1.3C	0327
	1.4C	0338
	1.4S	0014
Cartridges, starter, jet engine, see	1.2C	0381
	1.3C	0275
	1.4C	0276
	1.4S	0323
CASES, CARTRIDGE, EMPTY, WITH PRIMER	1.4C	0379
	1.4S	0055
CASES, COMBUSTIBLE, EMPTY, WITHOUT PRIMER	1.3C	0447
	1.4C	0446
Casinghead gasoline, see	3	1203
CASTOR BEANS	9	2969
CASTOR FLAKE	9	2969
CASTOR MEAL	9	2969
CASTOR POMACE	9	2969
CAUSTIC ALKALI LIQUID, N.O.S.	8	1719
Caustic potash, see	8	1814
Caustic soda, see	8	1824
Caustic soda liquor, see	8	1824
CELLS, CONTAINING SODIUM	4.3	3292
CELLULOID in block, rods, rolls, sheets, tubes, etc., except scrap	4.1	2000
CELLULOID, SCRAP	4.2	2002
Cement, see	3	1133
CERIUM, slabs, ingots or rods	4.1	1333
CERIUM, turnings or gritty powder	4.3	3078
Cer mishmetall, see	4.1	1323
Charcoal, activated, see	4.2	1362
Charcoal, non-activated, see	4.2	1361
CHARGES, BURSTING, PLASTICS BONDED	1.1D	0457
	1.2D	0458
	1.4D	0459
	1.4S	0460
CHARGES, DEMOLITION	1.1D	0048
CHARGES, DEPTH	1.1D	0056
Charges, expelling, explosive, for fire extinguishers, see	1.2C	0381
	1.3C	0275
	1.4C	0276
	1.4S	0323
CHARGES, EXPLOSIVE, COMMERCIAL without detonator	1.1D	0442
	1.2D	0443
	1.4D	0444
	1.4S	0445
CHARGES, PROPELLING	1.1C	0271
	1.2C	0415
	1.3C	0272
	1.4C	0491
CHARGES, PROPELLING, FOR CANNON	1.1C	0279
	1.2C	0414
	1.3C	0242

Name and description	Class	UN No.
CHARGES, SHAPED, FLEXIBLE, LINEAR	1.1D 1.4D	0288 0237
CHARGES, SHAPED, without detonator	1.1D 1.2D 1.4D 1.4S	0059 0439 0440 0441
CHARGES, SUPPLEMENTARY, EXPLOSIVE	1.1D	0060
CHEMICAL KIT	9	3316
CHEMICAL SAMPLE, TOXIC	6.1	3315
CHEMICAL UNDER PRESSURE, N.O.S.	2.2	3500
CHEMICAL UNDER PRESSURE, CORROSIVE, N.O.S.	2.2	3503
CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S.	2.1	3501
CHEMICAL UNDER PRESSURE, FLAMMABLE, CORROSIVE, N.O.S.	2.1	3505
CHEMICAL UNDER PRESSURE, FLAMMABLE, TOXIC, N.O.S.	2.1	3504
CHEMICAL UNDER PRESSURE, TOXIC, N.O.S.	2.2	3502
Chile saltpetre, see	5.1	1498
CHLORAL, ANHYDROUS, STABILIZED	6.1	2075
CHLORATE AND BORATE MIXTURE	5.1	1458
CHLORATE AND MAGNESIUM CHLORIDE MIXTURE, SOLID	5.1	1459
CHLORATE AND MAGNESIUM CHLORIDE MIXTURE SOLUTION	5.1	3407
CHLORATES, INORGANIC, N.O.S.	5.1	1461
CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	3210
CHLORIC ACID, AQUEOUS SOLUTION with not more than 10 % chloric acid	5.1	2626
CHLORINE	2.3	1017
CHLORINE, ADSORBED	2.3	3520
CHLORINE PENTAFLUORIDE	2.3	2548
CHLORINE TRIFLUORIDE	2.3	1749
CHLORITES, INORGANIC, N.O.S.	5.1	1462
CHLORITE SOLUTION	8	1908
Chloroacetaldehyde, see	6.1	2232
CHLOROACETIC ACID, MOLTEN	6.1	3250
CHLOROACETIC ACID, SOLID	6.1	1751
CHLOROACETIC ACID SOLUTION	6.1	1750
CHLOROACETONE, STABILIZED	6.1	1695
CHLOROACETONITRILE	6.1	2668
CHLOROACETOPHENONE, SOLID	6.1	1697
CHLOROACETOPHENONE, LIQUID	6.1	3416
CHLOROACETYL CHLORIDE	6.1	1752
CHLOROANILINES, LIQUID	6.1	2019
CHLOROANILINES, SOLID	6.1	2018
CHLOROANISIDINES	6.1	2233
CHLOROBENZENE	3	1134
CHLOROBENZOTRIFLUORIDES	3	2234
CHLOROBENZYL CHLORIDES, LIQUID	6.1	2235
CHLOROBENZYL CHLORIDES, SOLID	6.1	3427
1-Chloro-3-bromopropane, see	6.1	2688
1-Chlorobutane, see	3	1127
2-Chlorobutane, see	3	1127
CHLOROBUTANES	3	1127
CHLOROCRESOLS SOLUTION	6.1	2669
CHLOROCRESOLS, SOLID	6.1	3437
CHLORODIFLUOROBROMO METHANE	2.3	1974
1-CHLORO-1,1-DIFLUOROETHANE	2.1	2517
CHLORODIFLUOROMETHANE	2.2	1018
CHLORODIFLUOROMETHANE AND CHLOROPENTAFLUORO-ETHANE MIXTURE with fixed boiling point, with approximately 49 % chlorodifluoromethane	2.2	1973

Name and description	Class	UN No.
3-Chloro-1,2-dihydroxypropane, see	6.1	2689
Chlorodimethyl ether, see	6.1	1239
CHLORODINITROBENZENES, LIQUID	6.1	1577
CHLORODINITROBENZENES, SOLID	6.1	3441
2-CHLOROETHANAL	6.1	2232
Chloroethane, see	2.1	1037
Chloroethane nitrile, see	6.1	2668
2-Chloroethanol, see	6.1	1135
CHLOROFORM	6.1	1888
CHLOROFORMATES, TOXIC, CORROSIVE, N.O.S.	6.1	3277
CHLOROFORMATES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.	6.1	2742
Chloromethane, see	2.1	1063
1-Chloro-3-methylbutane, see	3	1107
2-Chloro-2-methylbutane, see	3	1107
CHLOROMETHYL CHLOROFORMATE	6.1	2745
Chloromethyl cyanide, see	6.1	2668
CHLOROMETHYL ETHYL ETHER	3	2354
Chloromethyl methyl ether, see	6.1	1239
3-CHLORO-4-METHYLPHENYL ISOCYANATE, LIQUID	6.1	2236
3-CHLORO-4-METHYLPHENYL ISOCYANATE, SOLID	6.1	3428
3-Chloro-2-methylprop-1-ene, see	3	2554
CHLORONITROANILINES	6.1	2237
CHLORONITROBENZENES, SOLID	6.1	1578
CHLORONITROBENZENES, LIQUID	6.1	3409
CHLORONITROTOLUENES, LIQUID	6.1	2433
CHLORONITROTOLUENES, SOLID	6.1	3457
CHLOROPENTAFLUOROETHANE	2.2	1020
CHLOROPHENOLATES, LIQUID	8	2904
CHLOROPHENOLATES, SOLID	8	2905
CHLOROPHENOLS, LIQUID	6.1	2021
CHLOROPHENOLS, SOLID	6.1	2020
CHLOROPHENYL-TRICHLOROSILANE	8	1753
CHLOROPICRIN	6.1	1580
CHLOROPICRIN AND METHYL CHLORIDE MIXTURE	2.3	1582
CHLOROPICRIN AND METHYL BROMIDE MIXTURE with more than 2 % chloropicrin	2.3	1581
CHLOROPICRIN MIXTURE, N.O.S.	6.1	1583
CHLOROPLATINIC ACID, SOLID	8	2507
CHLOROPRENE, STABILIZED	3	1991
1-CHLOROPROPANE	3	1278
2-CHLOROPROPANE	3	2356
3-Chloro-propanediol-1,2, see	6.1	2689
3-CHLOROPROPANOL-1	6.1	2849
2-CHLOROPROPENE	3	2456
3-Chloropropene, see	3	1100
3-Chloroprop-1-ene, see	3	1100
2-CHLOROPROPIONIC ACID	8	2511
2-CHLOROPYRIDINE	6.1	2822
CHLOROSILANES, CORROSIVE, N.O.S.	8	2987
CHLOROSILANES, CORROSIVE, FLAMMABLE, N.O.S.	8	2986
CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S.	3	2985
CHLOROSILANES, TOXIC, CORROSIVE, N.O.S.	6.1	3361
CHLOROSILANES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.	6.1	3362
CHLOROSILANES, WATER-REACTIVE, FLAMMABLE, CORROSIVE, N.O.S.	4.3	2988
CHLOROSULPHONIC ACID (with or without sulphur trioxide)	8	1754

Name and description	Class	UN No.
1-CHLORO-1,2,2,2-TETRAFLUOROETHANE	2.2	1021
CHLOROTOLUENES	3	2238
4-CHLORO-o-TOLUIDINE HYDROCHLORIDE, SOLID	6.1	1579
4-CHLORO-ortho-TOLUIDINE HYDROCHLORIDE SOLUTION	6.1	3410
CHLOROTOLUIDINES, SOLID	6.1	2239
CHLOROTOLUIDINES, LIQUID	6.1	3429
1-CHLORO-2,2,2-TRIFLUORO-ETHANE	2.2	1983
Chlorotrifluoroethylene, see	2.3	1082
CHLOROTRIFLUOROMETHANE	2.2	1022
CHLOROTRIFLUOROMETHANE AND TRIFLUOROMETHANE AZEOTROPIC MIXTURE with approximately 60 % chlorotrifluoromethane	2.2	2599
Chromic acid, solid, see	5.1	1463
CHROMIC ACID SOLUTION	8	1755
Chromic anhydride, solid, see	5.1	1463
CHROMIC FLUORIDE, SOLID	8	1756
CHROMIC FLUORIDE SOLUTION	8	1757
Chromic nitrate, see	5.1	2720
Chromium (VI) dichloride dioxide, see	8	1758
Chromium (III) fluoride, solid, see	8	1756
CHROMIUM NITRATE	5.1	2720
Chromium (III) nitrate, see	5.1	2720
CHROMIUM OXYCHLORIDE	8	1758
CHROMIUM TRIOXIDE, ANHYDROUS	5.1	1463
CHROMOSULPHURIC ACID	8	2240
Chrysotile, see	9	2590
Cinene, see	3	2052
Cinnamene, see	3	2055
Cinnamol, see	3	2055
CLINICAL WASTE, UNSPECIFIED, N.O.S.	6.2	3291
COAL GAS, COMPRESSED	2.3	1023
COAL TAR DISTILLATES, FLAMMABLE	3	1136
Coal tar naphtha, see	3	1268
Coal tar oil, see	3	1136
COATING SOLUTION (includes surface treatment or coatings used for industrial or other purposes such as vehicle under coating, drum or barrel lining)	3	1139
COBALT DIHYDROXIDE POWDER, containing not less than 10 % respirable particles	6.1	3550
COBALT NAPHTHENATES, POWDER	4.1	2001
COBALT RESINATE, PRECIPITATED	4.1	1318
Cocculus, see	6.1	3172
Collodion cottons, see	1.1D 1.1D 1.3C 3 4.1 4.1 4.1	0340 0341 0342 2059 2555 2556 2557
COMPONENTS, EXPLOSIVE TRAIN, N.O.S.	1.1B 1.2B 1.4B 1.4S	0461 0382 0383 0384
Composition B, see	1.1D	0118
COMPRESSED GAS, N.O.S.	2.2	1956
COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1	1954
COMPRESSED GAS, OXIDIZING, N.O.S.	2.2	3156
COMPRESSED GAS, TOXIC, N.O.S.	2.3	1955
COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	3304
COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	1953
COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	3305

Name and description	Class	UN No.
COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	3303
COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	3306
CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge	1.2L 1.3L	0248 0249
COPPER ACETOARSENITE	6.1	1585
COPPER ARSENITE	6.1	1586
Copper (II) arsenite, see	6.1	1586
COPPER BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2776
COPPER BASED PESTICIDE, LIQUID, TOXIC	6.1	3010
COPPER BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3009
COPPER BASED PESTICIDE, SOLID, TOXIC	6.1	2775
COPPER CHLORATE	5.1	2721
Copper (II) chlorate, see	5.1	2721
COPPER CHLORIDE	8	2802
COPPER CYANIDE	6.1	1587
Copper selenate, see	6.1	2630
Copper selenite, see	6.1	2630
COPRA	4.2	1363
CORD, DETONATING, flexible	1.1D 1.4D	0065 0289
CORD, DETONATING, metal clad	1.1D 1.2D	0290 0102
CORD, DETONATING, MILD EFFECT, metal clad	1.4D	0104
CORD, IGNITER	1.4G	0066
Cordite, see	1.1C 1.3C	0160 0161
CORROSIVE LIQUID, N.O.S.	8	1760
CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.	8	3264
CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.	8	3265
CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.	8	3266
CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S.	8	3267
CORROSIVE LIQUID, FLAMMABLE, N.O.S.	8	2920
CORROSIVE LIQUID, OXIDIZING, N.O.S.	8	3093
CORROSIVE LIQUID, SELF-HEATING, N.O.S.	8	3301
CORROSIVE LIQUID, TOXIC, N.O.S.	8	2922
CORROSIVE LIQUID, WATER-REACTIVE, N.O.S.	8	3094
CORROSIVE SOLID, N.O.S.	8	1759
CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.	8	3260
CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.	8	3261
CORROSIVE SOLID, BASIC, INORGANIC, N.O.S.	8	3262
CORROSIVE SOLID, BASIC, ORGANIC, N.O.S.	8	3263
CORROSIVE SOLID, FLAMMABLE, N.O.S.	8	2921
CORROSIVE SOLID, OXIDIZING, N.O.S.	8	3084
CORROSIVE SOLID, SELF-HEATING, N.O.S.	8	3095
CORROSIVE SOLID, TOXIC, N.O.S.	8	2923
CORROSIVE SOLID, WATER-REACTIVE, N.O.S.	8	3096
COTTON WASTE, OILY	4.2	1364
COTTON, WET	4.2	1365
COUMARIN DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	3024
COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1	3026

Name and description	Class	UN No.
COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3025
COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1	3027
Creosote, see	6.1	2810
Creosote salts, see	4.1	1334
CRESOLS, LIQUID	6.1	2076
CRESOLS, SOLID	6.1	3455
CRESYLIC ACID	6.1	2022
Crocidolite, see	9	2212
CROTONALDEHYDE	6.1	1143
CROTONALDEHYDE, STABILIZED	6.1	1143
CROTONIC ACID, SOLID	8	2823
CROTONIC ACID, LIQUID	8	3472
Crotonic aldehyde, stabilized, see	6.1	1143
CROTONYLENE	3	1144
Crude naphtha, see	3	1268
Cumene, see	3	1918
Cupric chlorate, see	5.1	2721
CUPRIETHYLENEDIAMINE SOLUTION	8	1761
CUTTERS, CABLE, EXPLOSIVE	1.4S	0070
CYANIDE SOLUTION, N.O.S.	6.1	1935
CYANIDES, INORGANIC, SOLID, N.O.S.	6.1	1588
Cyanides, organic, flammable, toxic, n.o.s., see	3	3273
Cyanides, organic, toxic, n.o.s., see	6.1 6.1	3276 3439
Cyanides, organic, toxic, flammable, n.o.s., see	6.1	3275
Cyanoacetonitrile, see	6.1	2647
CYANOGEN	2.3	1026
CYANOGEN BROMIDE	6.1	1889
CYANOGEN CHLORIDE, STABILIZED	2.3	1589
CYANURIC CHLORIDE	8	2670
CYCLOBUTANE	2.1	2601
CYCLOBUTYL CHLOROFORMATE	6.1	2744
1,5,9-CYCLODODECATRIENE	6.1	2518
CYCLOHEPTANE	3	2241
CYCLOHEPTATRIENE	3	2603
1,3,5-Cycloheptatriene, see	3	2603
CYCLOHEPTENE	3	2242
1,4-Cyclohexadienedione, see	6.1	2587
CYCLOHEXANE	3	1145
Cyclehexanethiol, see	3	3054
CYCLOHEXANONE	3	1915
CYCLOHEXENE	3	2256
CYCLOHEXENYLTRI-CHLOROSILANE	8	1762
CYCLOHEXYL ACETATE	3	2243
CYCLOHEXYLAMINE	8	2357
CYCLOHEXYL ISOCYANATE	6.1	2488
CYCLOHEXYL MERCAPTAN	3	3054
CYCLOHEXYLTRICHLOROSILANE	8	1763
CYCLONITE, see	1.1D 1.1D 1.1D	0072 0391 0483
CYCLOOCTADIENE PHOSPHINES, see	4.2	2940
CYCLOOCTADIENES	3	2520
CYCLOOCTATETRAENE	3	2358
CYCLOPENTANE	3	1146
CYCLOPENTANOL	3	2244
CYCLOPENTANONE	3	2245
CYCLOPENTENE	3	2246
CYCLOPROPANE	2.1	1027

Name and description	Class	UN No.
CYCLOTETRAMETHYLENE-TETRANITRAMINE, DESENSITIZED	1.1D	0484
CYCLOTETRAMETHYLENE-TETRANITRAMINE, WETTED with not less than 15 % water, by mass	1.1D	0226
CYCLOTRIMETHYLENE TRINITRAMINE AND CYCLOTETRAMETHYLENE-TETRANITRAMINE MIXTURE, DESENSITIZED with not less than 10 % phlegmatizer, by mass	1.1D	0391
CYCLOTRIMETHYLENETRI-NITRAMINE AND CYCLOTETRAMETHYLENE-TETRANITRAMINE MIXTURE, WETTED with not less than 15 % water, by mass	1.1D	0391
CYCLOTRIMETHYLENE-TRINITRAMINE, DESENSITIZED	1.1D	0483
CYCLOTRIMETHYLENE-TRINITRAMINE, WETTED with not less than 15 % water, by mass	1.1D	0072
CYMENES	3	2046
Cymol, see	3	2046
DANGEROUS GOODS IN APPARATUS	9	3363
DANGEROUS GOODS IN ARTICLES	9	3363
DANGEROUS GOODS IN MACHINERY	9	3363
Deanol, see	8	2051
DECABORANE	4.1	1868
DECAHYDRONAPHTHALENE	3	1147
Decalin, see	3	1147
n-DECANE	3	2247
DEFLAGRATING METAL SALTS OF AROMATIC NITRODERIVATIVES, N.O.S.	1.3C	0132
Depth charge, see	1.1D	0056
DESENSITIZED EXPLOSIVE, LIQUID, N.O.S.	3	3379
DESENSITIZED EXPLOSIVE, SOLID, N.O.S.	4.1	3380
Detonating relays, see	1.1B 1.1B 1.4B 1.4B 1.4S 1.4S	0029 0360 0267 0361 0455 0500
DETONATOR ASSEMBLIES, NON-ELECTRIC for blasting	1.1B 1.4B 1.4S	0360 0361 0500
DETONATORS FOR AMMUNITION	1.1B 1.2B 1.4B 1.4S	0073 0364 0365 0366
DETONATORS, ELECTRIC for blasting	1.1B 1.4B 1.4S	0030 0255 0456
DETONATORS, ELECTRONIC programmable for blasting	1.1B 1.4B 1.4S	0511 0512 0513
DETONATORS, NON-ELECTRIC for blasting	1.1B 1.4B 1.4S	0029 0267 0455
DEUTERIUM, COMPRESSED	2.1	1957
DEVICES, SMALL, HYDROCARBON GAS POWERED with release device	2.1	3150
DIACETONE ALCOHOL	3	1148
DIALLYLAMINE	3	2359
DIALLYL ETHER	3	2360
4,4'-DIAMINODIPHENYLMETHANE	6.1	2651
1,2-Diaminoethane, see	8	1604
Diaminopropylamine, see	8	2269
DI-n-AMYLAMINE	3	2841
DIAZODINITROPHENOL, WETTED with not less than 40 % water, or mixture of alcohol and water, by mass	1.1A	0074
Dibenzopyridine, see	6.1	2713
DIBENZYLDICHLOROSILANE	8	2434
DIBORANE	2.3	1911
1,2-DIBROMOBUTAN-3-ONE	6.1	2648
DIBROMOCHLOROPROPANES	6.1	2872
1,2-Dibromo-3-chloropropane, see	6.1	2872

Name and description	Class	UN No.
DIBROMODIFLUOROMETHANE	9	1941
DIBROMOMETHANE	6.1	2664
DI-n-BUTYLAMINE	8	2248
DIBUTYLAMINOETHANOL	6.1	2873
2-Dibutylaminoethanol, see	6.1	2873
N,N-Di-n-butylaminoethanol, see	6.1	2873
DIBUTYL ETHERS	3	1149
DICHLOROACETIC ACID	8	1764
1,3-DICHLOROACETONE	6.1	2649
DICHLOROACETYL CHLORIDE	8	1765
DICHLOROANILINES, LIQUID	6.1	1590
DICHLOROANILINES, SOLID	6.1	3442
o-DICHLOROBENZENE	6.1	1591
2,2'-DICHLORODIETHYL ETHER	6.1	1916
DICHLORODIFLUOROMETHANE	2.2	1028
DICHLORODIFLUOROMETHANE AND DIFLUOROETHANE AZEOTROPIC MIXTURE with approximately 74 % dichlorodifluoromethane	2.2	2602
Dichlorodifluoromethane and ethylene oxide mixture, see	2.2	3070
DICHLORODIMETHYL ETHER, SYMMETRICAL	6.1	2249
1,1-DICHLOROETHANE	3	2362
1,2-Dichloroethane, see	3	1184
1,2-DICHLOROETHYLENE	3	1150
Di(2-chloroethyl) ether, see	6.1	1916
DICHLOROFLUOROMETHANE	2.2	1029
alpha-Dichlorohydrin, see	6.1	2750
DICHLOROISOCYANURIC ACID, DRY	5.1	2465
DICHLOROISOCYANURIC ACID SALTS	5.1	2465
DICHLOROISOPROPYL ETHER	6.1	2490
DICHLOROMETHANE	6.1	1593
1,1-DICHLORO-1-NITROETHANE	6.1	2650
DICHLOROPENTANES	3	1152
Dichlorophenol, see	6.1	2020
	6.1	2021
DICHLOROPHENYL ISOCYANATES	6.1	2250
DICHLOROPHENYLTRICHLORO-SILANE	8	1766
1,2-DICHLOROPROPANE	3	1279
1,3-DICHLOROPROPANOL-2	6.1	2750
1,3-Dichloro-2-propanone, see	6.1	2649
DICHLOROPROPENES	3	2047
DICHLOROSILANE	2.3	2189
1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE	2.2	1958
Dichloro-s-triazine-2,4,6-trione, see	5.1	2465
1,4-Dicyanobutane, see	6.1	2205
Dicycloheptadiene, see	3	2251
DICYCLOHEXYLAMINE	8	2565
Dicyclohexylamine nitrite, see	4.1	2687
DICYCLOHEXYLAMMONIUM NITRITE	4.1	2687
DICYCLOPENTADIENE	3	2048
1,2-DI-(DIMETHYLAMINO) ETHANE	3	2372
DIDYMIUM NITRATE	5.1	1465
DIESEL FUEL	3	1202
1,1-Diethoxyethane, see	3	1088
1,2-Diethoxyethane, see	3	1153
DIETHOXYMETHANE	3	2373
3,3-DIETHOXYPROPENE	3	2374
DIETHYLAMINE	3	1154
2-DIETHYLAMINOETHANOL	8	2686
3-DIETHYLAMINOPROPYLAMINE	3	2684
N,N-DIETHYLANILINE	6.1	2432
DIETHYLBENZENE	3	2049

Name and description	Class	UN No.
Diethylcarbinol, see	3	1105
DIETHYL CARBONATE	3	2366
DIETHYLDICHLOROSILANE	8	1767
Diethylenediamine, see	8	2579
DIETHYLENEGLYCOL DINITRATE, DESENSITIZED with not less than 25 % non-volatile, water-insoluble phlegmatizer, by mass	1.1D	0075
DIETHYLENETRIAMINE	8	2079
N,N-Diethylethanolamine, see	8	2686
DIETHYL ETHER	3	1155
N,N-DIETHYLETHYLENEDIAMINE	8	2685
Di-(2-ethylhexyl) phosphoric acid, see	8	1902
DIETHYL KETONE	3	1156
DIETHYL SULPHATE	6.1	1594
DIETHYL SULPHIDE	3	2375
DIETHYLTHIOPHOSPHORYL CHLORIDE	8	2751
Diethylzinc, see	4.2	3394
2,4-Difluoroaniline, see	6.1	2941
Difluorochloroethane, see	2.1	2517
1,1-DIFLUOROETHANE	2.1	1030
1,1-DIFLUOROETHYLENE	2.1	1959
DIFLUOROMETHANE	2.1	3252
Difluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 23 % difluoromethane and 25 % pentafluoroethane, see	2.2	3340
Difluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 20 % difluoromethane and 40 % pentafluoroethane, see	2.2	3338
Difluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 10 % difluoromethane and 70 % pentafluoroethane, see	2.2	3339
DIFLUOROPHOSPHORIC ACID, ANHYDROUS	8	1768
2,3-DIHYDROPYRAN	3	2376
DIISOBUTYLAMINE	3	2361
DIISOBUTYLENE, ISOMERIC COMPOUNDS	3	2050
alpha-Diisobutylene, see	3	2050
beta-Diisobutylene, see	3	2050
DIISOBUTYL KETONE	3	1157
DIISOOCTYL ACID PHOSPHATE	8	1902
DIISOPROPYLAMINE	3	1158
DIISOPROPYL ETHER	3	1159
DIKETENE, STABILIZED	6.1	2521
1,1-DIMETHOXYETHANE	3	2377
1,2-DIMETHOXYETHANE	3	2252
Dimethoxystrychnine, see	6.1	1570
DIMETHYLAMINE, ANHYDROUS	2.1	1032
DIMETHYLAMINE AQUEOUS SOLUTION	3	1160
2-DIMETHYLAMINO-ACETONITRILE	3	2378
2-DIMETHYLAMINOETHANOL	8	2051
2-DIMETHYLAMINOETHYL ACRYLATE, STABILIZED	6.1	3302
2-DIMETHYLAMINOETHYL METHACRYLATE, STABILIZED	6.1	2522
N,N-DIMETHYLANILINE	6.1	2253
Dimethylarsenic acid, see	6.1	1572
N,N-Dimethylbenzylamine, see	8	2619
2,3-DIMETHYLBUTANE	3	2457
1,3-DIMETHYLBUTYLAMINE	3	2379
DIMETHYLCARBAMOYL CHLORIDE	8	2262
DIMETHYL CARBONATE	3	1161
DIMETHYLCYCLOHEXANES	3	2263

Name and description	Class	UN No.
N,N-DIMETHYLCYCLO-HEXYLAMINE	8	2264
DIMETHYLDICHLOROSILANE	3	1162
DIMETHYLDIETHOXYSILANE	3	2380
DIMETHYLDIOXANES	3	2707
DIMETHYL DISULPHIDE	3	2381
Dimethylethanolamine, see	8	2051
DIMETHYL ETHER	2.1	1033
N,N-DIMETHYLFORMAMIDE	3	2265
DIMETHYLHYDRAZINE, SYMMETRICAL	6.1	2382
DIMETHYLHYDRAZINE, UNSYMMETRICAL	6.1	1163
1,1-Dimethylhydrazine, see	6.1	1163
N,N-Dimethyl-4-nitrosoaniline, see	4.2	1369
2,2-DIMETHYLPROPANE	2.1	2044
DIMETHYL-N-PROPYLAMINE	3	2266
DIMETHYL SULPHATE	6.1	1595
DIMETHYL SULPHIDE	3	1164
DIMETHYL THIOPHOSPHORYL CHLORIDE	6.1	2267
Dimethylzinc, see	4.2	3394
DINGU, see	1.1D	0489
DINITROANILINES	6.1	1596
DINITROBENZENES, SOLID	6.1	3443
DINITROBENZENES LIQUID	6.1	1597
Dinitrochlorobenzene, see	6.1	1577
DINITRO-o-CRESOL	6.1	1598
DINITROGEN TETROXIDE	2.3	1067
DINITROGLYCOLURIL	1.1D	0489
DINITROPHENOL, dry or wetted with less than 15 % water, by mass	1.1D	0076
DINITROPHENOL SOLUTION	6.1	1599
DINITROPHENOL, WETTED with not less than 15 % water, by mass	4.1	1320
DINITROPHENOLATES, alkali metals, dry or wetted with less than 15 % water, by mass	1.3C	0077
DINITROPHENOLATES, WETTED with not less than 15 % water, by mass	4.1	1321
DINITRORESORCINOL, dry or wetted with less than 15 % water, by mass	1.1D	0078
DINITRORESORCINOL, WETTED with not less than 15 % water, by mass	4.1	1322
DINITROSOBENZENE	1.3C	0406
Dinitrotoluene mixed with sodium chlorate, see	1.1D	0083
DINITROTOLUENES, LIQUID	6.1	2038
DINITROTOLUENES, MOLTEN	6.1	1600
DINITROTOLUENES, SOLID	6.1	3454
DIOXANE	3	1165
DIOXOLANE	3	1166
DIPENTENE	3	2052
DIPHENYLAMINE CHLOROARSINE	6.1	1698
DIPHENYLCHLOROARSINE, LIQUID	6.1	1699
DIPHENYLCHLOROARSINE, SOLID	6.1	3450
DIPHENYLDICHLOROSILANE	8	1769
DIPHENYLMETHYL BROMIDE	8	1770
DIPICRYLAMINE, see	1.1D	0079
DIPICRYL SULPHIDE, dry or wetted with less than 10 % water, by mass	1.1D	0401
DIPICRYL SULPHIDE, WETTED with not less than 10 % water, by mass	4.1	2852
DIPROPYLAMINE	3	2383
Dipropylene triamine, see	8	2269
DI-n-PROPYL ETHER	3	2384
DIPROPYL KETONE	3	2710
DISINFECTANT, LIQUID, CORROSIVE, N.O.S.	8	1903
DISINFECTANT, LIQUID, TOXIC, N.O.S.	6.1	3142

Name and description	Class	UN No.
DISINFECTANT, SOLID, TOXIC, N.O.S.	6.1	1601
DISODIUM TRIOXOSILICATE	8	3253
DIVINYL ETHER, STABILIZED	3	1167
DODECYLTRICHLOROSILANE	8	1771
DRY ICE, see	9	1845
DYE INTERMEDIATE, LIQUID, CORROSIVE, N.O.S.	8	2801
DYE INTERMEDIATE, LIQUID, TOXIC, N.O.S.	6.1	1602
DYE INTERMEDIATE, SOLID, CORROSIVE, N.O.S.	8	3147
DYE INTERMEDIATE, SOLID, TOXIC, N.O.S.	6.1	3143
Dynamite, see	1.1D	0081
Electric storage batteries, see	8 8 8 8	2794 2795 2800 3028
Electrolyte (acid or alkaline) for batteries, see	8 8	2796 2797
ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flash-point (including molten metals, molten salts, etc.)	9	3257
ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S. with flash-point above 60 °C, at or above its flash-point	3	3256
ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C	9	3258
ENGINE, FUEL CELL, FLAMMABLE GAS POWERED	2.1	3529
ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED	3	3528
ENGINE, INTERNAL COMBUSTION	9	3530
ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED	2.1	3529
ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED	3	3528
Engines, rocket, see	1.2L 1.3L	0322 0250
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.	9	3082
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	9	3077
EPIBROMOHYDRIN	6.1	2558
EPICHLOROHYDRIN	6.1	2023
1,2-Epoxybutane, stabilized, see	3	3022
Epoxyethane, see	2.3	1040
1,2-EPOXY-3-ETHOXYPROPANE	3	2752
2,3-Epoxy-1-propanal, see	3	2622
2,3-Epoxypropyl ethyl ether, see	3	2752
ESTERS, N.O.S.	3	3272
ETHANE	2.1	1035
ETHANE, REFRIGERATED LIQUID	2.1	1961
Ethanethiol, see	3	2363
ETHANOL	3	1170
ETHANOL AND GASOLINE MIXTURE	3	3475
ETHANOL AND MOTOR SPIRIT MIXTURE	3	3475
ETHANOL AND PETROL MIXTURE	3	3475
ETHANOL SOLUTION	3	1170
ETHANOLAMINE	8	2491
ETHANOLAMINE SOLUTION	8	2491
Ether, see	3	1155
ETHERS, N.O.S.	3	3271
2-Ethoxyethanol, see	3	1171
2-Ethoxyethyl acetate, see	3	1172
Ethoxy propane-1, see	3	2615
ETHYL ACETATE	3	1173
ETHYLACETYLENE, STABILIZED	2.1	2452
ETHYL ACRYLATE, STABILIZED	3	1917
ETHYL ALCOHOL, see	3	1170
ETHYL ALCOHOL SOLUTION, see	3	1170

Name and description	Class	UN No.
ETHYLAMINE	2.1	1036
ETHYLAMINE, AQUEOUS SOLUTION with not less than 50 % but not more than 70 % ethylamine	3	2270
ETHYL AMYL KETONE	3	2271
N-ETHYLANILINE	6.1	2272
2-ETHYLANILINE	6.1	2273
ETHYLBENZENE	3	1175
N-ETHYL-N-BENZYLANILINE	6.1	2274
N-ETHYLBENZYLTOLUIDINES, LIQUID	6.1	2753
N-ETHYLBENZYLTOLUIDINES, SOLID	6.1	3460
ETHYL BORATE	3	1176
ETHYL BROMIDE	6.1	1891
ETHYL BROMOACETATE	6.1	1603
2-ETHYLBUTANOL	3	2275
2-ETHYLBUTYL ACETATE	3	1177
2-Ethylbutyl acetate, see	3	1177
ETHYL BUTYL ETHER	3	1179
2-ETHYLBUTYRALDEHYDE	3	1178
ETHYL BUTYRATE	3	1180
ETHYL CHLORIDE	2.1	1037
ETHYL CHLOROACETATE	6.1	1181
Ethyl chlorocarbonate, see	6.1	1182
ETHYL CHLOROFORMATE	6.1	1182
ETHYL 2-CHLOROPROPIONATE	3	2935
Ethyl-alpha-chloropropionate, see	3	2935
ETHYL CHLOROTHIOFORMATE	8	2826
ETHYL CROTONATE	3	1862
ETHYLDICHLOROARSINE	6.1	1892
ETHYLDICHLOROSILANE	4.3	1183

Name and description	Class	UN No.
ETHYLENE, ACETYLENE AND PROPYLENE MIXTURE, REFRIGERATED LIQUID containing at least 71.5 % ethylene with not more than 22.5 % acetylene and not more than 6 % propylene	2.1	3138
ETHYLENE CHLOROHYDRIN	6.1	1135
ETHYLENE	2.1	1962
ETHYLENEDIAMINE	8	1604
ETHYLENE DIBROMIDE	6.1	1605
Ethylene dibromide and methyl bromide, liquid mixture, see	6.1	1647
ETHYLENE DICHLORIDE	3	1184
ETHYLENE GLYCOL DIETHYL ETHER	3	1153
ETHYLENE GLYCOL MONOETHYL ETHER	3	1171
ETHYLENE GLYCOL MONOETHYL ETHER ACETATE	3	1172
ETHYLENE GLYCOL MONOMETHYL ETHER	3	1188
ETHYLENE GLYCOL MONOMETHYL ETHER ACETATE	3	1189
ETHYLENEIMINE, STABILIZED	6.1	1185
ETHYLENE OXIDE	2.3	1040
ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87 % ethylene oxide	2.3	3300
ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9 % but not more than 87 % ethylene oxide	2.1	1041
ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with not more than 9 % ethylene oxide	2.2	1952
ETHYLENE OXIDE AND CHLOROTETRAFLUORO-ETHANE MIXTURE with not more than 8.8 % ethylene oxide	2.2	3297
ETHYLENE OXIDE AND DICHLORODIFLUOROMETHANE MIXTURE with not more than 12.5 % ethylene oxide	2.2	3070

Name and description	Class	UN No.
ETHYLENE OXIDE AND PENTAFLUOROETHANE MIXTURE with not more than 7.9 % ethylene oxide	2.2	3298
ETHYLENE OXIDE AND PROPYLENE OXIDE MIXTURE, not more than 30 % ethylene oxide	3	2983
ETHYLENE OXIDE AND TETRAFLUOROETHANE MIXTURE with not more than 5.6 % ethylene oxide	2.2	3299
ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C	2.3	1040
ETHYLENE, REFRIGERATED LIQUID	2.1	1038
ETHYL ETHER, see	3	1155
ETHYL FLUORIDE	2.1	2453
ETHYL FORMATE	3	1190
2-ETHYLHEXYLAMINE	3	2276
2-ETHYLHEXYL CHLOROFORMATE	6.1	2748
Ethylidene chloride, see	3	2362
ETHYL ISOBUTYRATE	3	2385
ETHYL ISOCYANATE	3	2481
ETHYL LACTATE	3	1192
ETHYL MERCAPTAN	3	2363
ETHYL METHACRYLATE, STABILIZED	3	2277
ETHYL METHYL ETHER	2.1	1039
ETHYL METHYL KETONE	3	1193
ETHYL NITRITE SOLUTION	3	1194
ETHYL ORTHOFORMATE	3	2524
ETHYL OXALATE	6.1	2525
ETHYLPHENYLDICHLOROSILANE	8	2435
1-ETHYLPIPERIDINE	3	2386
ETHYL PROPIONATE	3	1195
ETHYL PROPYL ETHER	3	2615
Ethyl silicate, see	3	1292
Ethyl sulphate, see	6.1	1594
N-ETHYLTOLUIDINES	6.1	2754
ETHYLTRICHLOROSILANE	3	1196
EXPLOSIVE, BLASTING, TYPE A	1.1D	0081
EXPLOSIVE, BLASTING, TYPE B	1.1D 1.5D	0082 0331
EXPLOSIVE, BLASTING, TYPE C	1.1D	0083
EXPLOSIVE, BLASTING, TYPE D	1.1D	0084
EXPLOSIVE, BLASTING, TYPE E	1.1D 1.5D	0241 0332
Explosives, emulsion, see	1.1D 1.5D	0241 0332
Explosive, seismic, see	1.1D 1.1D 1.1D 1.5D	0081 0082 0083 0331
Explosive, slurry, see	1.1D 1.5D	0241 0332
Explosive, water gel, see	1.1D 1.5D	0241 0332
Extracts, aromatic, liquid, see	3	1197
Extracts, flavouring, liquid, see	3	1197
EXTRACTS, LIQUID, for flavour or aroma	3	1197
FABRICS, ANIMAL, N.O.S. with oil	4.2	1373
FABRICS IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S.	4.1	1353
FABRICS, SYNTHETIC, N.O.S. with oil	4.2	1373
FABRICS, VEGETABLE, N.O.S. with oil	4.2	1373
FERRIC ARSENATE	6.1	1606
FERRIC ARSENITE	6.1	1607
FERRIC CHLORIDE, ANHYDROUS	8	1773
FERRIC CHLORIDE SOLUTION	8	2582
FERRIC NITRATE	5.1	1466

Name and description	Class	UN No.
FERROCERIUM	4.1	1323
FERROSILICON with 30 % or more but less than 90 % silicon	4.3	1408
FERROUS ARSENATE	6.1	1608
FERROUS METAL BORINGS in a form liable to self-heating	4.2	2793
FERROUS METAL CUTTINGS in a form liable to self-heating	4.2	2793
FERROUS METAL SHAVINGS in a form liable to self-heating	4.2	2793
FERROUS METAL TURNINGS in a form liable to self-heating	4.2	2793
FERTILIZER AMMONIATING SOLUTION with free ammonia	2.2	1043
Fertilizer with ammonium nitrate, n.o.s., see	5.1 9	2067 2071
FIBRES, ANIMAL burnt, wet or damp	4.2	1372
FIBRES, ANIMAL, N.O.S. with oil	4.2	1373
FIBRES IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S.	4.1	1353
FIBRES, SYNTHETIC, N.O.S. with oil	4.2	1373
FIBRES, VEGETABLE burnt, wet or damp	4.2	1372
FIBRES, VEGETABLE, DRY	4.1	3360
FIBRES, VEGETABLE, N.O.S. with oil	4.2	1373
Films, nitrocellulose base, from which gelatin has been removed; film scrap, see	4.2	2002
FILMS, NITROCELLULOSE BASE, gelatin coated, except scrap	4.1	1324
FIRE EXTINGUISHER CHARGES, corrosive liquid	8	1774
Fire extinguisher charges, expelling, explosive, see	1.2C 1.3C 1.4C 1.4S	0381 0275 0276 0323
FIRE EXTINGUISHERS with compressed or liquefied gas	2.2	1044
FIRELIGHTERS, SOLID with flammable liquid	4.1	2623
FIREWORKS	1.1G 1.2G 1.3G 1.4G 1.4S	0333 0334 0335 0336 0337
FIRST AID KIT	9	3316
Fish meal, stabilized	9	2216
FISH MEAL, UNSTABILIZED	4.2	1374
Fish scrap, stabilized, see	9	2216
FISH SCRAP, UNSTABILIZED, see	4.2	1374
Flammable gas in lighters, see	2.1	1057
FLAMMABLE LIQUID, N.O.S	3	1993
FLAMMABLE LIQUID, CORROSIVE, N.O.S.	3	2924
FLAMMABLE LIQUID, TOXIC, N.O.S.	3	1992
FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S.	3	3286
FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S.	4.1	3180
FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.	4.1	2925
FLAMMABLE SOLID, INORGANIC, N.O.S.	4.1	3178
FLAMMABLE SOLID, ORGANIC, N.O.S.	4.1	1325
FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	4.1	3176
FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	3097
FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.	4.1	3179
FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.	4.1	2926
FLARES, AERIAL	1.1G 1.2G 1.3G 1.4G 1.4S	0420 0421 0093 0403 0404

Name and description	Class	UN No.
Flares, aeroplane, see	1.1G 1.2G 1.3G 1.4G 1.4S	0420 0421 0093 0403 0404
Flares, highway,; Flares, distress, small,; or Flares, railway or highway; see	1.4G 1.4S	0191 0373
FLARES, SURFACE	1.1G 1.2G 1.3G	0418 0419 0092
Flares, water-activated, see	1.2L 1.3L	0248 0249
FLASH POWDER	1.1G 1.3G	0094 0305
Flue dusts, toxic, see	6.1	1562
Fluoric acid, see	8	1790
FLUORINE, COMPRESSED	2.3	1045
FLUOROACETIC ACID	6.1	2642
FLUOROANILINES	6.1	2941
2-Fluoroaniline, see	6.1	2941
4-Fluoroaniline, see	6.1	2941
o-Fluoroaniline, see	6.1	2941
p-Fluoroaniline, see	6.1	2941
FLUOROBENZENE	3	2387
FLUOROBORIC ACID	8	1775
Fluoroethane, see	2.1	2453
Fluoroform, see	2.2	1984
Fluoromethane, see	2.1	2454
FLUOROPHOSPHORIC ACID, ANHYDROUS	8	1776
FLUOROSILICATES, N.O.S.	6.1	2856
FLUOROSILICIC ACID	8	1778
FLUOROSULPHONIC ACID	8	1777
FLUOROTOLUENES	3	2388
FORMALDEHYDE SOLUTION with not less than 25 % formaldehyde	8	2209
FORMALDEHYDE SOLUTION, FLAMMABLE	3	1198
Formalin, see	3 8	1198 2209
Formamidine sulphinic acid, see	4.2	3341
FORMIC ACID with more than 85 % acid by mass	8	1779
FORMIC ACID with not less than 10 % but not more than 85 % acid by mass	8	3412
FORMIC ACID with not less than 5 % but less than 10 % acid by mass	8	3412
Formic aldehyde, see	3 8	1198 2209
2-Formyl-3,4-dihydro-2H-pyran, see	3	2607
FRACTURING DEVICES, EXPLOSIVE without detonator, for oil wells	1.1D	0099
FUEL, AVIATION, TURBINE ENGINE	3	1863
FUEL CELL CARTRIDGES containing corrosive substances	8	3477
FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT containing corrosive substances	8	3477
FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT containing corrosive substances	8	3477
FUEL CELL CARTRIDGES containing flammable liquids	3	3473
FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT containing flammable liquids	3	3473
FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT containing flammable liquids	3	3473
FUEL CELL CARTRIDGES containing hydrogen in metal hydride	2.1	3479
FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT containing hydrogen in metal hydride	2.1	3479
FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT containing hydrogen in metal hydride	2.1	3479

Name and description	Class	UN No.
FUEL CELL CARTRIDGES containing liquefied flammable gas	2.1	3478
FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT containing liquefied flammable gas	2.1	3478
FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT containing liquefied flammable gas	2.1	3478
FUEL CELL CARTRIDGES containing water-reactive substances	4.3	3476
FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT containing water-reactive substances	4.3	3476
FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT containing water-reactive substances	4.3	3476
Fumaroyl dichloride, see	8	1780
FUMARYL CHLORIDE	8	1780
FUMIGATED CARGO TRANSPORT UNIT	9	3359
FURALDEHYDES	6.1	1199
FURAN	3	2389
FURFURYL ALCOHOL	6.1	2874
FURFURYLAMINE	3	2526
Furyl carbinol, see	6.1	2874
FUSE, DETONATING, metal clad, see	1.1D 1.2D	0290 0102
FUSE, DETONATING, MILD EFFECT, metal clad, see	1.4D	0104
FUSE, IGNITER, tubular, metal clad	1.4G	0103
FUSE, NON-DETONATING	1.3G	0101
FUSEL OIL	3	1201
FUSE, SAFETY	1.4S	0105
Fuze, combination, percussion or time, see	1.1B 1.2B 1.3G 1.4B 1.4G 1.4S 1.4S	0106 0107 0316 0257 0317 0367 0368
FUZES, DETONATING	1.1B 1.2B 1.4B 1.4S	0106 0107 0257 0367
FUZES, DETONATING with protective features	1.1D 1.2D 1.4D	0408 0409 0410
FUZES, IGNITING	1.3G 1.4G 1.4S	0316 0317 0368
GALLIUM	8	2803
GAS CARTRIDGES without a release device, non-refillable, see	2	2037
Gas drips, hydrocarbon, see	3	3295
GAS OIL	3	1202
GASOLINE	3	1203
Gasoline, casinghead, see	3	1203
GASOLINE AND ETHANOL MIXTURE	3	3475
GAS, REFRIGERATED LIQUID, N.O.S.	2.2	3158
GAS, REFRIGERATED LIQUID, FLAMMABLE, N.O.S.	2.1	3312
GAS, REFRIGERATED LIQUID, OXIDIZING, N.O.S.	2.2	3311
GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, N.O.S., not refrigerated liquid	2.1	3167
GAS SAMPLE, NON-PRESSURIZED, TOXIC, N.O.S., not refrigerated liquid	2.3	3169
GAS SAMPLE, NON-PRESSURIZED, TOXIC, FLAMMABLE, N.O.S., not refrigerated liquid	2.3	3168
Gelatin, blasting, see	1.1D	0081
Gelatin, dynamites, see	1.1D	0081
GENETICALLY MODIFIED MICROORGANISMS	9	3245
GENETICALLY MODIFIED ORGANISMS	9	3245
GERMANE	2.3	2192
GERMANE, ADSORBED	2.3	3523

Name and description	Class	UN No.
Germanium hydride, see	2.3	2192
Glycer-1,3-dichlorohydrin, see	6.1	2750
GLYCEROL alpha-MONOCHLOROHYDRIN	6.1	2689
Glyceryl trinitrate, see	1.1D	0143
	1.1D	0144
	3	1204
	3	3064
GLYCIDALDEHYDE	3	2622
GRENADES, hand or rifle, with bursting charge	1.1D	0284
	1.1F	0292
	1.2D	0285
	1.2F	0293
Grenades, illuminating, see	1.2G	0171
	1.3G	0254
	1.4G	0297
GRENADES, PRACTICE, hand or rifle	1.2G	0372
	1.3G	0318
	1.4G	0452
	1.4S	0110
Grenades, smoke, see	1.2G	0015
	1.2H	0245
	1.3G	0016
	1.3H	0246
	1.4G	0303
GUANIDINE NITRATE	5.1	1467
GUANYLNITROSAMINO-GUANYLIDENE HYDRAZINE, WETTED with not less than 30 % water, by mass	1.1A	0113
GUANYLNITROSAMINO-GUANYLTETRAZENE, WETTED with not less than 30 % water, or mixture of alcohol and water, by mass	1.1A	0114
GUNPOWDER, COMPRESSED, see	1.1D	0028
GUNPOWDER, granular or as a meal, see	1.1D	0027
GUNPOWDER, IN PELLETS, see	1.1D	0028
Gutta percha solution, see	3	1287
HAFNIUM POWDER, DRY	4.2	2545
HAFNIUM POWDER, WETTED with not less than 25 % water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns	4.1	1326
HALOGENATED MONOMETHYLDIPHENYL-METHANES, LIQUID	9	3151
HALOGENATED MONOMETHYLDIPHENYL-METHANES, SOLID	9	3152
HAY	4.1	1327
HEATING OIL, LIGHT	3	1202
Heavy hydrogen, see	2.1	1957
HELIUM, COMPRESSED	2.2	1046
HELIUM, REFRIGERATED LIQUID	2.2	1963
HEPTAFLUOROPROPANE	2.2	3296
n-HEPTALDEHYDE	3	3056
n-Heptanal, see	3	3056
HEPTANES	3	1206
4-Heptanone, see	3	2710
n-HEPTENE	3	2278
HEXACHLOROACETONE	6.1	2661
HEXACHLOROBENZENE	6.1	2729
HEXACHLOROBUTADIENE	6.1	2279
Hexachloro-1,3-butadiene, see	6.1	2279
HEXACHLOROCYCLO-PENTADIENE	6.1	2646
HEXACHLOROPHENE	6.1	2875
Hexachloro-2-propanone, see	6.1	2661
HEXADECYLTRICHLOROSILANE	8	1781
HEXADIENE	3	2458
HEXAETHYL TETRAPHOSPHATE	6.1	1611
HEXAETHYL TETRAPHOSPHATE AND COMPRESSED GAS MIXTURE	2.3	1612
HEXAFLUOROACETONE	2.3	2420

Name and description	Class	UN No.
HEXAFLUOROACETONE HYDRATE, LIQUID	6.1	2552
HEXAFLUOROACETONE HYDRATE, SOLID	6.1	3436
HEXAFLUOROETHANE	2.2	2193
HEXAFLUOROPHOSPHORIC ACID	8	1782
HEXAFLUOROPROPYLENE	2.2	1858
Hexahydrocresol, see	3	2617
Hexahydromethyl phenol, see	3	2617
HEXALDEHYDE	3	1207
HEXAMETHYLENEDIAMINE, SOLID	8	2280
HEXAMETHYLENEDIAMINE SOLUTION	8	1783
HEXAMETHYLENE DIISOCYANATE	6.1	2281
HEXAMETHYLENEIMINE	3	2493
HEXAMETHYLENETETRAMINE	4.1	1328
Hexamine, see	4.1	1328
HEXANES	3	1208
HEXANITRODIPHENYLAMINE	1.1D	0079
HEXANITROSTILBENE	1.1D	0392
Hexanoic acid, see	8	2829
HEXANOLS	3	2282
1-HEXENE	3	2370
HEXOGEN, see	1.1D 1.1D 1.1D	0072 0391 0483
HEXOLITE, dry or wetted with less than 15 % water, by mass	1.1D	0118
HEXOTOL, see	1.1D	0118
HEXOTONAL	1.1D	0393
HEXOTONAL, cast, see	1.1D	0393
HEXYL, see	1.1D	0079
HEXYLTRICHLOROSILANE	8	1784
HMX, see	1.1D 1.1D 1.1D	0226 0391 0484
HYDRAZINE, ANHYDROUS	8	2029
HYDRAZINE, AQUEOUS SOLUTION with more than 37 % hydrazine, by mass	8	2030
HYDRAZINE, AQUEOUS SOLUTION with not more than 37 % hydrazine, by mass	6.1	3293
HYDRAZINE AQUEOUS SOLUTION, FLAMMABLE with more than 37 % hydrazine, by mass	8	3484
Hydrazine hydrate	8	2030
Hydrides, metal, water-reactive, n.o.s., see	4.3	1409
Hydriodic acid, anhydrous, see	2.3	2197
HYDRIODIC ACID	8	1787
HYDROBROMIC ACID	8	1788
HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.	2.1	1964
HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. such as mixtures A, A01, A02, A0, A1, B1, B2, B or C	2.1	1965
HYDROCARBON GAS REFILLS FOR SMALL DEVICES with release device	2.1	3150
HYDROCARBONS, LIQUID, N.O.S.	3	3295
HYDROCHLORIC ACID	8	1789
HYDROCYANIC ACID, AQUEOUS SOLUTION with not more than 20 % hydrogen cyanide	6.1	1613
HYDROFLUORIC ACID, with more than 60 % hydrogen fluoride	8	1790
HYDROFLUORIC ACID, with not more than 60 % hydrogen fluoride	8	1790
HYDROFLUORIC ACID AND SULPHURIC ACID MIXTURE	8	1786
Hydrofluoroboric acid, see	8	1775
Hydrofluorosilicic acid, see	8	1778
HYDROGEN AND METHANE MIXTURE, COMPRESSED	2.1	2034
Hydrogen arsenide, see	2.3	2188
HYDROGEN BROMIDE, ANHYDROUS	2.3	1048

Name and description	Class	UN No.
Hydrogen bromide solution, see	8	1788
HYDROGEN CHLORIDE, ANHYDROUS	2.3	1050
HYDROGEN CHLORIDE, REFRIGERATED LIQUID	2.3	2186
HYDROGEN, COMPRESSED	2.1	1049
HYDROGEN CYANIDE, AQUEOUS SOLUTION with not more than 20 % hydrogen cyanide, see	6.1	1613
HYDROGEN CYANIDE, SOLUTION IN ALCOHOL with not more than 45 % hydrogen cyanide	6.1	3294
HYDROGEN CYANIDE, STABILIZED containing less than 3 % water	6.1	1051
HYDROGEN CYANIDE, STABILIZED, containing less than 3 % water and absorbed in a porous inert material	6.1	1614
HYDROGENDIFLUORIDES, SOLID, N.O.S.	8	1740
HYDROGENDIFLUORIDES, SOLUTION, N.O.S.	8	3471
HYDROGEN FLUORIDE, ANHYDROUS	8	1052
Hydrogen fluoride solution, see	8	1790
HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM	2.1	3468
HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM CONTAINED IN EQUIPMENT	2.1	3468
HYDROGEN IN A METAL HYDRIDE STORAGE SYSTEM PACKED WITH EQUIPMENT	2.1	3468
HYDROGEN IODIDE, ANHYDROUS	2.3	2197
Hydrogen iodide solution, see	8	1787
HYDROGEN PEROXIDE AND PEROXYACETIC ACID MIXTURE with acid(s), water and not more than 5 % peroxyacetic acid, STABILIZED	5.1	3149
HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 8 % but less than 20 % hydrogen peroxide (stabilized as necessary)	5.1	2984
HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20 % but not more than 60 % hydrogen peroxide (stabilized as necessary)	5.1	2014
HYDROGEN PEROXIDE, AQUEOUS SOLUTION, STABILIZED with more than 60 % hydrogen peroxide	5.1	2015
HYDROGEN PEROXIDE, STABILIZED	5.1	2015
HYDROGEN, REFRIGERATED LIQUID	2.1	1966
HYDROGEN SELENIDE, ADSORBED	2.3	3526
HYDROGEN SELENIDE, ANHYDROUS	2.3	2202
Hydrogen silicide, see	2.1	2203
HYDROGEN SULPHIDE	2.3	1053
Hydroselenic acid, see	2.3	2202
Hydrosilicofluoric acid, see	8	1778
1-HYDROXYBENZOTRIAZOLE, ANHYDROUS, dry or wetted with less than 20 % water, by mass	1.3C	0508
1-HYDROXYBENZOTRIAZOLE-MONOHYDRATE	4.1	3474
3-Hydroxybutan-2-one, see	3	2621
HYDROXYLAMINE SULPHATE	8	2865
1-Hydroxy-3-methyl-2-penten-4-yne, see	8	2705
3-Hydroxyphenol, see	6.1	2876
HYPOCHLORITES, INORGANIC, N.O.S.	5.1	3212
HYPOCHLORITE SOLUTION	8	1791
IGNITERS	1.1G 1.2G 1.3G 1.4G 1.4S	0121 0314 0315 0325 0454
3,3'-IMINODIPROPYLAMINE	8	2269
Indiarubber, see	3	1287
INFECTIOUS SUBSTANCE, AFFECTING ANIMALS only	6.2	2900

Name and description	Class	UN No.
INFECTIOUS SUBSTANCE, AFFECTING HUMANS	6.2	2814
Ink, printer's, flammable, see	3	1210
INSECTICIDE GAS, N.O.S.	2.2	1968
INSECTICIDE GAS, FLAMMABLE, N.O.S.	2.1	3354
INSECTICIDE GAS, TOXIC, N.O.S.	2.3	1967
INSECTICIDE GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	3355
IODINE	8	3495
IODINE MONOCHLORIDE, LIQUID	8	3498
IODINE MONOCHLORIDE, SOLID	8	1792
IODINE PENTAFLUORIDE	5.1	2495
2-IODOBUTANE	3	2390
Iodomethane, see	6.1	2644
IODOMETHYLPROPANES	3	2391
IODOPROPANES	3	2392
alpha-Iodotoluene, see	6.1	2653
I.p.d.i., see	6.1	2290
Iron chloride, anhydrous, see	8	1773
Iron (III) chloride, anhydrous, see	8	1773
Iron chloride solution, see	8	2582
IRON OXIDE, SPENT obtained from coal gas purification	4.2	1376
IRON PENTACARBONYL	6.1	1994
Iron perchloride, anhydrous, see	8	1773
Iron powder, pyrophoric, see	4.2	1383
Iron sesquichloride, anhydrous, see	8	1773
IRON SPONGE, SPENT obtained from coal gas purification	4.2	1376
Iron swarf, see	4.2	2793
ISOBUTANE	2.1	1969
ISOBUTANOL	3	1212
Isobutene, see	2.1	1055
ISOBUTYL ACETATE	3	1213
ISOBUTYL ACRYLATE, STABILIZED	3	2527
ISOBUTYL ALCOHOL, see	3	1212
ISOBUTYL ALDEHYDE, see	3	2045
ISOBUTYLAMINE	3	1214
ISOBUTYLENE	2.1	1055
ISOBUTYL FORMATE	3	2393
ISOBUTYL ISOBUTYRATE	3	2528
ISOBUTYL ISOCYANATE	3	2486
ISOBUTYL METHACRYLATE, STABILIZED	3	2283
ISOBUTYL PROPIONATE	3	2394
ISOBUTYRALDEHYDE	3	2045
ISOBUTYRIC ACID	3	2529
ISOBUTYRONITRILE	3	2284
ISOBUTYRYL CHLORIDE	3	2395
ISOCYANATES, FLAMMABLE, TOXIC, N.O.S.	3	2478
ISOCYANATES, TOXIC, N.O.S.	6.1	2206
ISOCYANATES, TOXIC, FLAMMABLE, N.O.S.	6.1	3080
ISOCYANATE SOLUTION, FLAMMABLE, TOXIC, N.O.S.	3	2478
ISOCYANATE SOLUTION, TOXIC, N.O.S.	6.1	2206
ISOCYANATE SOLUTION, TOXIC, FLAMMABLE, N.O.S.	6.1	3080
ISOCYANATOBENZOTRI-FLUORIDES	6.1	2285
3-Isocyanatomethyl-3,5,5-tri-methylcyclohexyl isocyanate, see	6.1	2290
Isododecane, see	3	2286
ISOHEPTENES	3	2287
ISOHEXENES	3	2288
Isooctane, see	3	1262

Name and description	Class	UN No.
ISOOCTENES	3	1216
Isopentane, see	3	1265
ISOPENTENES	3	2371
Isopentylamine, see	3	1106
Isopentyl nitrite, see	3	1113
ISOPHORONEDIAMINE	8	2289
ISOPHORONE DIISOCYANATE	6.1	2290
ISOPRENE, STABILIZED	3	1218
ISOPROPANOL	3	1219
ISOPROPENYL ACETATE	3	2403
ISOPROPENYLBENZENE	3	2303
ISOPROPYL ACETATE	3	1220
ISOPROPYL ACID PHOSPHATE	8	1793
ISOPROPYL ALCOHOL, see	3	1219
ISOPROPYLAMINE	3	1221
ISOPROPYLBENZENE	3	1918
ISOPROPYL BUTYRATE	3	2405
Isopropyl chloride, see	3	2356
ISOPROPYL CHLOROACETATE	3	2947
ISOPROPYL CHLOROFORMATE	6.1	2407
ISOPROPYL 2-CHLOROPROPIONATE	3	2934
Isopropyl-alpha-chloropropionate, see	3	2934
Isopropyl ether, see	3	1159
Isopropylethylene, see	3	2561
Isopropyl formate, see	3	1281
ISOPROPYL ISOBUTYRATE	3	2406
ISOPROPYL ISOCYANATE	3	2483
Isopropyl mercaptan, see	3	2402
ISOPROPYL NITRATE	3	1222
ISOPROPYL PROPIONATE	3	2409
Isolpropyltoluene, see	3	2046
Isopropyltoluol, see	3	2046
ISOSORBIDE DINITRATE MIXTURE with not less than 60 % lactose, mannose, starch or calcium hydrogen phosphate	4.1	2907
ISOSORBIDE-5-MONONITRATE	4.1	3251
Isovaleraldehyde, see	3	2058
JET PERFORATING GUNS, CHARGED, oil well, without detonator	1.1D 1.4D	0124 0494
Jet tappers, without detonator, see	1.1D	0059
KEROSENE	3	1223
KETONES, LIQUID, N.O.S.	3	1224
KRILL MEAL	4.2	3497
KRYPTON, COMPRESSED	2.2	1056
KRYPTON, REFRIGERATED LIQUID	2.2	1970
Lacquer base or lacquer chips, nitrocellulose, dry, see	4.1	2557
Lacquer base or lacquer chips, plastic, wet with alcohol or solvent, see	3 3 4.1 4.1	1263 2059 2555 2556
LEAD ACETATE	6.1	1616
Lead (II) acetate, see	6.1	1616
LEAD ARSENATES	6.1	1617
LEAD ARSENITES	6.1	1618
LEAD AZIDE, WETTED with not less than 20 % water, or mixture of alcohol and water, by mass	1.1A	0129
Lead chloride, solid, see	6.1	2291
LEAD COMPOUND, SOLUBLE, N.O.S.	6.1	2291
LEAD CYANIDE	6.1	1620
Lead (II) cyanide	6.1	1620
LEAD DIOXIDE	5.1	1872
LEAD NITRATE	5.1	1469
Lead (II) nitrate	5.1	1469
LEAD PERCHLORATE, SOLID	5.1	1470
Lead (II) perchlorate	5.1 5.1	1470 3408

Name and description	Class	UN No.
LEAD PERCHLORATE SOLUTION	5.1	3408
Lead peroxide, see	5.1	1872
LEAD PHOSPHITE, DIBASIC	4.1	2989
LEAD STYPHNATE, WETTED with not less than 20 % water, or mixture of alcohol and water, by mass	1.1A	0130
LEAD SULPHATE with more than 3 % free acid	8	1794
Lead tetraethyl, see	6.1	1649
Lead tetramethyl, see	6.1	1649
LEAD TRINITRORESORCINATE, WETTED, see	1.1A	0130
LIFE-SAVING APPLIANCES NOT SELF-INFLATING containing dangerous goods as equipment	9	3072
LIFE-SAVING APPLIANCES, SELF-INFLATING	9	2990
LIGHTER REFILLS containing flammable gas	2.1	1057
LIGHTERS containing flammable gas	2.1	1057
LIGHTERS, FUSE	1.4S	0131
Limonene, inactive, see	3	2052
LIQUEFIED GAS, N.O.S.	2.2	3163
LIQUEFIED GASES, non-flammable, charged with nitrogen, carbon dioxide or air	2.2	1058
LIQUEFIED GAS, FLAMMABLE, N.O.S.	2.1	3161
LIQUEFIED GAS, OXIDIZING, N.O.S.	2.2	3157
LIQUEFIED GAS, TOXIC, N.O.S.	2.3	3162
LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	3308
LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	3160
LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	3309
LIQUEFIED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	3307
LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	3310
Liquefied petroleum gas, see	2.1	1075
LITHIUM	4.3	1415
Lithium alkyls, liquid, see	4.2	3394
Lithium alkyls, solid, see	4.2	3393
Lithium alloy batteries	9	3090
	9	3091
LITHIUM ALUMINIUM HYDRIDE	4.3	1410
LITHIUM ALUMINIUM HYDRIDE, ETHEREAL	4.3	1411
LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT lithium ion batteries or lithium metal batteries	9	3536
LITHIUM BOROHYDRIDE	4.3	1413
LITHIUM FERROSILICON	4.3	2830
LITHIUM HYDRIDE	4.3	1414
LITHIUM HYDRIDE, FUSED SOLID	4.3	2805
LITHIUM HYDROXIDE	8	2680
LITHIUM HYDROXIDE SOLUTION	8	2679
LITHIUM HYPOCHLORITE, DRY	5.1	1471
LITHIUM HYPOCHLORITE MIXTURE	5.1	1471
Lithium in cartouches, see	4.3	1415
LITHIUM ION BATTERIES	9	3480
LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT	9	3481
LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT lithium ion batteries or lithium metal batteries	9	3536
LITHIUM ION BATTERIES PACKED WITH EQUIPMENT	9	3481
Lithium ion polymer batteries	9	3480
	9	3481
LITHIUM METAL BATTERIES	9	3090
LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT	9	3091
LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT	9	3091

Name and description	Class	UN No.
LITHIUM NITRATE	5.1	2722
LITHIUM NITRIDE	4.3	2806
LITHIUM PEROXIDE	5.1	1472
Lithium silicide, see	4.3	1417
LITHIUM SILICON	4.3	1417
L.n.g., see	2.1	1972
LONDON PURPLE	6.1	1621
L.p.g., see	2.1	1075
Lye, see	8	1823
Lythene, see	3	1268
MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED	2.1	3529
MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED	3	3528
MACHINERY, INTERNAL COMBUSTION	9	3530
ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED	2.1	3529
MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED	3	3528
MAGNESIUM in pellets, turnings or ribbons	4.1	1869
Magnesium alkyls, see	4.2	3394
MAGNESIUM ALLOYS with more than 50 % magnesium in pellets, turnings or ribbons	4.1	1869
MAGNESIUM ALLOYS POWDER	4.3	1418
MAGNESIUM ALUMINIUM PHOSPHIDE	4.3	1419
MAGNESIUM ARSENATE	6.1	1622
Magnesium bisulphite solution, see	8	2693
MAGNESIUM BROMATE	5.1	1473
MAGNESIUM CHLORATE	5.1	2723
Magnesium chloride and chlorate mixture, see	5.1 5.1	1459 3407
MAGNESIUM DIAMIDE	4.2	2004
Magnesium diphenyl, see	4.2	3393
MAGNESIUM FLUOROSILICATE	6.1	2853
MAGNESIUM GRANULES, COATED, particle size not less than 149 microns	4.3	2950
MAGNESIUM HYDRIDE	4.3	2010
MAGNESIUM NITRATE	5.1	1474
MAGNESIUM PERCHLORATE	5.1	1475
MAGNESIUM PEROXIDE	5.1	1476
MAGNESIUM PHOSPHIDE	4.3	2011
MAGNESIUM POWDER	4.3	1418
Magnesium scrap, see	4.1	1869
MAGNESIUM SILICIDE	4.3	2624
Magnesium silicofluoride, see	6.1	2853
Magnetized material	9	2807
MALEIC ANHYDRIDE	8	2215
MALEIC ANHYDRIDE, MOLTEN	8	2215
Malonic dinitrile, see	6.1	2647
Malonodinitrile, see	6.1	2647
MALONONITRILE	6.1	2647
MANEB	4.2	2210
MANEB PREPARATION with not less than 60 % maneb	4.2	2210
MANEB PREPARATION, STABILIZED against self-heating	4.3	2968
MANEB, STABILIZED against self-heating	4.3	2968
Manganese ethylene-di-dithiocarbamate, see	4.2	2210
Manganese ethylene-1,2-dithiocarbamate, see	4.2	2210
MANGANESE NITRATE	5.1	2724
Manganese (II) nitrate, see	5.1	2724
MANGANESE RESINATE	4.1	1330
Manganous nitrate, see	5.1	2724

Name and description	Class	UN No.
MANNITOL HEXANITRATE, WETTED with not less than 40 % water, or mixture of alcohol and water, by mass	1.1D	0133
MATCHES, FUSEE	4.1	2254
MATCHES, SAFETY (book, card or strike on box)	4.1	1944
MATCHES, “STRIKE ANYWHERE”	4.1	1331
MATCHES, WAX “VESTA”	4.1	1945
MEDICAL WASTE, CATEGORY A, AFFECTING HUMANS, solid	6.2	3549
MEDICAL WASTE, CATEGORY A, AFFECTING ANIMALS only, solid	6.2	3549
MEDICAL WASTE, N.O.S.	6.2	3291
MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	3248
MEDICINE, LIQUID, TOXIC, N.O.S.	6.1	1851
MEDICINE, SOLID, TOXIC, N.O.S.	6.1	3249
p-Mentha-1,8-diene, see	3	2052
MERCAPTANS, LIQUID, FLAMMABLE, N.O.S.	3	3336
MERCAPTANS, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	1228
MERCAPTANS, LIQUID, TOXIC, FLAMMABLE, N.O.S.	6.1	3071
MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S.	3	3336
MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	1228
MERCAPTAN MIXTURE, LIQUID, TOXIC, FLAMMABLE, N.O.S.	6.1	3071
2-Mercaptoethanol, see	6.1	2966
2-Mercaptopropionic acid, see	6.1	2936
5-MERCAPTOTETRAZOL-1-ACETIC ACID	1.4C	0448
MERCURIC ARSENATE	6.1	1623
MERCURIC CHLORIDE	6.1	1624
MERCURIC NITRATE	6.1	1625
MERCURIC POTASSIUM CYANIDE	6.1	1626
Mercuric sulphate, see	6.1	1645
Mercurol, see	6.1	1639
Mercurous bisulphate, see	6.1	1645
Mercurous chloride, see	6.1	2025
MERCUROUS NITRATE	6.1	1627
Mercurous sulphate, see	6.1	1645
MERCURY	8	2809
MERCURY ACETATE	6.1	1629
MERCURY AMMONIUM CHLORIDE	6.1	1630
MERCURY BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2778
MERCURY BASED PESTICIDE, LIQUID, TOXIC	6.1	3012
MERCURY BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3011
MERCURY BASED PESTICIDE, SOLID, TOXIC	6.1	2777
MERCURY BENZOATE	6.1	1631
Mercury bichloride, see	6.1	1624
MERCURY BROMIDES	6.1	1634
MERCURY COMPOUND, LIQUID, N.O.S.	6.1	2024
MERCURY COMPOUND, SOLID, N.O.S.	6.1	2025
MERCURY CONTAINED IN MANUFACTURED ARTICLES	8	3506
MERCURY CYANIDE	6.1	1636
MERCURY FULMINATE, WETTED with not less than 20 % water, or mixture of alcohol and water, by mass	1.1A	0135
MERCURY GLUCONATE	6.1	1637
MERCURY IODIDE	6.1	1638
MERCURY NUCLEATE	6.1	1639
MERCURY OLEATE	6.1	1640
MERCURY OXIDE	6.1	1641

Name and description	Class	UN No.
MERCURY OXYCYANIDE, DESENSITIZED	6.1	1642
MERCURY POTASSIUM IODIDE	6.1	1643
MERCURY SALICYLATE	6.1	1644
MERCURY SULPHATE	6.1	1645
MERCURY THIOCYANATE	6.1	1646
Mesitylene, see	3	2325
MESITYL OXIDE	3	1229
METAL CARBONYLS, LIQUID, N.O.S.	6.1	3281
METAL CARBONYLS, SOLID, N.O.S.	6.1	3466
METAL CATALYST, DRY	4.2	2881
METAL CATALYST, WETTED with a visible excess of liquid	4.2	1378
METALDEHYDE	4.1	1332
METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1	3182
METAL HYDRIDES, WATER-REACTIVE, N.O.S.	4.3	1409
METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S.	4.3	3208
METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S.	4.3	3209
METAL POWDER, FLAMMABLE, N.O.S.	4.1	3089
METAL POWDER, SELF-HEATING, N.O.S.	4.2	3189
METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S.	4.1	3181
METHACRYLALDEHYDE, STABILIZED	3	2396
METHACRYLIC ACID, STABILIZED	8	2531
METHACRYLONITRILE, STABILIZED	3	3079
METHALLYL ALCOHOL	3	2614
Methanal, see	3 8	1198 2209
Methane and hydrogen mixture, see	2.1	2034
METHANE, COMPRESSED	2.1	1971
METHANE, REFRIGERATED LIQUID	2.1	1972
METHANESULPHONYL CHLORIDE	6.1	3246
METHANOL	3	1230
2-Methoxyethyl acetate, see	3	1189
METHOXYMETHYL ISOCYANATE	3	2605
4-METHOXY-4-METHYLPENTAN-2-ONE	3	2293
1-Methoxy-2-nitrobenzene, see	6.1 6.1	2730 3458
1-Methoxy-3-nitrobenzene, see	6.1 6.1	2730 3458
1-Methoxy-4-nitrobenzene, see	6.1 6.1	2730 3458
1-METHOXY-2-PROPANOL	3	3092
METHYL ACETATE	3	1231
METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED	2.1	1060
beta-Methyl acrolein, see	6.1	1143
METHYL ACRYLATE, STABILIZED	3	1919
METHYLAL	3	1234
Methyl alcohol, see	3	1230
Methyl allyl alcohol, see	3	2614
METHYLALLYL CHLORIDE	3	2554
METHYLAMINE, ANHYDROUS	2.1	1061
METHYLAMINE, AQUEOUS SOLUTION	3	1235
METHYLAMYL ACETATE	3	1233
Methyl amyl alcohol, see	3	2053
Methyl amyl ketone, see	3	1110
N-METHYLANILINE	6.1	2294
Methylated spirit, see	3 3	1986 1987
alpha-METHYLBENZYL ALCOHOL, LIQUID	6.1	2937

Name and description	Class	UN No.
alpha-METHYLBENZYL ALCOHOL, SOLID	6.1	3438
METHYL BROMIDE with not more than 2 % chloropicrin	2.3	1062
Methyl bromide and chloropicrin mixture, see	2.3	1581
METHYL BROMIDE AND ETHYLENE DIBROMIDE MIXTURE, LIQUID	6.1	1647
METHYL BROMOACETATE	6.1	2643
2-METHYLBUTANAL	3	3371
3-METHYLBUTAN-2-ONE	3	2397
2-METHYL-1-BUTENE	3	2459
2-METHYL-2-BUTENE	3	2460
3-METHYL-1-BUTENE	3	2561
N-METHYLBUTYLAMINE	3	2945
METHYL tert-BUTYL ETHER	3	2398
METHYL BUTYRATE	3	1237
METHYL CHLORIDE	2.1	1063
Methyl chloride and chloropicrin mixture, see	2.3	1582
METHYL CHLORIDE AND METHYLENE CHLORIDE MIXTURE	2.1	1912
METHYL CHLOROACETATE	6.1	2295
Methyl chlorocarbonate, see	6.1	1238
Methyl chloroform, see	6.1	2831
METHYL CHLOROFORMATE	6.1	1238
METHYL CHLOROMETHYL ETHER	6.1	1239
METHYL 2-CHLOROPROPIONATE	3	2933
Methyl alpha-chloropropionate, see	3	2933
METHYLCHLOROSILANE	2.3	2534
Methyl cyanide, see	3	1648
METHYLCYCLOHEXANE	3	2296
METHYLCYCLOHEXANOLS, flammable	3	2617
METHYLCYCLOHEXANONE	3	2297
METHYLCYCLOPENTANE	3	2298
METHYL DICHLOROACETATE	6.1	2299
METHYLDICHLOROSILANE	4.3	1242
Methylene bromide, see	6.1	2664
Methylene chloride, see	6.1	1593
Methylene chloride and methyl chloride mixture, see	2.1	1912
Methylene cyanide, see	6.1	2647
p,p'-Methylene dianiline, see	6.1	2651
Methylene dibromide, see	6.1	2664
2,2'-Methylene-di-(3,4,6-trichlorophenol), see	6.1	2875
Methyl ethyl ether, see	2.1	1039
METHYL ETHYL KETONE, see	3	1193
2-METHYL-5-ETHYLPYRIDINE	6.1	2300
METHYL FLUORIDE	2.1	2454
METHYL FORMATE	3	1243
2-METHYLFURAN	3	2301
Methyl glycol, see	3	1188
Methyl glycol acetate, see	3	1189
2-METHYL-2-HEPTANETHIOL	6.1	3023
5-METHYLHEXAN-2-ONE	3	2302
METHYLHYDRAZINE	6.1	1244
METHYL IODIDE	6.1	2644
METHYL ISOBUTYL CARBINOL	3	2053
METHYL ISOBUTYL KETONE	3	1245
METHYL ISOCYANATE	6.1	2480
METHYL ISOPROPENYL KETONE, STABILIZED	3	1246
METHYL ISOTHIOCYANATE	6.1	2477
METHYL ISOVALERATE	3	2400
METHYL MAGNESIUM BROMIDE IN ETHYL ETHER	4.3	1928

Name and description	Class	UN No.
METHYL MERCAPTAN	2.3	1064
Methyl mercaptopropionaldehyde, see	6.1	2785
METHYL METHACRYLATE MONOMER, STABILIZED	3	1247
4-METHYLMORPHOLINE	3	2535
N-METHYLMORPHOLINE, see	3	2535
METHYL NITRITE	2.2	2455
METHYL ORTHOSILICATE	6.1	2606
METHYLPENTADIENE	3	2461
Methylpentanes, see	3	1208
2-METHYLPENTAN-2-OL	3	2560
4-Methylpentan-2-ol, see	3	2053
3-Methyl-2-penten-4ynol, see	8	2705
METHYLPHENYLDICHLORO-SILANE	8	2437
2-Methyl-2-phenylpropane, see	3	2709
1-METHYLPIPERIDINE	3	2399
METHYL PROPIONATE	3	1248
Methylpropylbenzene, see	3	2046
METHYL PROPYL ETHER	3	2612
METHYL PROPYL KETONE	3	1249
Methyl pyridines, see	3	2313
Methylstyrene, inhibited, see	3	2618
alpha-Methylstyrene, see	3	2303
Methyl sulphate, see	6.1	1595
Methyl sulphide, see	3	1164
METHYLTETRAHYDROFURAN	3	2536
METHYL TRICHLOROACETATE	6.1	2533
METHYLTRICHLOROSILANE	3	1250
alpha-METHYLVALERALDEHYDE	3	2367
Methyl vinyl benzene, inhibited, see	3	2618
METHYL VINYL KETONE, STABILIZED	6.1	1251
M.i.b.c., see	3	2053
MINES with bursting charge	1.1D	0137
	1.1F	0136
	1.2D	0138
	1.2F	0294
Mirbane oil, see	6.1	1662
Missiles, guided, see	1.1E	0181
	1.1F	0180
	1.1J	0397
	1.2C	0436
	1.2E	0182
	1.2F	0295
	1.2J	0398
	1.3C	0183
	1.3C	0437
	1.4C	0438
MOLYBDENUM PENTACHLORIDE	8	2508
Monochloroacetic acid, see	6.1	1750
	6.1	1751
Monochlorobenzene, see	3	1134
Monochlorodifluoromethane, see	2.2	1018
Monochlorodifluoromethane and monochloropentafluoroethane mixture, see	2.2	1973
Monochlorodifluoromono-bromomethane, see	2.2	1974
Monochloropentafluoroethane and monochlorodifluoromethane mixture, see	2.2	1973
Monoethylamine, see	2.1	1036
MONONITROTOLUIDINES, see	6.1	2660
Monopropylamine, see	3	1277
MORPHOLINE	8	2054
MOTOR FUEL ANTI-KNOCK MIXTURE	6.1	1649
MOTOR FUEL ANTI-KNOCK MIXTURE, FLAMMABLE	6.1	3483
MOTOR SPIRIT	3	1203
MOTOR SPIRIT AND ETHANOL MIXTURE	3	3475
Muriatic acid, see	8	1789
MUSK XYLENE, see	4.1	2956
Mysorite, see	9	2212

Name and description	Class	UN No.
Naphta, see	3	1268
Naphta, petroleum, see	3	1268
Naphta, solvent, see	3	1268
NAPHTHALENE, CRUDE	4.1	1334
NAPHTHALENE, MOLTEN	4.1	2304
NAPHTHALENE, REFINED	4.1	1334
alpha-NAPHTHYLAMINE	6.1	2077
beta-NAPHTHYLAMINE, SOLID	6.1	1650
beta-NAPHTHYLAMINE SOLUTION	6.1	3411
NAPHTHYLTHIOUREA	6.1	1651
1-Naphthylthiourea, see	6.1	1651
NAPHTHYLUREA	6.1	1652
NATURAL GAS, COMPRESSED with high methane content	2.1	1971
NATURAL GAS, REFRIGERATED LIQUID with high methane content	2.1	1972
Natural gasoline, see	3	1203
Neohexane, see	3	1208
NEON, COMPRESSED	2.2	1065
NEON, REFRIGERATED LIQUID	2.2	1913
Neothyl, see	3	2612
NICKEL CARBONYL	6.1	1259
NICKEL CYANIDE	6.1	1653
Nickel (II) cyanide, see	6.1	1653
NICKEL NITRATE	5.1	2725
Nickel (II) nitrate, see	5.1	2725
NICKEL NITRITE	5.1	2726
Nickel (II) nitrite, see	5.1	2726
Nickelous nitrate, see	5.1	2725
Nickelous nitrite, see	5.1	2726
Nickel tetracarbonyl, see	6.1	1259
NICOTINE	6.1	1654
NICOTINE COMPOUND, LIQUID, N.O.S	6.1	3144
NICOTINE COMPOUND, SOLID, N.O.S	6.1	1655
NICOTINE HYDROCHLORIDE, LIQUID	6.1	1656
NICOTINE HYDROCHLORIDE, SOLID	6.1	3444
NICOTINE HYDROCHLORIDE SOLUTION	6.1	1656
NICOTINE PREPARATION, LIQUID, N.O.S.	6.1	3144
NICOTINE PREPARATION, SOLID, N.O.S.	6.1	1655
NICOTINE SALICYLATE	6.1	1657
NICOTINE SULPHATE, SOLID	6.1	3445
NICOTINE SULPHATE SOLUTION	6.1	1658
NICOTINE TARTRATE	6.1	1659
NITRATES, INORGANIC, N.O.S.	5.1	1477
NITRATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	3218
NITRATING ACID MIXTURE with more than 50 % nitric acid	8	1796
NITRATING ACID MIXTURE with not more than 50 % nitric acid	8	1796
NITRATING ACID MIXTURE, SPENT, with more than 50 % nitric acid	8	1826
NITRATING ACID MIXTURE, SPENT, with not more than 50 % nitric acid	8	1826
NITRIC ACID, other than red fuming	8	2031
NITRIC ACID, RED FUMING	8	2032
NITRIC OXIDE, COMPRESSED	2.3	1660
NITRIC OXIDE AND DINITROGEN TETROXIDE MIXTURE	2.3	1975
NITRIC OXIDE AND NITROGEN DIOXIDE MIXTURE, see	2.3	1975
NITRILES, FLAMMABLE, TOXIC, N.O.S.	3	3273
NITRILES, LIQUID, TOXIC, N.O.S.	6.1	3276
NITRILES, SOLID, TOXIC, N.O.S.	6.1	3439

Name and description	Class	UN No.
NITRILES, TOXIC, FLAMMABLE, N.O.S.	6.1	3275
NITRITES, INORGANIC, N.O.S.	5.1	2627
NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	3219
NITROANILINES (o-, m-, p-)	6.1	1661
NITROANISOLES, LIQUID	6.1	2730
NITROANISOLES, SOLID	6.1	3458
NITROBENZENE	6.1	1662
Nitrobenzene bromide, see	6.1	2732
NITROBENZENESULPHONIC ACID	8	2305
Nitrobenzol, see	6.1	1662
5-NITROBENZOTRIAZOL	1.1D	0385
NITROBENZOTRIFLUORIDES, liquid	6.1	2306
NITROBENZOTRIFLUORIDES, SOLID	6.1	3431
NITROBROMOBENZENES, LIQUID	6.1	2732
NITROBROMOBENZENES, SOLID	6.1	3459
NITROCELLULOSE, dry or wetted with less than 25 % water (or alcohol), by mass	1.1D	0340
NITROCELLULOSE, unmodified or plasticized with less than 18 % plasticizing substance, by mass	1.1D	0341
NITROCELLULOSE MEMBRANE FILTERS, with not more than 12.6 % nitrogen, by dry mass	4.1	3270
NITROCELLULOSE, with not more than 12.6 % nitrogen, by dry mass, MIXTURE WITH PLASTICIZER, WITH PIGMENT	4.1	2557
NITROCELLULOSE, with not more than 12.6 % nitrogen, by dry mass, MIXTURE WITH PLASTICIZER, WITHOUT PIGMENT	4.1	2557
NITROCELLULOSE, with not more than 12.6 % nitrogen, by dry mass, MIXTURE WITHOUT PLASTICIZER, WITH PIGMENT	4.1	2557
NITROCELLULOSE, with not more than 12.6 % nitrogen, by dry mass, MIXTURE WITHOUT PLASTICIZER, WITHOUT PIGMENT	4.1	2557
NITROCELLULOSE, PLASTICIZED with not less than 18 % plasticizing substance, by mass	1.3C	0343
NITROCELLULOSE SOLUTION, FLAMMABLE with not more than 12.6 % nitrogen, by dry mass, and not more than 55 % nitrocellulose	3	2059
NITROCELLULOSE, WETTED with not less than 25 % alcohol, by mass	1.3C	0342
NITROCELLULOSE WITH ALCOHOL (not less than 25 % alcohol, by mass, and not more than 12.6 % nitrogen, by dry mass)	4.1	2556
NITROCELLULOSE WITH WATER (not less than 25 % water, by mass)	4.1	2555
Nitrochlorobenzenes, see	6.1	1578
3-NITRO-4-CHLOROBENZOTRI-FLUORIDE	6.1	2307
NITROCRESOLS, SOLID	6.1	2446
NITROCRESOLS, LIQUID	6.1	3434
NITROETHANE	3	2842
NITROGEN, COMPRESSED	2.2	1066
NITROGEN DIOXIDE, see	2.3	1067
NITROGEN, REFRIGERATED LIQUID	2.2	1977
NITROGEN TRIFLUORIDE	2.2	2451
NITROGEN TRIOXIDE	2.3	2421
NITROGLYCERIN, DESENSITIZED with not less than 40 % non-volatile water-insoluble phlegmatizer, by mass	1.1D	0143
NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30 % nitroglycerin, by mass	3	3357
NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, FLAMMABLE, N.O.S. with not more than 30 % nitroglycerin, by mass	3	3343

Name and description	Class	UN No.
NITROGLYCERIN MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 2 % but not more than 10 % nitroglycerin, by mass	4.1	3319
NITROGLYCERIN, SOLUTION IN ALCOHOL with more than 1 % but not more than 5 % nitroglycerin	3	3064
NITROGLYCERIN SOLUTION IN ALCOHOL with more than 1 % but not more than 10 % nitroglycerin	1.1D	0144
NITROGLYCERIN SOLUTION IN ALCOHOL with not more than 1 % nitroglycerin	3	1204
NITROGUANIDINE, dry or wetted with less than 20 % water, by mass	1.1D	0282
NITROGUANIDINE, WETTED with not less than 20 % water, by mass	4.1	1336
NITROHYDROCHLORIC ACID	8	1798
NITROMANNITE, WETTED, see	1.1D	0133
NITROMETHANE	3	1261
Nitromuriatic acid, see	8	1798
NITRONAPHTHALENE	4.1	2538
NITROPHENOLS (o-, m-, p-)	6.1	1663
4-NITROPHENYLHYDRAZINE, with not less than 30 % water, by mass	4.1	3376
NITROPROPANES	3	2608
p-NITROSODIMETHYLANILINE	4.2	1369
NITROSTARCH, dry or wetted with less than 20 % water, by mass	1.1D	0146
NITROSTARCH, WETTED with not less than 20 % water, by mass	4.1	1337
NITROSYL CHLORIDE	2.3	1069
NITROSYLSULPHURIC ACID, LIQUID	8	2308
NITROSYLSULPHURIC ACID, SOLID	8	3456
NITROTOLUENES, LIQUID	6.1	1664
NITROTOLUENES, SOLID	6.1	3446
NITROTOLUIDINES	6.1	2660
NITROTRIAZOLONE	1.1D	0490
NITRO UREA	1.1D	0147
NITROUS OXIDE	2.2	1070
NITROUS OXIDE, REFRIGERATED LIQUID	2.2	2201
NITROXYLENES, LIQUID	6.1	1665
NITROXYLENES, SOLID	6.1	3447
Non-activated carbon, see	4.2	1361
Non-activated charcoal, see	4.2	1361
NONANES	3	1920
NONYLTRICHLOROSILANE	8	1799
2,5-NORBORNADIENE, STABILIZED, see	3	2251
Normal propyl alcohol, see	3	1274
NTO, see	1.1D	0490
OCTADECYLTRICHLOROSILANE	8	1800
OCTADIENE	3	2309
OCTAFLUOROBUT-2-ENE	2.2	2422
OCTAFLUOROCYCLOBUTANE	2.2	1976
OCTAFLUOROPROPANE	2.2	2424
OCTANES	3	1262
OCTOGEN, see	1.1D 1.1D 1.1D	0226 0391 0484
OCTOL, dry or wetted with less than 15 % water, by mass, see	1.1D	0266
OCTOLITE, dry or wetted with less than 15 % water, by mass	1.1D	0266
OCTONAL	1.1D	0496
OCTYL ALDEHYDES	3	1191
tert-Octyl mercaptan, see	6.1	3023
OCTYLTRICHLOROSILANE	8	1801
Oenanthol, see	3	3056
OIL GAS, COMPRESSED	2.3	1071
Oleum, see	8	1831

Name and description	Class	UN No.
ORGANIC PEROXIDE TYPE B, LIQUID	5.2	3101
ORGANIC PEROXIDE TYPE B, LIQUID, TEMPERATURE CONTROLLED	5.2	3111
ORGANIC PEROXIDE TYPE B, SOLID	5.2	3102
ORGANIC PEROXIDE TYPE B, SOLID, TEMPERATURE CONTROLLED	5.2	3112
ORGANIC PEROXIDE TYPE C, LIQUID	5.2	3103
ORGANIC PEROXIDE TYPE C, LIQUID, TEMPERATURE CONTROLLED	5.2	3113
ORGANIC PEROXIDE TYPE C, SOLID	5.2	3104
ORGANIC PEROXIDE TYPE C, SOLID, TEMPERATURE CONTROLLED	5.2	3114
ORGANIC PEROXIDE TYPE D, LIQUID	5.2	3105
ORGANIC PEROXIDE TYPE D, LIQUID, TEMPERATURE CONTROLLED	5.2	3115
ORGANIC PEROXIDE TYPE D, SOLID	5.2	3106
ORGANIC PEROXIDE TYPE D, SOLID, TEMPERATURE CONTROLLED	5.2	3116
ORGANIC PEROXIDE TYPE E, LIQUID	5.2	3107
ORGANIC PEROXIDE TYPE E, LIQUID, TEMPERATURE CONTROLLED	5.2	3117
ORGANIC PEROXIDE TYPE E, SOLID	5.2	3108
ORGANIC PEROXIDE TYPE E, SOLID, TEMPERATURE CONTROLLED	5.2	3118
ORGANIC PEROXIDE TYPE F, LIQUID	5.2	3109
ORGANIC PEROXIDE TYPE F, LIQUID, TEMPERATURE CONTROLLED	5.2	3119
ORGANIC PEROXIDE TYPE F, SOLID	5.2	3110
ORGANIC PEROXIDE TYPE F, SOLID, TEMPERATURE CONTROLLED	5.2	3120
Organic peroxides, see 2.5.3.2.4 for a list of currently assigned organic peroxides	5.2	3101 to 3120
ORGANIC PIGMENTS, SELF-HEATING	4.2	3313
ORGANOARSENIC COMPOUND, LIQUID, N.O.S.	6.1	3280
ORGANOARSENIC COMPOUND, SOLID, N.O.S.	6.1	3465
ORGANOCHLORINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2762
ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC	6.1	2996
ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	2995
ORGANOCHLORINE PESTICIDE, SOLID, TOXIC	6.1	2761
ORGANOMETALLIC COMPOUND, LIQUID, TOXIC, N.O.S.	6.1	3282
ORGANOMETALLIC COMPOUND, SOLID, TOXIC, N.O.S.	6.1	3467
ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC	4.2	3392
ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE	4.2	3394
ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE	4.3	3398
ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3399
ORGANOMETALLIC SUBSTANCE, SOLID, PYROPHORIC	4.2	3391
ORGANOMETALLIC SUBSTANCE, SOLID, PYROPHORIC, WATER-REACTIVE	4.2	3393

Name and description	Class	UN No.
ORGANOMETALLIC SUBSTANCE, SOLID, SELF-HEATING	4.2	3400
ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, FLAMMABLE	4.3	3396
ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE	4.3	3395
ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, SELF-HEATING	4.3	3397
ORGANOPHOSPHORUS COMPOUND, TOXIC, FLAMMABLE, N.O.S.	6.1	3279
ORGANOPHOSPHORUS COMPOUND, LIQUID, TOXIC, N.O.S.	6.1	3278
ORGANOPHOSPHORUS COMPOUND, SOLID, TOXIC, N.O.S.	6.1	3464
ORGANOPHOSPHORUS PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2784
ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC	6.1	3018
ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3017
ORGANOPHOSPHORUS PESTICIDE, SOLID, TOXIC	6.1	2783
ORGANOTIN COMPOUND, LIQUID, N.O.S.	6.1	2788
ORGANOTIN COMPOUND, SOLID, N.O.S.	6.1	3146
ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2787
ORGANOTIN PESTICIDE, LIQUID, TOXIC	6.1	3020
ORGANOTIN PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3019
ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1	2786
Orthophospohoric acid, see	8	1805
	8	3453
OSMIUM TETROXIDE	6.1	2471
OXIDIZING LIQUID, N.O.S.	5.1	3139
OXIDIZING LIQUID, CORROSIVE, N.O.S.	5.1	3098
OXIDIZING LIQUID, TOXIC, N.O.S.	5.1	3099
OXIDIZING SOLID, N.O.S.	5.1	1479
OXIDIZING SOLID, CORROSIVE, N.O.S.	5.1	3085
OXIDIZING SOLID, FLAMMABLE, N.O.S.	5.1	3137
OXIDIZING SOLID, SELF-HEATING, N.O.S.	5.1	3100
OXIDIZING SOLID, TOXIC, N.O.S.	5.1	3087
OXIDIZING SOLID, WATER-REACTIVE, N.O.S.	5.1	3121
Oxirane, see	2.3	1040
OXYGEN, COMPRESSED	2.2	1072
OXYGEN DIFLUORIDE, COMPRESSED	2.3	2190
OXYGEN GENERATOR, CHEMICAL	5.1	3356
OXYGEN, REFRIGERATED LIQUID	2.2	1073
1-Oxy-4-nitrobenzene, see	6.1	1663
PACKAGING DISCARDED, EMPTY, UNCLEANED	9	3509
PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)	3 8	1263 3066
PAINT, CORROSIVE, FLAMMABLE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)	8	3470
PAINT, FLAMMABLE, CORROSIVE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)	3	3469
PAINT RELATED MATERIAL (including paint thinning and reducing compound)	3 8	1263 3066

Name and description	Class	UN No.
PAINT RELATED MATERIAL CORROSIVE, FLAMMABLE (including paint thinning or reducing compound)	8	3470
PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint thinning or reducing compound)	3	3469
PAPER, UNSATURATED OIL TREATED, incompletely dried (including carbon paper)	4.2	1379
Paraffin, see	3	1223
PARAFORMALDEHYDE	4.1	2213
PARALDEHYDE	3	1264
PCBs, see	9 9	2315 3432
PENTABORANE	4.2	1380
PENTACHLOROETHANE	6.1	1669
PENTACHLOROPHENOL	6.1	3155
PENTAERYTHRITE TETRANITRATE with not less than 7 % wax, by mass	1.1D	0411
PENTAERYTHRITE TETRANITRATE, DESENSITIZED with not less than 15 % phlegmatizer, by mass	1.1D	0150
PENTAERYTHRITE TETRANITRATE MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 10 % but not more than 20 % PETN, by mass	4.1	3344
PENTAERYTHRITE TETRANITRATE, WETTED with not less than 25 % water, by mass	1.1D	0150
PENTAERYTHRITOL TETRANITRATE, see	1.1D 1.1D	0150 0411
PENTAERYTHRITOL TETRANITRATE MIXTURE, DESENSITIZED, see	4.1	3344
PENTAFLUOROETHANE	2.2	3220
Pentafluoroethane, 1,1,1-trifluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 44 % pentafluoroethane and 52 % 1,1,1-trifluoroethane, see	2.2	3337
PENTAMETHYLHEPTANE	3	2286
Pentanal, see	3	2058
PENTANE-2,4-DIONE	3	2310
PENTANES, liquid	3	1265
n-Pentane, see	3	1265
PENTANOLS	3	1105
3-Pentanol, see	3	1105
1-PENTENE	3	1108
1-PENTOL	8	2705
PENTOLITE, dry or wetted with less than 15 % water, by mass	1.1D	0151
Pentyl nitrite, see	3	1113
PERCHLORATES, INORGANIC, N.O.S.	5.1	1481
PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	3211
PERCHLORIC ACID with more than 50 % but not more than 72 % acid, by mass	5.1	1873
PERCHLORIC ACID with not more than 50 % acid, by mass	8	1802
Perchlorobenzene, see	6.1	2729
Perchlorocyclopentadiene, see	6.1	2646
Perchloroethylene, see	6.1	1897
PERCHLOROMETHYL MERCAPTAN	6.1	1670
PERCHLORYL FLUORIDE	2.3	3083
Perfluoroacetylchloride, see	2.3	3057
PERFLUORO(ETHYL VINYL ETHER)	2.1	3154
PERFLUORO(METHYL VINYL ETHER)	2.1	3153
Perfluoropropane, see	2.2	2424
PERFUMERY PRODUCTS with flammable solvents	3	1266
PERMANGANATES, INORGANIC, N.O.S.	5.1	1482
PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	3214
PEROXIDES, INORGANIC, N.O.S.	5.1	1483

Name and description	Class	UN No.
PERSULPHATES, INORGANIC, N.O.S.	5.1	3215
PERSULPHATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	3216
PESTICIDE, LIQUID, FLAMMABLE, TOXIC, N.O.S., flash-point less than 23 °C	3	3021
PESTICIDE, LIQUID, TOXIC, N.O.S.	6.1	2902
PESTICIDE, LIQUID, TOXIC, FLAMMABLE, N.O.S., flash-point not less than 23 °C	6.1	2903
PESTICIDE, SOLID, TOXIC, N.O.S.	6.1	2588
Pesticide, toxic, under compressed gas, n.o.s, see	2	1950
PETN, see	1.1D 1.1D	0150 0411
PETN, MIXTURE DESENSITIZED, see	4.1	3344
PETN/TNT, see	1.1D	0151
PETROL	3	1203
MOTOR SPIRIT AND ETHANOL MIXTURE	3	3475
PETROLEUM CRUDE OIL	3	1267
PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	3494
PETROLEUM DISTILLATES, N.O.S.	3	1268
Petroleum ether, see	3	1268
PETROLEUM GASES, LIQUEFIED	2.1	1075
Petroleum naphtha, see	3	1268
Petroleum oil, see	3	1268
PETROLEUM PRODUCTS, N.O.S.	3	1268
Petroleum raffinate, see	3	1268
Petroleum spirit, see	3	1268
PHENACYL BROMIDE	6.1	2645
PHENETIDINES	6.1	2311
PHENOLATES, LIQUID	8	2904
PHENOLATES, SOLID	8	2905
PHENOL, MOLTEN	6.1	2312
PHENOL, SOLID	6.1	1671
PHENOL SOLUTION	6.1	2821
PHENOLSULPHONIC ACID, LIQUID	8	1803
PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	3346
PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC	6.1	3348
PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3347
PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1	3345
PHENYLACETONITRILE, LIQUID	6.1	2470
PHENYLACETYL CHLORIDE	8	2577
Phenylamine, see	6.1	1547
1-Phenylbutane, see	3	2709
2-Phenylbutane, see	3	2709
PHENYLCARBYLAMINE CHLORIDE	6.1	1672
PHENYL CHLOROFORMATE	6.1	2746
Phenyl cyanide, see	6.1	2224
PHENYLENEDIAMINES (o-, m-, p-)	6.1	1673
Phenylethylene, see	3	2055
PHENYLHYDRAZINE	6.1	2572
PHENYL ISOCYANATE	6.1	2487
Phenylisocyanodichloride, see	6.1	1672
PHENYL MERCAPTAN	6.1	2337
PHENYLMERCURIC ACETATE	6.1	1674
PHENYLMERCURIC COMPOUND, N.O.S.	6.1	2026
PHENYLMERCURIC HYDROXIDE	6.1	1894
PHENYLMERCURIC NITRATE	6.1	1895
PHENYLPHOSPHORUS DICHLORIDE	8	2798

Name and description	Class	UN No.
PHENYLPHOSPHORUS THIODICHLORIDE	8	2799
2-Phenylpropene, see	3	2303
PHENYLTRICHLOROSILANE	8	1804
PHOSGENE	2.3	1076
9-PHOSPHABICYCLONONANES	4.2	2940
PHOSPHINE	2.3	2199
PHOSPHINE, ADSORBED	2.3	3525
Phosphoretted hydrogen, see	2.3	2199
PHOSPHORIC ACID, SOLUTION	8	1805
PHOSPHORIC ACID, SOLID	8	3453
Phosphoric acid, anhydrous, see	8	1807
PHOSPHOROUS ACID	8	2834
PHOSPHORUS, AMORPHOUS	4.1	1338
Phosphorus bromide, see	8	1808
Phosphorus chloride, see	6.1	1809
PHOSPHORUS HEPTASULPHIDE, free from yellow and white phosphorus	4.1	1339
PHOSPHORUS OXYBROMIDE	8	1939
PHOSPHORUS OXYBROMIDE, MOLTEN	8	2576
PHOSPHORUS OXYCHLORIDE	8	1810
PHOSPHORUS PENTABROMIDE	8	2691
PHOSPHORUS PENTACHLORIDE	8	1806
PHOSPHORUS PENTAFLUORIDE	2.3	2198
PHOSPHORUS PENTAFLUORIDE, ADSORBED	2.3	3524
PHOSPHORUS PENTASULPHIDE, free from yellow and white phosphorus	4.3	1340
PHOSPHORUS PENTOXIDE	8	1807
PHOSPHORUS SESQUISULPHIDE, free from yellow and white phosphorus	4.1	1341
Phosphorus (V) sulphide, free from yellow and white phosphorus, see	4.3	1340
Phosphorus sulphochloride, see	8	1837
PHOSPHORUS TRIBROMIDE	8	1808
PHOSPHORUS TRICHLORIDE	6.1	1809
PHOSPHORUS TRIOXIDE	8	2578
PHOSPHORUS TRISULPHIDE, free from yellow and white phosphorus	4.1	1343
PHOSPHORUS, WHITE, DRY	4.2	1381
PHOSPHORUS, WHITE IN SOLUTION	4.2	1381
PHOSPHORUS, WHITE, MOLTEN	4.2	2447
PHOSPHORUS, WHITE, UNDER WATER	4.2	1381
PHOSPHORUS, YELLOW, DRY	4.2	1381
PHOSPHORUS, YELLOW, IN SOLUTION	4.2	1381
PHOSPHORUS, YELLOW, UNDER WATER	4.2	1381
Phosphoryl chloride, see	8	1810
PHTHALIC ANHYDRIDE with more than 0.05 % of maleic anhydride	8	2214
PICOLINES	3	2313
PICRAMIDE, see	1.1D	0153
PICRIC ACID, see	1.1D	0154
PICRIC ACID, WETTED see	4.1 4.1	1344 3364
PICRITE, see	1.1D	0282
PICRITE, WETTED, see	4.1	1336
Picrotoxin, see	6.1 6.1	3172 3462
PICRYL CHLORIDE, see	1.1D	0155
PICRYLCHLORIDE, WETTED see	4.1	3365
alpha-PINENE	3	2368
PINE OIL	3	1272
PIPERAZINE	8	2579
PIPERIDINE	8	2401
Pivaloyl chloride, see	6.1	2438
Plastic explosives , see	1.1D	0084

Name and description	Class	UN No.
PLASTICS MOULDING COMPOUND in dough, sheet or extruded rope form evolving flammable vapour	9	3314
PLASTICS, NITROCELLULOSE-BASED, SELF-HEATING, N.O.S.	4.2	2006
POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S.	3	2733
POLYAMINES, LIQUID, CORROSIVE, N.O.S.	8	2735
POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.	8	2734
POLYAMINES, SOLID, CORROSIVE, N.O.S.	8	3259
POLYCHLORINATED BIPHENYLS, LIQUID	9	2315
POLYCHLORINATED BIPHENYLS, SOLID	9	3432
POLYESTER RESIN KIT, liquid base material	3	3269
POLYESTER RESIN KIT, solid base material	4.1	3527
POLYHALOGENATED BIPHENYLS, LIQUID	9	3151
POLYHALOGENATED BIPHENYLS, SOLID	9	3152
POLYHALOGENATED TERPHENYLS, LIQUID	9	3151
POLYHALOGENATED TERPHENYLS, SOLID	9	3152
POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour	9	2211
POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.	4.1	3532
POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.	4.1	3534
POLYMERIZING SUBSTANCE, SOLID, STABILIZED, N.O.S.	4.1	3531
POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.	4.1	3533
Polystyrene beads, expandable, see	9	2211
POTASSIUM	4.3	2257
POTASSIUM ARSENATE	6.1	1677
POTASSIUM ARSENITE	6.1	1678
Potassium bifluoride, see	8	1811
Potassium bisulphate, see	8	2509
Potassium bisulphite solution, see	8	2693
POTASSIUM BOROHYDRIDE	4.3	1870
POTASSIUM BROMATE	5.1	1484
POTASSIUM CHLORATE	5.1	1485
POTASSIUM CHLORATE, AQUEOUS SOLUTION	5.1	2427
Potassium chlorate mixed with mineral oil, see	1.1D	0083
POTASSIUM CUPROCYANIDE	6.1	1679
POTASSIUM CYANIDE, SOLID	6.1	1680
POTASSIUM CYANIDE SOLUTION	6.1	3413
Potassium dicyanocuprate (I), see	6.1	1679
POTASSIUM DITHIONITE	4.2	1929
POTASSIUM FLUORIDE, SOLID	6.1	1812
POTASSIUM FLUORIDE SOLUTION	6.1	3422
POTASSIUM FLUOROACETATE	6.1	2628
POTASSIUM FLUOROSILICATE	6.1	2655
Potassium hexafluorosilicate, see	6.1	2655
Potassium hydrate, see	8	1814
POTASSIUM HYDROGENDIFLUORIDE SOLID	8	1811
POTASSIUM HYDROGENDIFLUORIDE SOLUTION	8	3421
POTASSIUM HYDROGEN SULPHATE	8	2509
POTASSIUM HYDROSULPHITE, see	4.2	1929
Potassium hydroxide, liquid, see	8	1814
POTASSIUM HYDROXIDE, SOLID	8	1813

Name and description	Class	UN No.
POTASSIUM HYDROXIDE SOLUTION	8	1814
POTASSIUM METAL ALLOYS, LIQUID	4.3	1420
POTASSIUM METAL ALLOYS, SOLID	4.3	3403
POTASSIUM METAVANADATE	6.1	2864
POTASSIUM MONOXIDE	8	2033
POTASSIUM NITRATE	5.1	1486
Potassium nitrate and sodium nitrate mixture, see	5.1	1499
POTASSIUM NITRATE AND SODIUM NITRITE MIXTURE	5.1	1487
POTASSIUM NITRITE	5.1	1488
POTASSIUM PERCHLORATE	5.1	1489
POTASSIUM PERMANGANATE	5.1	1490
POTASSIUM PEROXIDE	5.1	1491
POTASSIUM PERSULPHATE	5.1	1492
POTASSIUM PHOSPHIDE	4.3	2012
Potassium selenate, see	6.1	2630
Potassium selenite, see	6.1	2630
Potassium silicofluoride, see	6.1	2655
POTASSIUM SODIUM ALLOYS,LIQUID	4.3	1422
POTASSIUM SODIUM ALLOYS, SOLID	4.3	3404
POTASSIUM SULPHIDE with less than 30 % water of crystallization	4.2	1382
POTASSIUM SULPHIDE, ANHYDROUS	4.2	1382
POTASSIUM SULPHIDE, HYDRATED with not less than 30 % water of crystallization	8	1847
POTASSIUM SUPEROXIDE	5.1	2466
Potassium tetracyanomercurate (II), see	6.1	1626
POWDER CAKE, WETTED with not less than 17 % alcohol, by mass	1.1C	0433
POWDER CAKE, WETTED with not less than 25 % water, by mass	1.3C	0159
POWDER PASTE, see	1.1C 1.3C	0433 0159
POWDER, SMOKELESS	1.1C 1.3C 1.4C	0160 0161 0509
Power devices, explosive, see	1.2C 1.3C 1.4C 1.4S	0381 0275 0276 0323
PRIMERS, CAP TYPE	1.1B 1.4B 1.4S	0377 0378 0044
Primers, small arms, see	1.4S	0044
PRIMERS, TUBULAR	1.3G 1.4G 1.4S	0319 0320 0376
PRINTING INK, flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable	3	1210
Projectiles, illuminating, seee	1.2G 1.3G 1.4G	0171 0254 0297
PROJECTILES, inert with tracer	1.3G 1.4G 1.4S	0424 0425 0345
PROJECTILES with burster or expelling charge	1.2D 1.2F 1.2G 1.4D 1.4F 1.4G	0346 0426 0434 0347 0427 0435
PROJECTILES with bursting charge	1.1D 1.1F 1.2D 1.2F 1.4D	0168 0167 0169 0324 0344
PROPADIENE, STABILIZED	2.1	2200
Propadiene and methyl acetylene mixture, stabilized, see	2.1	1060
PROPANE	2.1	1978
PROPANETHIOLS	3	2402
n-PROPANOL	3	1274

Name and description	Class	UN No.
PROPELLANT, LIQUID	1.1C 1.3C	0497 0495
PROPELLANT, SOLID	1.1C 1.3C 1.4C	0498 0499 0501
Propellant with a single base; Propellant with a double base; or Propellant with a triple base; see	1.1C 1.3C	0160 0161
Propene, see	2.1	1077
PROPIONALDEHYDE	3	1275
PROPIONIC ACID with not less than 10 % and less than 90 % acid by mass	8	1848
PROPIONIC ACID with not less than 90 % acid by mass	8	3463
PROPIONIC ANHYDRIDE	8	2496
PROPIONITRILE	3	2404
PROPIONYL CHLORIDE	3	1815
n-PROPYL ACETATE	3	1276
PROPYL ALCOHOL, NORMAL, see	3	1274
PROPYLAMINE	3	1277
n-PROPYLBENZENE	3	2364
Propyl chloride, see	3	1278
n-PROPYL CHLOROFORMATE	6.1	2740
PROPYLENE	2.1	1077
PROPYLENE CHLOROHYDRIN	6.1	2611
1,2-PROPYLENEDIAMINE	8	2258
Propylene dichloride, see	3	1279
PROPYLENEIMINE, STABILIZED	3	1921
PROPYLENE OXIDE	3	1280
PROPYLENE TETRAMER	3	2850
Propylene trimer, see	3	2057
PROPYL FORMATES	3	1281
n-PROPYL ISOCYANATE	6.1	2482
Propyl mercaptan, see	3	2402
n-PROPYL NITRATE	3	1865
PROPYLTRICHLOROSILANE	8	1816
Pyrazine hexahydride, see	8	2579
PYRETHROID PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	3350
PYRETHROID PESTICIDE, LIQUID, TOXIC	6.1	3352
PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3351
PYRETHROID PESTICIDE, SOLID, TOXIC	6.1	3349
PYRIDINE	3	1282
PYROPHORIC ALLOY, N.O.S.	4.2	1383
PYROPHORIC LIQUID, INORGANIC, N.O.S.	4.2	3194
PYROPHORIC LIQUID, ORGANIC, N.O.S.	4.2	2845
PYROPHORIC METAL, N.O.S.	4.2	1383
PYROPHORIC SOLID, INORGANIC, N.O.S.	4.2	3200
PYROPHORIC SOLID, ORGANIC, N.O.S.	4.2	2846
PYROSULPHURYL CHLORIDE	8	1817
Pyroxylin solution, see	3	2059
PYRROLIDINE	3	1922
QUINOLINE	6.1	2656
Quinone, see	6.1	2587
RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM	7	2909
RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - EMPTY PACKAGING	7	2908
RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - INSTRUMENTS or ARTICLES	7	2911

Name and description	Class	UN No.
RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - LIMITED QUANTITY OF MATERIAL	7	2910
RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non fissile or fissile-excepted	7	2912
RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE	7	3324
RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non fissile or fissile-excepted	7	3321
RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, (LSA-III), FISSILE	7	3325
RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non fissile or fissile-excepted	7	3322
RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE	7	3326
RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I, SCO-II or SCO-III), non fissile or fissile-excepted	7	2913
RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE	7	3331
RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non fissile or fissile-excepted	7	2919
RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE, non-special form	7	3327
RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non fissile or fissile-excepted	7	2915
RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSILE	7	3333
RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, non fissile or fissile-excepted	7	3332
RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSILE	7	3329
RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non fissile or fissile-excepted	7	2917
RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSILE	7	3328
RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non fissile or fissile-excepted	7	2916
RADIOACTIVE MATERIAL, TYPE C PACKAGE, FISSILE	7	3330
RADIOACTIVE MATERIAL, TYPE C PACKAGE, non fissile or fissile-excepted	7	3323
RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE	7	2977
RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non fissile or fissile-excepted	7	2978
RAGS, OILY	4.2	1856
RDX, see	1.1D 1.1D 1.1D	0072 0391 0483
RECEPTACLES, SMALL, CONTAINING GAS without a release device, non-refillable	2	2037
Red phosphorus, see	4.1	1338
REFRIGERANT GAS, N.O.S.	2.2	1078
REFRIGERANT GAS R 12, see	2.2	1028
REFRIGERANT GAS R 12B1, see	2.2	1974
REFRIGERANT GAS R 13, see	2.2	1022
REFRIGERANT GAS R 13B1, see	2.2	1009
REFRIGERANT GAS R 14, see	2.2	1982
REFRIGERANT GAS R 21, see	2.2	1029
REFRIGERANT GAS R 22, see	2.2	1018
REFRIGERANT GAS R 23, see	2.2	1984
REFRIGERANT GAS R 32, see	2.1	3252
REFRIGERANT GAS R 40, see	2.1	1063
REFRIGERANT GAS R 41, see	2.1	2454
REFRIGERANT GAS R 114, see	2.2	1958

Name and description	Class	UN No.
REFRIGERANT GAS R 115, see	2.2	1020
REFRIGERANT GAS R 116, see	2.2	2193
REFRIGERANT GAS R 124, see	2.2	1021
REFRIGERANT GAS R 125, see	2.2	3220
REFRIGERANT GAS R 133a, see	2.2	1983
REFRIGERANT GAS R 134a, see	2.2	3159
REFRIGERANT GAS R 142b, see	2.1	2517
REFRIGERANT GAS R 143a, see	2.1	2035
REFRIGERANT GASR 152a, see	2.1	1030
REFRIGERANT GAS R 161, see	2.1	2453
REFRIGERANT GAS R 218, see	2.2	2424
REFRIGERANT GAS R 227, see	2.2	3296
REFRIGERANT GAS R 404A	2.2	3337
REFRIGERANT GAS R 407A	2.2	3338
REFRIGERANT GAS R 407B	2.2	3339
REFRIGERANT GAS R 407C	2.2	3340
REFRIGERANT GAS R 500, see	2.2	2602
REFRIGERANT GAS R 502, see	2.2	1973
REFRIGERANT GAS R 503, see	2.2	2599
REFRIGERANT GAS R 1132a, see	2.1	1959
REFRIGERANT GAS R 1216, see	2.2	1858
REFRIGERANT GAS R 1318, see	2.2	2422
REFRIGERANT GAS RC 318, see	2.2	1976
REFRIGERATING MACHINES containing flammable, non-toxic, liquefied gas	2.1	3358
REFRIGERATING MACHINES containing non-flammable, non-toxic, gases or ammonia solutions (UN 2672)	2.2	2857
REGULATED MEDICAL WASTE, N.O.S.	6.2	3291
RELEASE DEVICES, EXPLOSIVE	1.4S	0173
RESIN SOLUTION, flammable	3	1866
Resorcin, see	6.1	2876
RESORCINOL	6.1	2876
RIVETS, EXPLOSIVE	1.4S	0174
ROCKET MOTORS	1.1C 1.2C 1.3C 1.4C	0280 0281 0186 0510
ROCKET MOTORS, LIQUID FUELLED	1.2J 1.3J	0395 0396
ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without expelling charge	1.2L 1.3L	0322 0250
ROCKETS with bursting charge	1.1E 1.1F 1.2E 1.2F	0181 0180 0182 0295
ROCKETS with expelling charge	1.2C 13C 1.4C	0436 0437 0438
ROCKETS with inert head	1.3C 1.2C	0183 0502
ROCKETS, LINE-THROWING	1.2G 1.3G 1.4G	0238 0240 0453
ROCKETS, LIQUID FUELLED with bursting charge	1.1J 1.2J	0397 0398
ROSIN OIL	3	1286
RUBBER SCRAP, powdered or granulated, not exceeding 840 microns and rubber content exceeding 45 %	4.1	1345
RUBBER SHODDY, powdered or granulated, not exceeding 840 microns and rubber content exceeding 45 %	4.1	1345
RUBBER SOLUTION	3	1287
RUBIDIUM	4.3	1423
RUBIDIUM HYDROXIDE	8	2678
RUBIDIUM HYDROXIDE SOLUTION	8	2677
Rubidium nitrate, see	5.1	1477
SAFETY DEVICES, electrically initiated	9	3268
SAFETY DEVICES, PYROTECHNIC	1.4G	0503
Saltpetre, see	5.1	1486

Name and description	Class	UN No.
SAMPLES, EXPLOSIVE, other than initiating explosive		0190
Sand acid, see	8	1778
Seat-belt pretensioners, see	1.4G	0503
	9	3268
SEED CAKE with more than 1.5 % oil and not more than 11 % moisture	4.2	1386
SEED CAKE with not more than 1.5 % oil and not more than 11 % moisture	4.2	2217
Seed expellers, see	4.2	1386
	4.2	2217
SELENATES	6.1	2630
SELENIC ACID	8	1905
SELENITES	6.1	2630
SELENIUM COMPOUND, N.O.S.	6.1	3283
SELENIUM COMPOUND, LIQUID, N.O.S.	6.1	3440
SELENIUM DISULPHIDE	6.1	2657
SELENIUM HEXAFLUORIDE	2.3	2194
SELENIUM OXYCHLORIDE	8	2879
SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.	4.2	3188
SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.	4.2	3185
SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2	3186
SELF-HEATING LIQUID, ORGANIC, N.O.S.	4.2	3183
SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.	4.2	3187
SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.	4.2	3184
SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S.	4.2	3192
SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S.	4.2	3126
SELF-HEATING SOLID, INORGANIC, N.O.S.	4.2	3190
SELF-HEATING SOLID, ORGANIC, N.O.S.	4.2	3088
SELF-HEATING SOLID, OXIDIZING, N.O.S	4.2	3127
SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S.	4.2	3191
SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S.	4.2	3128
SELF-REACTIVE LIQUID TYPE B	4.1	3221
SELF-REACTIVE LIQUID TYPE B, TEMPERATURE CONTROLLED	4.1	3231
SELF-REACTIVE LIQUID TYPE C	4.1	3223
SELF-REACTIVE LIQUID TYPE C, TEMPERATURE CONTROLLED	4.1	3233
SELF-REACTIVE LIQUID TYPE D	4.1	3225
SELF-REACTIVE LIQUID TYPE D, TEMPERATURE CONTROLLED	4.1	3235
SELF-REACTIVE LIQUID TYPE E	4.1	3227
SELF-REACTIVE LIQUID TYPE E, TEMPERATURE CONTROLLED	4.1	3237
SELF-REACTIVE LIQUID TYPE F	4.1	3229
SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED	4.1	3239
SELF-REACTIVE SOLID TYPE B	4.1	3222
SELF-REACTIVE SOLID TYPE B, TEMPERATURE CONTROLLED	4.1	3232
SELF-REACTIVE SOLID TYPE C	4.1	3224
SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED	4.1	3234
SELF-REACTIVE SOLID TYPE D	4.1	3226
SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED	4.1	3236
SELF-REACTIVE SOLID TYPE E	4.1	3228
SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED	4.1	3238
SELF-REACTIVE SOLID TYPE F	4.1	3230
SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED	4.1	3240
SHALE OIL	3	1288

Name and description	Class	UN No.
Shaped charges, see	1.1D	0059
	1.2D	0439
	1.4D	0440
	1.4S	0441
SIGNAL DEVICES, HAND	1.4G	0191
	1.4S	0373
SIGNALS, DISTRESS, ship	1.1G	0194
	1.3G	0195
	1.4G	0505
	1.4S	0506
Signals, distress, ship, water-activated, see	1.3L	0249
SIGNALS, RAILWAY TRACK, EXPLOSIVE	1.1G	0192
	1.3G	0492
	1.4G	0493
	1.4S	0193
SIGNALS, SMOKE	1.1G	0196
	1.2G	0313
	1.3G	0487
	1.4G	0197
	1.4S	0507
SILANE	2.1	2203
Silicofluoric acid, see	8	1778
Silicofluorides, n.o.s., see	6.1	2856
Silicon chloride, see	8	1818
SILICON POWDER, AMORPHOUS	4.1	1346
SILICON TETRACHLORIDE	8	1818
SILICON TETRAFLUORIDE	2.3	1859
SILICON TETRAFLUORIDE, ADSORBED	2.3	3521
SILVER ARSENITE	6.1	1683
SILVER CYANIDE	6.1	1684
SILVER NITRATE	5.1	1493
SILVER PICRATE, WETTED with not less than 30 % water, by mass	4.1	1347
SLUDGE ACID	8	1906
SODA LIME with more than 4 % sodium hydroxide	8	1907
SODIUM	4.3	1428
Sodium aluminate, solid	8	2812
SODIUM ALUMINATE SOLUTION	8	1819
SODIUM ALUMINIUM HYDRIDE	4.3	2835
SODIUM AMMONIUM VANADATE	6.1	2863
SODIUM ARSANILATE	6.1	2473
SODIUM ARSENATE	6.1	1685
SODIUM ARSENITE, AQUEOUS SOLUTION	6.1	1686
SODIUM ARSENITE, SOLID	6.1	2027
SODIUM AZIDE	6.1	1687
Sodium bifluoride, see	8	2439
Sodium binoxide, see	5.1	1504
Sodium bisulphite solution, see	8	2693
SODIUM BOROHYDRIDE	4.3	1426
SODIUM BOROHYDRIDE AND SODIUM HYDROXIDE SOLUTION, with not more than 12 % sodium borohydride and not more than 40 % sodium hydroxide, by mass	8	3320
SODIUM BROMATE	5.1	1494
SODIUM CACODYLATE	6.1	1688
SODIUM CARBONATE PEROXYHYDRATE	5.1	3378
SODIUM CHLORATE	5.1	1495
SODIUM CHLORATE, AQUEOUS SOLUTION	5.1	2428
Sodium chlorate mixed with dinitrotoluene, see	1.1D	0083
SODIUM CHLORITE	5.1	1496
SODIUM CHLOROACETATE	6.1	2659
SODIUM CUPROCYANIDE, SOLID	6.1	2316
SODIUM CUPROCYANIDE SOLUTION	6.1	2317
SODIUM CYANIDE, SOLID	6.1	1689
SODIUM CYANIDE SOLUTION	6.1	3414
Sodium dicyanocuprate (I), solid, see	6.1	2316
Sodium dicyanocuprate (I) solution, see	6.1	2317
Sodium dimethylarsenate, see	6.1	1688

Name and description	Class	UN No.
SODIUM DINITRO-o-CRESOLATE, dry or wetted with less than 15 % water, by mass	1.3C	0234
SODIUM DINITRO-o-CRESOLATE, WETTED, with not less than 10 % water, by mass	4.1	3369
SODIUM DINITRO-o-CRESOLATE, WETTED with not less than 15 % water, by mass	4.1	1348
Sodium dioxide, see	5.1	1504
SODIUM DITHIONITE	4.2	1384
SODIUM FLUORIDE, SOLID	6.1	1690
SODIUM FLUORIDE SOLUTION	6.1	3415
SODIUM FLUOROACETATE	6.1	2629
SODIUM FLUOROSILICATE	6.1	2674
Sodium hexafluorosilicate, see	6.1	2674
Sodium hydrate, see	8	1824
SODIUM HYDRIDE	4.3	1427
Sodium hydrogen 4-amino-phenylarsenate, see	6.1	2473
SODIUM HYDROGENDIFLUORIDE	8	2439
SODIUM HYDROSULPHIDE with less than 25 % water of crystallization	4.2	2318
SODIUM HYDROSULPHIDE, HYDRATED with not less than 25 % water of crystallization	8	2949
SODIUM HYDROSULPHITE, see	4.2	1384
SODIUM HYDROXIDE, SOLID	8	1823
SODIUM HYDROXIDE SOLUTION	8	1824
Sodium metasilicate pentahydrate, see	8	3253
SODIUM METHYLATE	4.2	1431
SODIUM METHYLATE SOLUTION in alcohol	3	1289
SODIUM MONOXIDE	8	1825
SODIUM NITRATE	5.1	1498
SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE	5.1	1499
SODIUM NITRITE	5.1	1500
Sodium nitrite and potassium nitrate mixture, see	5.1	1487
SODIUM PENTACHLOROPHENATE	6.1	2567
SODIUM PERBORATE MONOHYDRATE	5.1	3377
SODIUM PERCHLORATE	5.1	1502
SODIUM PERMANGANATE	5.1	1503
SODIUM PEROXIDE	5.1	1504
SODIUM PEROXOBORATE, ANHYDROUS	5.1	3247
SODIUM PERSULPHATE	5.1	1505
SODIUM PHOSPHIDE	4.3	1432
SODIUM PICRAMATE, dry or wetted with less than 20 % water, by mass	1.3C	0235
SODIUM PICRAMATE, WETTED with not less than 20 % water, by mass	4.1	1349
Sodium potassium alloys, see	4.3 4.3	1422 3404
Sodium selenate, see	6.1	2630
Sodium selenite, see	6.1	2630
Sodium silicofluoride, see	6.1	2674
SODIUM SULPHIDE, ANHYDROUS	4.2	1385
SODIUM SULPHIDE with less than 30 % water of crystallization	4.2	1385
SODIUM SULPHIDE, HYDRATED with not less than 30 % water	8	1849
SODIUM SUPEROXIDE	5.1	2547
SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.	8	3244
SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S.	4.1	3175
SOLIDS CONTAINING TOXIC LIQUID, N.O.S.	6.1	3243
Solvents, flammable, n.o.s., see	3	1993
Solvents, flammable, toxic, n.o.s., see	3	1992
SOUNDING DEVICES, EXPLOSIVE	1.1D 1.1F 1.2D 1.2F	0374 0296 0375 0204

Name and description	Class	UN No.
Squibs, see	1.4G	0325
	1.4S	0454
STANNIC CHLORIDE, ANHYDROUS	8	1827
STANNIC CHLORIDE PENTAHYDRATE	8	2440
STANNIC PHOSPHIDES	4.3	1433
Steel swarf, see	4.2	2793
STIBINE	2.3	2676
STRAW	4.1	1327
Strontium alloys, pyrophoric, see	4.2	1383
STRONTIUM ARSENITE	6.1	1691
STRONTIUM CHLORATE	5.1	1506
Strontium dioxide, see	5.1	1509
STRONTIUM NITRATE	5.1	1507
STRONTIUM PERCHLORATE	5.1	1508
STRONTIUM PEROXIDE	5.1	1509
STRONTIUM PHOSPHIDE	4.3	2013
STRYCHNINE	6.1	1692
STRYCHNINE SALTS	6.1	1692
STYPHNIC ACID, see	1.1D	0219
	1.1D	0394
STYRENE MONOMER, STABILIZED	3	2055
SUBSTANCES, EVI, N.O.S., see	1.5D	0482
SUBSTANCES, EXPLOSIVE, N.O.S.	1.1A	0473
	1.1C	0474
	1.1D	0475
	1.1G	0476
	1.1L	0357
	1.2L	0358
	1.3C	0477
	1.3G	0478
	1.3L	0359
	1.4C	0479
	1.4D	0480
	1.4G	0485
	1.4S	0481
SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE, N.O.S.	1.5D	0482

Name and description	Class	UN No.
Substances liable to spontaneous combustion, n.o.s., see	4.2	2845
	4.2	2846
	4.2	3194
	4.2	3200
SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2780
SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC	6.1	3014
SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3013
SUBSTITUTED NITROPHENOL PESTICIDE, SOLID, TOXIC	6.1	2779
SULPHAMIC ACID	8	2967
SULPHUR	4.1	1350
SULPHUR CHLORIDES	8	1828
Sulphur dichloride, see	8	1828
SULPHUR DIOXIDE	2.3	1079
Sulphuretted hydrogen, see	2.3	1053
SULPHUR HEXAFLUORIDE	2.2	1080
SULPHURIC ACID with more than 51 % acid	8	1830
SULPHURIC ACID with not more than 51 % acid	8	2796
SULPHURIC ACID, FUMING	8	1831
SULPHURIC ACID, SPENT	8	1832
Sulphuric and hydrofluoric acid mixture, see	8	1786
SULPHUR, MOLTEN	4.1	2448
Sulphur monochloride, see	8	1828
SULPHUROUS ACID	8	1833
SULPHUR TETRAFLUORIDE	2.3	2418
SULPHUR TRIOXIDE, STABILIZED	8	1829
SULPHURYL CHLORIDE	8	1834
SULPHURYL FLUORIDE	2.3	2191
Table tennis balls, see	4.1	2000

Name and description	Class	UN No.
Talcum with tremolite and/or actinolite, see	9	2212
TARS, LIQUID, including road oils, and cutback bitumens	3	1999
Tartar emetic, see	6.1	1551
TEAR GAS CANDLES	6.1	1700
TEAR GAS SUBSTANCE, LIQUID, N.O.S.	6.1	1693
TEAR GAS SUBSTANCE, SOLID, N.O.S.	6.1	3448
TELLURIUM COMPOUND, N.O.S.	6.1	3284
TELLURIUM HEXAFLUORIDE	2.3	2195
TERPENE HYDROCARBONS, N.O.S.	3	2319
TERPINOLENE	3	2541
TETRABROMOETHANE	6.1	2504
1,1,2,2-TETRACHLOROETHANE	6.1	1702
TETRACHLOROETHYLENE	6.1	1897
TETRAETHYL DITHIOPYROPHOSPHATE	6.1	1704
TETRAETHYLENEPENTAMINE	8	2320
Tetraethyl lead, see	6.1	1649
TETRAETHYL SILICATE	3	1292
Tetraethyoxysilane, see	3	1292
Tetrafluorodichloroethane, see	2.2	1958
1,1,1,2-TETRAFLUOROETHANE	2.2	3159
TETRAFLUOROETHYLENE, STABILIZED	2.1	1081
TETRAFLUOROMETHANE	2.2	1982
1,2,3,6-TETRAHYDRO-BENZALDEHYDE	3	2498
TETRAHYDROFURAN	3	2056
TETRAHYDROFURFURYLAMINE	3	2943
Tetrahydro-1,4-oxazine, see	8	2054
TETRAHYDROPHTHALIC ANHYDRIDES with more than 0.05 % of maleic anhydride	8	2698
1,2,3,6-TETRAHYDROPYRIDINE	3	2410
TETRAHYDROTHIOPHENE	3	2412
Tetramethoxysilane, see	6.1	2606
TETRAMETHYLAMMONIUM HYDROXIDE SOLUTION	8	1835
TETRAMETHYLAMMONIUM HYDROXIDE, SOLID	8	3423
Tetramethylene, see	2.1	2601
Tetramethylene cyanide, see	6.1	2205
Tetramethyl lead, see	6.1	1649
TETRAMETHYLSILANE	3	2749
TETRANITROANILINE	1.1D	0207
TETRANITROMETHANE	5.1	1510
TETRAPROPYL ORTHOTITANATE	3	2413
TETRAZENE, WETTED see	1.1A	0114
TETRAZOL-1-ACETIC ACID	1.4C	0407
1H-TETRAZOLE	1.1D	0504
TETRYL, see	1.1D	0208
TEXTILE WASTE, WET	4.2	1857
THALLIUM CHLORATE	5.1	2573
Thallium (I) chlorate, see	5.1	2573
THALLIUM COMPOUND, N.O.S.	6.1	1707
THALLIUM NITRATE	6.1	2727
Thallium (I) nitrate, see	6.1	2727
Thallous chlorate, see	5.1	2573
4-THIAPENTANAL	6.1	2785
Thia-4-pentanal, see	6.1	2785
THIOACETIC ACID	3	2436
THIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2772
THIOCARBAMATE PESTICIDE, LIQUID, TOXIC	6.1	3006

Name and description	Class	UN No.
THIOCARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	3005
THIOCARBAMATE PESTICIDE, SOLID, TOXIC	6.1	2771
THIOGLYCOL	6.1	2966
THIOGLYCOLIC ACID	8	1940
THIOLACTIC ACID	6.1	2936
THIONYL CHLORIDE	8	1836
THIOPHENE	3	2414
Thiophenol, see	6.1	2337
THIOPHOSGENE	6.1	2474
THIOPHOSPHORYL CHLORIDE	8	1837
THIOUREA DIOXIDE	4.2	3341
Tin (IV) chloride, anhydrous, see	8	1827
Tin (IV) chloride pentahydrate, see	8	2440
TINCTURES, MEDICINAL	3	1293
Tin tetrachloride, see	8	1827
TITANIUM DISULPHIDE	4.2	3174
TITANIUM HYDRIDE	4.1	1871
TITANIUM POWDER, DRY	4.2	2546
TITANIUM POWDER, WETTED with not less than 25 % water (a visible excess of water must be present) mechanically produced, particle size less than 53 microns; chemically produced, particle size less than 840 microns	4.1	1352
TITANIUM SPONGE GRANULES	4.1	2878
TITANIUM SPONGE POWDERS	4.1	2878
TITANIUM TETRACHLORIDE	8	1838
TITANIUM TRICHLORIDE MIXTURE	8	2869
TITANIUM TRICHLORIDE MIXTURE, PYROPHORIC	4.2	2441
TITANIUM TRICHLORIDE, PYROPHORIC	4.2	2441
TNT, see	1.1D 1.1D 1.1D	0209 0388 0389
TNT, WETTED, see	4.1 4.1	1356 3366
TNT mixed with aluminium, see	1.1D	0390
Toe puffs, nitrocellulose base, see	4.1	1353
TOLUENE	3	1294
TOLUENE DIISOCYANATE	6.1	2078
TOLUIDINES, LIQUID	6.1	1708
TOLUIDINES, SOLID	6.1	3451
Toluol, see	3	1294
2,4-TOLUYLENEDIAMINE, SOLID	6.1	1709
2,4-TOLUYLENEDIAMINE SOLUTION	6.1	3418
Toluylene diisocyanate, see	6.1	2078
Tolylene diisocyanate, see	6.1	2078
Tolylethylene, inhibited, see	3	2618
TORPEDOES with bursting charge	1.1D 1.1E 1.1F	0451 0329 0330
TORPEDOES, LIQUID FUELLED with inert head	1.3J	0450
TORPEDOES, LIQUID FUELLED with or without bursting charge	1.1J	0449
TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3381
TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3382
TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3383

Name and description	Class	UN No.
TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3384
TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3488
TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3489
TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3385
TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3386
TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3490
TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3491
TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 or less and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3387
TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 or less and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3388
TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}	6.1	3389
TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}	6.1	3390
TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S.	6.1	3289
TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S.	6.1	2927
TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S.	6.1	2929
TOXIC LIQUID, INORGANIC, N.O.S.	6.1	3287
TOXIC LIQUID, ORGANIC, N.O.S.	6.1	2810
TOXIC LIQUID, OXIDIZING, N.O.S.	6.1	3122
TOXIC LIQUID, WATER-REACTIVE, N.O.S.	6.1	3123
TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S.	6.1	3290
TOXIC SOLID, CORROSIVE, ORGANIC, N.O.S.	6.1	2928
TOXIC SOLID, FLAMMABLE, INORGANIC, N.O.S.	6.1	3535
TOXIC SOLID, FLAMMABLE, ORGANIC, N.O.S.	6.1	2930
TOXIC SOLID, INORGANIC, N.O.S.	6.1	3288
TOXIC SOLID, ORGANIC, N.O.S.	6.1	2811
TOXIC SOLID, OXIDIZING, N.O.S.	6.1	3086
TOXIC SOLID, SELF-HEATING, N.O.S.	6.1	3124
TOXIC SOLID, WATER-REACTIVE, N.O.S.	6.1	3125
TOXINS, EXTRACTED FROM LIVING SOURCES, LIQUID, N.O.S.	6.1	3172
TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.	6.1	3462
TRACERS FOR AMMUNITION	1.3G 1.4G	0212 0306

Name and description	Class	UN No.
Tremolite, see	9	2212
TRIALLYLAMINE	3	2610
TRIALLYL BORATE	6.1	2609
TRIAZINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flash-point less than 23 °C	3	2764
TRIAZINE PESTICIDE, LIQUID, TOXIC	6.1	2998
TRIAZINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash-point not less than 23 °C	6.1	2997
TRIAZINE PESTICIDE, SOLID, TOXIC	6.1	2763
Tribromoborane, see	8	2692
TRIBUTYLAMINE	6.1	2542
TRIBUTYLPHOSPHANE	4.2	3254
Trichloroacetaldehyde, see	6.1	2075
TRICHLOROACETIC ACID	8	1839
TRICHLOROACETIC ACID SOLUTION	8	2564
Trichlororaceticaldehyde, see	6.1	2075
TRICHLOROACETYL CHLORIDE	8	2442
TRICHLOROBENZENES, LIQUID	6.1	2321
TRICHLOROBUTENE	6.1	2322
1,1,1-TRICHLOROETHANE	6.1	2831
TRICHLOROETHYLENE	6.1	1710
TRICHLOROISOCYANURIC ACID, DRY	5.1	2468
Trichloronitromethane, see	6.1	1580
TRICHLOROSILANE	4.3	1295
1,3,5-Trichloro-s-triazine-2,4,6-trione, see	5.1	2468
2,4,6-Trichloro-1,3,5- triazine, see	8	2670
TRICRESYL PHOSPHATE with more than 3 % ortho isomer	6.1	2574
TRIETHYLAMINE	3	1296
Triethyl borate, see	3	1176
TRIETHYLENETETRAMINE	8	2259
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TRIFLUOROACETYL CHLORIDE	2.3	3057
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TRIFLUOROCHLOROETHYLENE, STABILIZED, REFRIGERANT GAS R 1113	2.3	1082
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1,1,1-TRIFLUOROETHANE	2.1	2035
TRIFLUOROMETHANE	2.2	1984
TRIFLUOROMETHANE, REFRIGERATED LIQUID	2.2	3136
2-TRIFLUOROMETHYLANILINE	6.1	2942
3-TRIFLUOROMETHYLANILINE	6.1	2948
TRIISOBUTYLENE	3	2324
TRIISOPROPYL BORATE	3	2616
TRIMETHYLACETYL CHLORIDE	6.1	2438
TRIMETHYLAMINE, ANHYDROUS	2.1	1083
TRIMETHYLAMINE, AQUEOUS SOLUTION, not more than 50 % trimethylamine, by mass	3	1297
1,3,5-TRIMETHYLBENZENE	3	2325
TRIMETHYL BORATE	3	2416
TRIMETHYLCHLOROSILANE	3	1298
TRIMETHYLCYCLOHEXYLAMINE	8	2326
Trimethylene chlorobromide, see	6.1	2688
TRIMETHYLHEXA-METHYLENEDIAMINES	8	2327
TRIMETHYLHEXAMETHYLENE DIISOCYANATE	6.1	2328
2,4,4-Trimethylpentene-1, see	3	2050
2,4,4-Trimethylpentene-2, see	3	2050

Name and description	Class	UN No.
TRIMETHYL PHOSPHITE	3	2329
TRINITROANILINE	1.1D	0153
TRINITROANISOLE	1.1D	0213
TRINITROBENZENE, dry or wetted with less than 30 % water, by mass	1.1D	0214
TRINITROBENZENE, WETTED, with not less than 10 % water, by mass	4.1	3367
TRINITROBENZENE, WETTED with not less than 30 % water, by mass	4.1	1354
TRINITROBENZENESULPHONIC ACID	1.1D	0386
TRINITROBENZOIC ACID, dry or wetted with less than 30 % water, by mass	1.1D	0215
TRINITROBENZOIC ACID, WETTED, with not less than 10 % water by mass	4.1	3368
TRINITROBENZOIC ACID, WETTED with not less than 30 % water, by mass	4.1	1355
TRINITROCHLOROBENZENE	1.1D	0155
TRINITROCHLOROBENZENE, WETTED, with not less than 10 % water by mass	4.1	3365
TRINITRO-m-CRESOL	1.1D	0216
TRINITROFLUORENONE	1.1D	0387
TRINITRONAPHTHALENE	1.1D	0217
TRINITROPHENETOLE	1.1D	0218
TRINITROPHENOL, dry or wetted with less than 30 % water, by mass	1.1D	0154
TRINITROPHENOL, WETTED, with not less than 10 % water by mass	4.1	3364
TRINITROPHENOL, WETTED with not less than 30 % water, by mass	4.1	1344
TRINITROPHENYLMETHYL-NITRAMINE	1.1D	0208
TRINITRORESORCINOL, dry or wetted with less than 20 % water, or mixture of alcohol and water, by mass	1.1D	0219
TRINITRORESORCINOL, WETTED with not less than 20 % water, or mixture of alcohol and water, by mass	1.1D	0394
TRINITROTOLUENE, dry or wetted with less than 30 % water, by mass	1.1D	0209
TRINITROTOLUENE AND HEXA-NITROSTILBENE MIXTURE	1.1D	0388
TRINITROTOLUENE AND TRINITROBENZENE MIXTURE	1.1D	0388
TRINITROTOLUENE MIXTURE CONTAINING TRINITRO-BENZENE AND HEXANITROSTILBENE	1.1D	0389
TRINITROTOLUENE, WETTED, with not less than 10 % water by mass	4.1	3366
TRINITROTOLUENE, WETTED with not less than 30 % water, by mass	4.1	1356
TRIPROPYLAMINE	3	2260
TRIPROPYLENE	3	2057
TRIS-(1-AZIRIDINYL) PHOSPHINE OXIDE SOLUTION	6.1	2501
TRITONAL	1.1D	0390
Tropilidene, see	3	2603
TUNGSTEN HEXAFLUORIDE	2.3	2196
TURPENTINE	3	1299
TURPENTINE SUBSTITUTE	3	1300
UNDECANE	3	2330
URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile-excepted	6.1	3507
UREA HYDROGEN PEROXIDE	5.1	1511
UREA NITRATE, dry or wetted with less than 20 % water, by mass	1.1D	0220
UREA NITRATE, WETTED with not less than 10 % water, by mass	4.1	3370
UREA NITRATE, WETTED with not less than 20 % water, by mass	4.1	1357
Valeral, see	3	2058
VALERALDEHYDE	3	2058
n-Valeraldehyde, see	3	2058
Valeric aldehyde, see	3	2058

Name and description	Class	UN No.
VALERYL CHLORIDE	8	2502
VANADIUM COMPOUND, N.O.S.	6.1	3285
Vanadium (IV) oxide sulphate, see	6.1	2931
Vanadium oxysulphate, see	6.1	2931
VANADIUM OXYTRICHLORIDE	8	2443
VANADIUM PENTOXIDE, non-fused form	6.1	2862
VANADIUM TETRACHLORIDE	8	2444
VANADIUM TRICHLORIDE	8	2475
VANADYL SULPHATE	6.1	2931
VEHICLE, FLAMMABLE GAS POWERED	9	3166
VEHICLE, FLAMMABLE LIQUID POWERED	9	3166
VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED	9	3166
VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED	9	3166
Villiaumite, see	6.1	1690
VINYL ACETATE, STABILIZED	3	1301
Vinylbenzene, see	3	2055
VINYL BROMIDE, STABILIZED	2.1	1085
VINYL BUTYRATE, STABILIZED	3	2838
VINYL CHLORIDE, STABILIZED	2.1	1086
VINYL CHLOROACETATE	6.1	2589
VINYL ETHYL ETHER, STABILIZED	3	1302
VINYL FLUORIDE, STABILIZED	2.1	1860
VINYLIDENE CHLORIDE, STABILIZED	3	1303
VINYL ISOBUTYL ETHER, STABILIZED	3	1304
VINYL METHYL ETHER, STABILIZED	2.1	1087
VINYLPYRIDINES, STABILIZED	6.1	3073
VINYLTOLUENES, STABILIZED	3	2618
VINYLTRICHLOROSILANE	3	1305
Warheads for guided missiles, see	1.1D 1.1F 1.2D 1.4D 1.4F	0286 0369 0287 0370 0371
WARHEADS, ROCKET with burster or expelling charge	1.4D 1.4F	0370 0371
WARHEADS, ROCKET with bursting charge	1.1D 1.1F 1.2D	0286 0369 0287
WARHEADS, TORPEDO with bursting charge	1.1D	0221
WATER-REACTIVE LIQUID, N.O.S.	4.3	3148
WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.	4.3	3129
WATER-REACTIVE LIQUID, TOXIC, N.O.S.	4.3	3130
WATER-REACTIVE SOLID, N.O.S	4.3	2813
WATER-REACTIVE SOLID, CORROSIVE, N.O.S	4.3	3131
WATER-REACTIVE SOLID, FLAMMABLE, N.O.S	4.3	3132
WATER-REACTIVE SOLID, OXIDIZING, N.O.S	4.3	3133
WATER-REACTIVE SOLID, SELF-HEATING, N.O.S	4.3	3135
WATER-REACTIVE SOLID, TOXIC, N.O.S.	4.3	3134
White arsenic, see	6.1	1561
White spirit, see	3	1300
WOOD PRESERVATIVES, LIQUID	3	1306
WOOL WASTE, WET	4.2	1387
XANTHATES	4.2	3342
XENON	2.2	2036
XENON, REFRIGERATED LIQUID	2.2	2591
XYLENES	3	1307
XYLENOLS, SOLID	6.1	2261
XYLENOLS, LIQUID	6.1	3430
XYLIDINES, LIQUID	6.1	1711

Name and description	Class	UN No.
XYLIDINES, SOLID	6.1	3452
Xylols, see	3	1307
XYLYL BROMIDE, LIQUID	6.1	1701
XYLYL BROMIDE, SOLID	6.1	3417
ZINC AMMONIUM NITRITE	5.1	1512
ZINC ARSENATE	6.1	1712
ZINC ARSENATE AND ZINC ARSENITE MIXTURE	6.1	1712
ZINC ARSENITE	6.1	1712
ZINC ASHES	4.3	1435
Zinc bisulphite solution, see	8	2693
ZINC BROMATE	5.1	2469
ZINC CHLORATE	5.1	1513
ZINC CHLORIDE, ANHYDROUS	8	2331
ZINC CHLORIDE SOLUTION	8	1840
ZINC CYANIDE	6.1	1713
ZINC DITHIONITE	9	1931
ZINC DUST	4.3	1436
ZINC FLUOROSILICATE	6.1	2855
Zinc hexafluorosilicate, see	6.1	2855
ZINC HYDROSULPHITE, see	9	1931
ZINC NITRATE	5.1	1514
ZINC PERMANGANATE	5.1	1515
ZINC PEROXIDE	5.1	1516
ZINC PHOSPHIDE	4.3	1714
ZINC POWDER	4.3	1436
ZINC RESINATE	4.1	2714
Zinc selenate, see	6.1	2630
Zinc selenite, see	6.1	2630
Zinc silicofluoride, see	6.1	2855
ZIRCONIUM, DRY, coiled wire, finished metal sheets, strip (thinner than 254 microns but not thinner than 18 microns)	4.1	2858
ZIRCONIUM, DRY, finished sheets, strip or coiled wire	4.2	2009
ZIRCONIUM HYDRIDE	4.1	1437
ZIRCONIUM NITRATE	5.1	2728
ZIRCONIUM PICRAMATE, dry or wetted with less than 20 % water, by mass	1.3C	0236
ZIRCONIUM PICRAMATE, WETTED with not less than 20 % water, by mass	4.1	1517
ZIRCONIUM POWDER, DRY	4.2	2008
ZIRCONIUM POWDER, WETTED with not less than 25 % water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns	4.1	1358
ZIRCONIUM SCRAP	4.2	1932
ZIRCONIUM SUSPENDED IN A FLAMMABLE LIQUID	3	1308
ZIRCONIUM TETRACHLORIDE	8	2503

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Recommendations on the

TRANSPORT OF DANGEROUS GOODS

Model Regulations

Volume II

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TRANSPORT OF DANGEROUS GOODS

(cont'd)

PART 4

PACKING AND TANK PROVISIONS

CHAPTER 4.1

USE OF PACKAGINGS, INCLUDING INTERMEDIATE BULK CONTAINERS (IBCs) AND LARGE PACKAGINGS

4.1.1 General provisions for the packing of dangerous goods in packagings, including IBCs and large packagings

NOTE: *For the packing of goods of Class 2, Division 6.2 and Class 7, the general provisions of this section only apply as indicated in 4.1.8.2 (Division 6.2, UN 2814 and UN 2900), 4.1.9.1.5 (Class 7) and in the applicable packing instructions of 4.1.4 (P201, P207 and LP02 for Class 2 and P620, P621, P622, IBC620, LP621 and LP622 for Division 6.2).*

4.1.1.1 Dangerous goods shall be packed in good quality packagings, including IBCs and large packagings, which shall be strong enough to withstand the shocks and loadings normally encountered during transport, including transshipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings, including IBCs and large packagings, shall be constructed and closed so as to prevent any loss of contents when prepared for transport which may be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example). Packagings, including IBCs and large packagings, shall be closed in accordance with the information provided by the manufacturer. No dangerous residue shall adhere to the outside of packages, IBCs and large packagings during transport. These provisions apply, as appropriate, to new, reused, reconditioned or remanufactured packagings, and to new, reused, repaired or remanufactured IBCs, and to new, reused or remanufactured large packagings.

4.1.1.2 Parts of packagings, including IBCs and large packagings, which are in direct contact with dangerous goods:

(a) Shall not be affected or significantly weakened by those dangerous goods;

(b) Shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods; and

(c) Shall not allow permeation of the dangerous goods that could constitute a danger under normal conditions of transport.

Where necessary, they shall be provided with a suitable inner coating or treatment.

4.1.1.3 Unless otherwise provided elsewhere in these Regulations, each packaging, including IBCs and large packagings, except inner packagings, shall conform to a design type successfully tested in accordance with the requirements of 6.1.5, 6.3.5, 6.5.6 or 6.6.5, as applicable.

However, IBCs manufactured before 1 January 2011 and conforming to a design type which has not passed the vibration test of 6.5.6.13 or which was not required to meet the criteria of 6.5.6.9.5 (d) at the time it was subjected to the drop test, may still be used.

4.1.1.3.1 Packagings, including IBCs and large packagings, may conform to one or more than one successfully tested design type and may bear more than one mark.

4.1.1.4 When filling packagings, including IBCs and large packagings, with liquids, sufficient ullage (outage) shall be left to ensure that neither leakage nor permanent distortion of the packaging occurs as a result of an expansion of the liquid caused by temperatures likely to occur during transport. Unless specific requirements are prescribed, liquids shall not completely fill a packaging at a temperature of 55 °C. However, sufficient ullage shall be left in an IBC to ensure that at the mean bulk temperature of 50 °C it is not filled to more than 98 % of its water capacity.

4.1.1.4.1 For air transport, packagings intended to contain liquids shall also be capable of withstanding a pressure differential without leakage as specified in the international regulations for air transport.

4.1.1.5 Inner packagings shall be packed in an outer packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings containing liquids shall be packed with their closures upward and placed within outer packagings consistent with the orientation marks prescribed in 5.2.1.7 of these Regulations. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials, etc., shall be secured in outer packagings with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.

4.1.1.5.1 Where an outer packaging of a combination packaging or a large packaging has been successfully tested with different types of inner packagings, a variety of such different inner packagings may also be assembled in this outer packaging or large packaging. In addition, provided an equivalent level of performance is maintained, the following variations in inner packagings are allowed without further testing of the package:

(a) Inner packagings of equivalent or smaller size may be used provided:

(i) The inner packagings are of similar design to the tested inner packagings (e.g. shape - round, rectangular, etc.);

(ii) The material of construction of the inner packagings (glass, plastics, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested inner packaging;

(iii) The inner packagings have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc.);

(iv) Sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings; and

(v) Inner packagings are oriented within the outer packaging in the same manner as in the tested package.

(b) A lesser number of the tested inner packagings, or of the alternative types of inner packagings identified in (a) above, may be used provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the inner packagings.

4.1.1.5.2 Use of supplementary packagings within an outer packaging (e.g. an intermediate packaging or a receptacle inside a required inner packaging) additional to what is required by the packing instructions is authorized provided all relevant requirements are met, including those of 4.1.1.3, and, if appropriate, suitable cushioning is used to prevent movement within the packaging.

4.1.1.6 Dangerous goods shall not be packed together in the same outer packaging or in large packagings, with dangerous or other goods if they react dangerously with each other and cause:

(a) Combustion and/or evolution of considerable heat;

(b) Evolution of flammable, toxic or asphyxiant gases;

(c) The formation of corrosive substances; or

(d) The formation of unstable substances.

4.1.1.7 The closures of packagings containing wetted or diluted substances shall be such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during transport.

4.1.1.7.1 Where two or more closure systems are fitted in series on an IBC, that nearest to the substance being carried shall be closed first.

4.1.1.8 Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other causes), the packaging or IBC may be fitted with a vent provided that the gas emitted will not cause danger on account of its toxicity, its flammability or the quantity released, for example.

A venting device shall be fitted if dangerous overpressure may develop due to normal decomposition of substances. The vent shall be so designed that, when the packaging or IBC is in the attitude in which it is intended to be transported, leakages of liquid and the penetration of foreign substances are prevented under normal conditions of transport.

4.1.1.8.1 Liquids may only be filled into inner packagings which have an appropriate resistance to internal pressure that may be developed under normal conditions of transport.

4.1.1.8.2 Venting of the package is not permitted for air transport.

4.1.1.9 New, remanufactured or reused packagings, including IBCs and large packagings, or reconditioned packagings and repaired or routinely maintained IBCs shall be capable of passing the tests prescribed in 6.1.5, 6.3.5, 6.5.6 or 6.6.5, as applicable. Before being filled and handed over for transport, every packaging, including IBCs and large packagings, shall be inspected to ensure that it is free from corrosion, contamination or other damage and every IBC shall be inspected with regard to the proper functioning of any service equipment. Any packaging, which shows signs of reduced strength as compared with the approved design type shall no longer be used or shall be so reconditioned, that it is able to withstand the design type tests. Any IBC which shows signs of reduced strength as compared with the tested design type shall no longer be used or shall be so repaired or routinely maintained that it is able to withstand the design type tests.

4.1.1.10 Liquids shall be filled only into packagings, including IBCs, which have an appropriate resistance to the internal pressure that may develop under normal conditions of transport. Packagings and IBCs marked with the hydraulic test pressure prescribed in 6.1.3.1 (d) and 6.5.2.2.1, respectively shall be filled only with a liquid having a vapour pressure:

(a) Such that the total gauge pressure in the packaging or IBC (i.e. the vapour pressure of the filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55 °C, determined on the basis of a maximum degree of filling in accordance with 4.1.1.4 and a filling temperature of 15 °C, will not exceed two thirds of the marked test pressure; or

(b) At 50 °C less than four sevenths of the sum of the marked test pressure plus 100 kPa; or

(c) At 55 °C less than two thirds of the sum of the marked test pressure plus 100 kPa.

IBCs intended for the transport of liquids shall not be used to carry liquids having a vapour pressure of more than 110 kPa (1.1 bar) at 50 °C or 130 kPa (1.3 bar) at 55 °C.

Examples of required marked test pressures for packagings, including IBCs, calculated as in 4.1.1.10 (c)

UN No.	Name	Class	Packing group	V_{p55} (kPa)	$V_{p55} \times 1.5$ (kPa)	$(V_{p55} \times 1.5)$ minus 100 (kPa)	Required minimum test pressure gauge under 6.1.5.5.4 (c) (kPa)	Minimum test pressure (gauge) to be marked on the packaging (kPa)
2056	Tetrahydrofuran	3	II	70	105	5	100	100
2247	n-Decane	3	III	1.4	2.1	-97.9	100	100
1593	Dichloromethane	6.1	III	164	246	146	146	150
1155	Diethyl ether	3	I	199	299	199	199	250

NOTE 1: *For pure liquids the vapour pressure at 55 °C (V_{p55}) can often be obtained from scientific tables.*

NOTE 2: *The table refers to the use of 4.1.1.10 (c) only, which means that the marked test pressure shall exceed 1.5 times the vapour pressure at 55 °C less 100 kPa. When, for example, the test pressure for n-decane is determined according to 6.1.5.5.4 (a), the minimum marked test pressure may be lower.*

NOTE 3: *For diethyl ether the required minimum test pressure under 6.1.5.5.5 is 250 kPa.*

4.1.1.11 Empty packagings, including IBCs and large packagings, that have contained a dangerous substance shall be treated in the same manner as is required by these Regulations for a filled packaging, unless adequate measures have been taken to nullify any hazard.

4.1.1.12 Every packaging as specified in Chapter 6.1 intended to contain liquids shall successfully undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.1.1.4 which shows the capability of meeting the appropriate test level indicated in 6.1.5.4.3:

(a) Before it is first used for transport;

(b) After remanufacturing or reconditioning of any packaging, before it is re-used for transport.

For this test the packaging need not have its closures fitted. The inner receptacle of a composite packaging may be tested without the outer packaging, provided the test results are not affected. This test is not necessary for inner packagings of combination packagings or large packagings.

4.1.1.13 Packagings, including IBCs, used for solids which may become liquid at temperatures likely to be encountered during transport shall also be capable of containing the substance in the liquid state.

4.1.1.14 Packagings, including IBCs, used for powdery or granular substances shall be siftproof or shall be provided with a liner.

4.1.1.15 For plastics drums and jerricans, rigid plastics IBCs and composite IBCs with plastics inner receptacles, unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous substances shall be five years from the date of manufacture of the receptacles, except where a shorter period of use is prescribed because of the nature of the substance to be transported.

NOTE: *For composite IBCs the period of use refers to the date of manufacture of the inner receptacle.*

4.1.1.16 Where ice is used as a coolant it shall not affect the integrity of the packaging.

4.1.1.17 ***Explosives, self-reactive substances and organic peroxides***

Unless specific provision to the contrary is made in these Regulations, the packagings, including IBCs and large packagings, used for goods of Class 1, self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 shall comply with the provisions for the medium danger group (packing group II).

4.1.1.18 ***Use of salvage packagings and large salvage packagings***

4.1.1.18.1 Damaged, defective, leaking or non-conforming packages, or dangerous goods that have spilled or leaked may be transported in salvage packagings mentioned in 6.1.5.1.11 and 6.6.5.1.9. This does not prevent the use of a larger size packaging or large packaging of appropriate type and performance level and under the conditions of 4.1.1.18.2 and 4.1.1.18.3.

4.1.1.18.2 Appropriate measures shall be taken to prevent excessive movement of the damaged or leaking packages within a salvage packaging. When the salvage packaging contains liquids, sufficient inert absorbent material shall be added to eliminate the presence of free liquid.

4.1.1.18.3 Appropriate measures shall be taken to ensure that there is no dangerous build up of pressure.

4.1.1.19 ***Use of salvage pressure receptacles***

4.1.1.19.1 In the case of damaged, defective, leaking or non-conforming pressure receptacles, salvage pressure receptacles according to 6.2.3 may be used.

NOTE: *A salvage pressure receptacle may be used as an overpack in accordance with 5.1.2. When used as an overpack, marks shall be in accordance with 5.1.2.1 instead of 5.2.1.3.*

4.1.1.19.2 Pressure receptacles shall be placed in salvage pressure receptacles of suitable size. More than one pressure receptacle may be placed in the same salvage pressure receptacle only if the contents are known and do not react dangerously with each other (see 4.1.1.6). In this case the total sum of water capacities of the placed pressure receptacles shall not exceed 3 000 litres. Measures shall be taken to prevent movement of the pressure receptacles within the salvage pressure receptacle e.g. by partitioning, securing or cushioning.

4.1.1.19.3 A pressure receptacle may only be placed in a salvage pressure receptacle if:

(a) The salvage pressure receptacle is in accordance with 6.2.3.5 and a copy of the approval certificate is available;

(b) Parts of the salvage pressure receptacle which are, or are likely to be in direct contact with the dangerous goods will not be affected or weakened by those dangerous goods and will not cause a dangerous effect (e.g. catalyzing reaction or reacting with the dangerous goods); and

(c) The contents of the contained pressure receptacle(s) are limited in pressure and volume so that if totally discharged into the salvage pressure receptacle, the pressure in the salvage pressure receptacle at 65 °C will not exceed the test pressure of the salvage pressure receptacle (for gases, see packing instruction in P200 (3) 4.1.4.1). The reduction of the useable water capacity of the salvage pressure receptacle, e.g. by any contained equipment and cushioning, shall be taken into account.

4.1.1.19.4 The proper shipping name, the UN Number preceded by the letters “UN” and label(s) as required for packages in Chapter 5.2 applicable to the dangerous goods inside the contained pressure receptacle(s) shall be applied to the salvage pressure receptacle for transport.

4.1.1.19.5 Salvage pressure receptacles shall be cleaned, purged and visually inspected internally and externally after each use. They shall be periodically inspected and tested in accordance with 6.2.1.6 at least once every five years.

4.1.2 Additional general provisions for the use of IBCs

4.1.2.1 When IBCs are used for the transport of liquids with a flash point of 60 °C (closed-cup) or lower, or of powders liable to dust explosion, measures shall be taken to prevent a dangerous electrostatic discharge.

4.1.2.2 Every metal, rigid plastics and composite IBC shall be inspected and tested, as relevant, in accordance with 6.5.4.4 or 6.5.4.5:

- Before it is put into service;
- Thereafter at intervals not exceeding two and a half and five years, as appropriate; and
- After the repair or remanufacture, before it is re-used for transport.

An IBC shall not be filled and offered for transport after the date of expiry of the last periodic test or inspection. However, an IBC filled prior to the date of expiry of the last periodic test or inspection may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, an IBC may be transported after the date of expiry of the last periodic test or inspection:

(a) After emptying but before cleaning, for purposes of performing the required test or inspection prior to refilling; and

(b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection in order to allow the return of dangerous goods or residues for proper disposal or recycling. Reference to this exemption shall be entered in the transport document.

4.1.2.3 IBCs of type 31HZ2 shall be filled to at least 80 % of the volume of the outer casing and always be carried in closed cargo transport units.

4.1.2.4 Except for routine maintenance of metal, rigid plastics, composite and flexible IBCs performed by the owner of the IBC, whose State and name or authorized symbol is durably marked on the IBC, the party performing routine maintenance shall durably mark the IBC near the manufacturer's UN design type mark to show:

(a) The State in which the routine maintenance was carried out; and

(b) The name or authorized symbol of the party performing the routine maintenance.

4.1.3 General provisions concerning packing instructions

4.1.3.1 Packing instructions applicable to dangerous goods of Classes 1 to 9 are specified in 4.1.4. They are subdivided depending on the type of packagings to which they apply:

4.1.4.1 for packagings other than IBCs and large packagings; these packing instructions are designated by an alphanumeric code comprising the letter “P”;

4.1.4.2 for IBCs; these are designated by an alphanumeric code comprising the letters “IBC”;

4.1.4.3 for large packagings; these are designated by an alphanumeric code comprising the letters “LP”.

Generally, packing instructions specify that the general provisions of 4.1.1, 4.1.2 and/or 4.1.3, as appropriate, are applicable. They may also require compliance with the special provisions of sections 4.1.5, 4.1.6, 4.1.7, 4.1.8 or 4.1.9 when appropriate. Special packing provisions may also be specified in the packing instruction for individual substances or articles. They are also designated by an alphanumeric code comprising the letters:

"PP"	for packagings other than IBCs and large packagings
"B"	for IBCs
"L"	for large packagings.

Unless otherwise specified, each packaging shall conform to the applicable requirements of Part 6. Generally packing instructions do not provide guidance on compatibility and the user should not select a packaging without checking that the substance is compatible with the packaging material selected (e.g. most fluorides are unsuitable for glass receptacles). Where glass receptacles are permitted in the packing instructions porcelain, earthenware and stoneware packagings are also allowed.

4.1.3.2 Column 8 of the dangerous goods list shows for each article or substance the packing instruction(s) that shall be used. Column 9 indicates the special packing provisions applicable to specific substances or articles.

4.1.3.3 Each packing instruction shows, where applicable, the acceptable single and combination packagings. For combination packagings, the acceptable outer packagings, inner packagings and when applicable the maximum quantity permitted in each inner or outer packaging, are shown. Maximum net mass and maximum capacity are as defined in 1.2.1. Where packagings which need not meet the requirements of 4.1.1.3 (e.g., crates, pallets, etc.) are authorized in a packing instruction or the special provisions named in the dangerous goods list, these packages are not subject to the mass or volume limits generally applicable to packagings conforming to the requirements of Chapter 6.1, unless otherwise indicated in the relevant packing instruction or special provision.

4.1.3.4 The following packagings shall not be used when the substances being transported are liable to become liquid during transport:

Packagings

Drums:	1D and 1G
Boxes:	4C1, 4C2, 4D, 4F, 4G and 4H1
Bags:	5L1, 5L2, 5L3, 5H1, 5H2, 5H3, 5H4, 5M1 and 5M2
Composite packagings:	6HC, 6HD2, 6HG1, 6HG2, 6HD1, 6PC, 6PD1, 6PD2, 6PG1, 6PG2 and 6PH1

Large packagings

Flexible plastics:	51H (outer packaging)

IBCs

For substances of packing group I: All types of IBCs;

For substances of packing groups II and III:

Wooden:	11C, 11D and 11F
Fibreboard:	11G
Flexible:	13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 and 13M2
Composite:	11HZ2 and 21HZ2.

4.1.3.5 Where the packing instructions in this chapter authorize the use of a particular type of packaging (e.g. 4G; 1A2), packagings bearing the same packaging identification code followed by the letters "V", "U" or "W" marked in accordance with the requirements of Part 6 (e.g. 4GV, 4GU or 4GW; 1A2V, 1A2U or 1A2W) may also be used under the same conditions and limitations applicable to the use of that type of packaging according to the relevant packing instructions. For example, a combination packaging marked with the packaging code "4GV" may be used whenever a combination packaging marked "4G" is authorized,

provided the requirements in the relevant packing instruction regarding types of inner packagings and quantity limitations are respected.

4.1.3.6 ***Pressure receptacles for liquids and solids***

4.1.3.6.1 Unless otherwise indicated in these Regulations, pressure receptacles conforming to:

(a) The applicable requirements of Chapter 6.2; or

(b) The national or international standards on the design, construction, testing, manufacturing and inspection, as applied by the country in which the pressure receptacles are manufactured, provided that the provisions of 4.1.3.6 and 6.2.3.3 are met;

are authorized for the transport of any liquid or solid substance other than explosives, thermally unstable substances, organic peroxides, self-reactive substances, substances where significant pressure may develop by evolution of chemical reaction and radioactive material (unless permitted in 4.1.9).

This sub-section is not applicable to the substances mentioned in 4.1.4.1, packing instruction P200, Table 3.

4.1.3.6.2 Every design type of pressure receptacle shall be approved by the competent authority of the country of manufacture or as indicated in Chapter 6.2.

4.1.3.6.3 Unless otherwise indicated, pressure receptacles having a minimum test pressure of 0.6 MPa shall be used.

4.1.3.6.4 Unless otherwise indicated, pressure receptacles may be provided with an emergency pressure relief device designed to avoid bursting in case of overfill or fire accidents.

Pressure receptacle valves shall be designed and constructed in such a way that they are inherently able to withstand damage without release of the contents or shall be protected from damage which could cause inadvertent release of the contents of the pressure receptacle, by one of the methods as given in 4.1.6.1.8 (a) to (e).

4.1.3.6.5 The level of filling shall not exceed 95 % of the capacity of the pressure receptacle at 50 °C. Sufficient ullage (outage) shall be left to ensure that the pressure receptacle will not be liquid full at a temperature of 55 °C.

4.1.3.6.6 Unless otherwise indicated pressure receptacles shall be subjected to a periodic inspection and test every 5 years. The periodic inspection shall include an external examination, an internal examination or alternative method as approved by the competent authority, a pressure test or equivalent effective non-destructive testing with the agreement of the competent authority including an inspection of all accessories (e.g. tightness of valves, emergency relief valves or fusible elements). Pressure receptacles shall not be filled after they become due for periodic inspection and test but may be transported after the expiry of the time limit. Pressure receptacle repairs shall meet the requirements of 4.1.6.1.11.

4.1.3.6.7 Prior to filling, the filler shall perform an inspection of the pressure receptacle and ensure that the pressure receptacle is authorized for the substances to be transported and that the provisions of these Regulations have been met. Shut-off valves shall be closed after filling and remain closed during transport. The consignor shall verify that the closures and equipment are not leaking.

4.1.3.6.8 Refillable pressure receptacles shall not be filled with a substance different from that previously contained unless the necessary operations for change of service have been performed.

4.1.3.6.9 Marking of pressure receptacles for liquids and solids according to 4.1.3.6 (not conforming to the requirements of Chapter 6.2) shall be in accordance with the requirements of the competent authority of the country of manufacturing.

4.1.3.7 Packagings or IBCs not specifically authorized in the applicable packing instruction shall not be used for the transport of a substance or article unless specifically approved by the competent authority and provided:

(a) The alternative packaging complies with the general requirements of this Part;

(b) When the packing instruction indicated in the Dangerous Goods List so specifies, the alternative packaging meets the requirements of Part 6;

(c) The competent authority determines that the alternative packaging provides at least the same level of safety as if the substance were packed in accordance with a method specified in the particular packing instruction indicated in the Dangerous Goods List; and

(d) A copy of the competent authority approval accompanies each consignment or the transport document includes an indication that alternative packaging was approved by the competent authority.

NOTE: *The competent authorities granting such approvals should take action to amend these Model Regulations to include the provisions covered by the approval as appropriate.*

4.1.3.8 ***Unpackaged articles other than Class 1 articles***

4.1.3.8.1 Where large and robust articles cannot be packaged in accordance with the requirements of Chapters 6.1 or 6.6 and they have to be transported empty, uncleaned and unpackaged, the competent authority may approve such transport. In doing so the competent authority shall take into account that:

(a) Large and robust articles shall be strong enough to withstand the shocks and loadings normally encountered during transport including trans-shipment between cargo transport units and between cargo transport units and warehouses, as well as any removal from a pallet for subsequent manual or mechanical handling;

(b) All closures and openings shall be sealed so that there can be no loss of contents which might be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example). No dangerous residue shall adhere to the outside of the large and robust articles;

(c) Parts of large and robust articles, which are in direct contact with dangerous goods:

(i) shall not be affected or significantly weakened by those dangerous goods; and

(ii) shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods;

(d) Large and robust articles containing liquids shall be stowed and secured to ensure that neither leakage nor permanent distortion of the article occurs during transport;

(e) They shall be fixed in cradles or crates or other handling devices in such a way that they will not become loose during normal conditions of transport.

4.1.3.8.2 Unpackaged articles approved by the competent authority in accordance with the provisions of 4.1.3.8.1 shall be subject to the consignment procedures of Part 5. In addition the consignor of such articles shall ensure that a copy of any such approval is transported with the large and robust articles.

NOTE: *A large and robust article may include flexible fuel containment systems, military equipment, machinery or equipment containing dangerous goods above the limited quantity thresholds.*

4.1.4 List of packing instructions

4.1.4.1 *Packing instructions concerning the use of packagings (except IBCs and large packagings)*

P001	**PACKING INSTRUCTION (LIQUIDS)**			**P001**
The following packagings are authorized provided that the general provisions of **4.1.1** and **4.1.3** are met:				
		Maximum capacity/net mass (see 4.1.3.3)		
		Packing group I	**Packing group II**	**Packing group III**
Combination packagings				
Inner packagings	**Outer packagings**			
Glass 10 *l*	**Drums**			
Plastics 30 *l*	steel (1A1, 1A2)	250 kg	400 kg	400 kg
Metal 40 *l*	aluminium (1B1, 1B2)	250 kg	400 kg	400 kg
	other metal (1N1, 1N2)	250 kg	400 kg	400 kg
	plastics (1H1, 1H2)	250 kg	400 kg	400 kg
	plywood (1D)	150 kg	400 kg	400 kg
	fibre (1G)	75 kg	400 kg	400 kg
	Boxes			
	steel (4A)	250 kg	400 kg	400 kg
	aluminium (4B)	250 kg	400 kg	400 kg
	other metal (4N)	250 kg	400 kg	400 kg
	natural wood (4C1, 4C2)	150 kg	400 kg	400 kg
	plywood (4D)	150 kg	400 kg	400 kg
	reconstituted wood (4F)	75 kg	400 kg	400 kg
	fibreboard (4G)	75 kg	400 kg	400 kg
	expanded plastics (4H1)	60 kg	60 kg	60 kg
	solid plastics (4H2)	150 kg	400 kg	400 kg
	Jerricans			
	steel (3A1, 3A2)	120 kg	120 kg	120 kg
	aluminium (3B1, 3B2)	120 kg	120 kg	120 kg
	plastics (3H1, 3H2)	120 kg	120 kg	120 kg
Single packagings				
Drums				
steel, non-removable head (1A1)		250 *l*	450 *l*	450 *l*
steel, removable head (1A2)		250 *l* [a]	450 *l*	450 *l*
aluminium, non-removable head (1B1)		250 *l*	450 *l*	450 *l*
aluminium, removable head (1B2)		250 *l* [a]	450 *l*	450 *l*
other metal, non-removable head (1N1)		250 *l*	450 *l*	450 *l*
other metal, removable head (1N2)		250 *l* [a]	450 *l*	450 *l*
plastics, non-removable head (1H1)		250 *l*	450 *l*	450 *l*
plastics, removable head (1H2)		250 *l* [a]	450 *l*	450 *l*
Jerricans				
steel, non-removable head (3A1)		60 *l*	60 *l*	60 *l*
steel, removable head (3A2)		60 *l* [a]	60 *l*	60 *l*
aluminium, non-removable head (3B1)		60 *l*	60 *l*	60 *l*
aluminium, removable head (3B2)		60 *l* [a]	60 *l*	60 *l*
plastics, non-removable head (3H1)		60 *l*	60 *l*	60 *l*
plastics, removable head (3H2)		60 *l* [a]	60 *l*	60 *l*

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[a] *Only substances with a viscosity more than 200 mm^2/s are permitted.*

P001	PACKING INSTRUCTION (LIQUIDS) *(cont'd)*		P001
	Maximum capacity/Net mass (see 4.1.3.3)		
	Packing group I	**Packing group II**	**Packing group III**
Composite packagings			
plastics receptacle in steel or aluminium or plastics drum (6HA1, 6HB1, 6HH1)	250 *l*	250 *l*	250 *l*
plastics receptacle in fibre or plywood drum (6HG1, 6HD1)	120 *l*	250 *l*	250 *l*
plastics receptacle in steel or aluminium crate or box or plastic receptacle in wooden, plywood, fibreboard or solid plastics box (6HA2,6HB2, 6HC, 6HD2, 6HG2 or 6HH2)	60 *l*	60 *l*	60 *l*
glass receptacle in steel, aluminium, fibre, plywood, expanded plastics or solid plastics drum (6PA1, 6PB1, 6PG1, 6PD1, 6PH1 or 6PH2) or in steel, aluminium, wooden or fibreboard box or in a wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2)	60 *l*	60 *l*	60 *l*
Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.			

Special packing provisions:

PP1 For UN Nos. 1133, 1210, 1263 and 1866 and for adhesives, printing inks, printing ink related materials, paints, paint related materials and resin solutions which are assigned to UN 3082, metal or plastics packagings for substances of packing groups II and III in quantities of 5 litres or less per packaging are not required to meet the performance tests in Chapter 6.1 when transported:

(a) In palletized loads, a pallet box or unit load device, e.g. individual packagings placed or stacked and secured by strapping, shrink or stretch-wrapping or other suitable means to a pallet. For sea transport, the palletized loads, pallet boxes or unit load devices shall be firmly packed and secured in closed cargo transport units; or

(b) As an inner packaging of a combination packaging with a maximum net mass of 40 kg.

PP2 For UN 3065, wooden barrels with a maximum capacity of 250 litres and which do not meet the provisions of Chapter 6.1 may be used.

PP4 For UN 1774, packagings shall meet the packing group II performance level.

PP5 For UN 1204, packagings shall be so constructed that explosion is not possible by reason of increased internal pressure. Gas cylinders and gas receptacles shall not be used for these substances.

PP10 For UN 1791, packing group II, the packaging shall be vented.

PP31 For UN 1131, packagings shall be hermetically sealed.

PP33 For UN 1308, packing groups I and II, only combination packagings with a maximum gross mass of 75 kg are allowed.

PP81 For UN 1790 with more than 60 % but not more than 85 % hydrogen fluoride and UN 2031 with more than 55 % nitric acid, the permitted use of plastics, drums and jerricans as single packagings shall be two years from their date of manufacture.

PP93 For UN Nos. 3532 and 3534, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.

P002	PACKING INSTRUCTION (SOLIDS)	P002

The following packagings are authorized provided that the general provisions of **4.1.1** and **4.1.3** are met:

		Maximum net mass (see 4.1.3.3)		
		Packing group I	Packing group II	Packing group III
Combination packagings				
Inner packagings	**Outer packagings**			
Glass 10 kg	**Drums**			
Plastics[a] 50 kg	steel (1A1, 1A2)	400 kg	400 kg	400 kg
Metal 50 kg	aluminium (1B1, 1B2)	400 kg	400 kg	400 kg
Paper[a, b, c] 50 kg	other metal (1N1, 1N2)	400 kg	400 kg	400 kg
Fibre[a, b, c] 50 kg	plastics (1H1, 1H2)	400 kg	400 kg	400 kg
	plywood (1D)	400 kg	400 kg	400 kg
	fibre (1G)	400 kg	400 kg	400 kg
	Boxes			
	steel (4A)	400 kg	400 kg	400 kg
	aluminium (4B)	400 kg	400 kg	400 kg
	other metal (4N)	400 kg	400 kg	400 kg
	natural wood (4C1)	250 kg	400 kg	400 kg
	natural wood with sift proof walls (4C2)	250 kg	400 kg	400 kg
	plywood (4D)	250 kg	400 kg	400 kg
	reconstituted wood (4F)	125 kg	400 kg	400 kg
	fibreboard (4G)	125 kg	400 kg	400 kg
	expanded plastics (4H1)	60 kg	60 kg	60 kg
	solid plastics (4H2)	250 kg	400 kg	400 kg
	Jerricans			
	steel (3A1, 3A2)	120 kg	120 kg	120 kg
	aluminium (3B1, 3B2)	120 kg	120 kg	120 kg
	plastics (3H1, 3H2)	120 kg	120 kg	120 kg
Single packagings				
Drums				
steel (1A1 or 1A2[d])		400 kg	400 kg	400 kg
aluminium (1B1 or 1B2[d])		400 kg	400 kg	400 kg
metal, other than steel, or aluminium (1N1 or 1N2[d])		400 kg	400 kg	400 kg
plastics (1H1 or 1H2[d])		400 kg	400 kg	400 kg
fibre (1G)[e]		400 kg	400 kg	400 kg
plywood (1D)[e]		400 kg	400 kg	400 kg
Jerricans				
Steel (3A1 or 3A2[d])		120 kg	120 kg	120 kg
Aluminium (3B1 or 3B2[d])		120 kg	120 kg	120 kg
plastics (3H1 or 3H2[d])		120 kg	120 kg	120 kg

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[a] *These inner packagings shall be siftproof.*

[b] *These inner packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).*

[c] *Paper and fibre inner packagings shall not be used for substances of packing group I.*

[d] *These packagings shall not be used for substances of packing group I that may become liquid during transport (see 4.1.3.4).*

[e] *These packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).*

P002	PACKING INSTRUCTION (SOLIDS) *(cont'd)*		P002
	Maximum net mass (see 4.1.3.3)		
	Packing group I	**Packing group II**	**Packing group III**
Single packagings *(cont'd)*			
Boxes			
steel (4A)[e]	Not allowed	400 kg	400 kg
aluminium (4B)[e]	Not allowed	400 kg	400 kg
other metal (4N)[e]	Not allowed	400 kg	400 kg
natural wood (4C1)[e]	Not allowed	400 kg	400 kg
plywood (4D)[e]	Not allowed	400 kg	400 kg
reconstituted wood (4F)[e]	Not allowed	400 kg	400 kg
natural wood with sift proof walls (4C2)[e]	Not allowed	400 kg	400 kg
fibreboard (4G)[e]	Not allowed	400 kg	400 kg
solid plastics (4H2) [e]	Not allowed	400 kg	400 kg
Bags			
bags (5H3, 5H4, 5L3, 5M2)[e]	Not allowed	50 kg	50 kg
Composite packagings			
plastics receptacle in steel, aluminium, plywood, fibre or plastics drum (6HA1, 6HB1, 6HG1[e], 6HD1[e], or 6HH1)	400 kg	400 kg	400 kg
plastics receptacle in steel or aluminium crate or box, wooden box, plywood box, fibreboard box or solid plastics box (6HA2, 6HB2, 6HC, 6HD2 [e], 6HG2[e] or 6HH2)	75 kg	75 kg	75 kg
glass receptacle in steel, aluminium, plywood or fibre drum (6PA1, 6PB1, 6PD1[e] or 6PG1[e]) or in steel, aluminium, wooden or fibreboard box or in wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2[e], or 6PD2[e]) or in expanded or solid plastics packaging (6PH1 or 6PH2 [e])	75 kg	75 kg	75 kg
Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.			
Special packing provisions:			
PP7 For UN 2000, celluloid may be transported unpacked on pallets, wrapped in plastic film and secured by appropriate means, such as steel bands as a full load in closed cargo transport units. Each pallet shall not exceed 1000 kg.			
PP8 For UN 2002, packagings shall be so constructed that explosion is not possible by reason of increased internal pressure. Gas cylinders and gas receptacles shall not be used for these substances.			
PP9 For UN 3175, UN 3243 and UN 3244, packagings shall conform to a design type that has passed a leakproofness test at the packing group II performance level. For UN 3175 the leakproofness test is not required when the liquids are fully absorbed in solid material contained in sealed bags.			
PP11 For UN 1309, packing group III, and UN 1362, 5H1, 5L1 and 5M1 bags are allowed if they are overpacked in plastic bags and are wrapped in shrink or stretch wrap on pallets.			
PP12 For UN 1361, UN 2213 and UN 3077, 5H1, 5L1 and 5M1 bags are allowed when transported in closed cargo transport units.			
PP13 For articles classified under UN 2870, only combination packagings meeting the packing group I performance level are authorized.			
PP14 For UN 2211, UN 2698 and UN 3314, packagings are not required to meet the performance tests in Chapter 6.1.			
PP15 For UN 1324 and UN 2623, packagings shall meet the packing group III performance level.			

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[e] *These packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).*

P002	PACKING INSTRUCTION (SOLIDS) *(cont'd)*	P002

Special packing provisions (cont'd):

PP20 For UN 2217, any siftproof, tearproof receptacle may be used.

PP30 For UN 2471, paper or fibre inner packagings are not permitted.

PP34 For UN 2969 (as whole beans), 5H1, 5L1 and 5M1 bags are permitted.

PP37 For UN 2590 and UN 2212, 5M1 bags are permitted. All bags of any type shall be transported in closed cargo transport units or be placed in closed rigid overpacks.

PP38 For UN 1309, packing group II, bags are permitted only in closed cargo transport units.

PP84 For UN 1057, rigid outer packagings meeting the packing group II performance level shall be used. The packagings shall be designed and constructed and arranged to prevent movement, inadvertent ignition of the devices or inadvertent release of flammable gas or liquid.

PP85 For UN Nos. 1748, 2208, 2880, 3485, 3486 and 3487, if bags are used as single packagings they should be adequately separated to allow for the dissipation of heat. For transport by sea, bags are not allowed as single packagings.

PP92 For UN Nos. 3531 and 3533, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.

P003	PACKING INSTRUCTION	P003

Dangerous goods shall be placed in suitable outer packagings. The packagings shall meet the provisions of **4.1.1.1, 4.1.1.2, 4.1.1.4, 4.1.1.8** and **4.1.3** and be so designed that they meet the construction requirements of **6.1.4**. Outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, shall be used. Where this packing instruction is used for the transport of articles or inner packagings of combination packagings the packaging shall be designed and constructed to prevent inadvertent discharge of articles during normal conditions of transport.

Special packing provisions:

PP16 For UN 2800, batteries shall be protected from short circuit within the packagings.

PP17 For UN 2037, packages shall not exceed 55 kg net mass for fibreboard packagings or 125 kg net mass for other packagings.

PP18 For UN 1845, packagings shall be designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packagings.

PP19 For UN Nos. 1327, 1364, 1365, 1856 and 3360 transport as bales is authorized.

PP20 For UN Nos. 1363, 1386, 1408 and 2793 any siftproof, tearproof receptacle may be used.

PP32 UN Nos. 2857 and 3358 and robust articles consigned under UN 3164 may be transported unpackaged, in crates or in appropriate overpacks.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

PP90 For UN 3506, sealed inner liners or bags of strong leak-proof and puncture resistant material impervious to mercury which will prevent escape of the substance from the package irrespective of the position or the orientation of the package shall be used. For air transport additional requirements may apply.

PP91 For UN 1044, large fire extinguishers may also be transported unpackaged provided that the requirements of 4.1.3.8.1 (a) to (e) are met, the valves are protected by one of the methods in accordance with 4.1.6.1.8 (a) to (d) and other equipment mounted on the fire extinguisher is protected to prevent accidental activation. For the purpose of this special packing provision, “large fire extinguishers” means fire extinguishers as described in indents (c) to (e) of special provision 225 of Chapter 3.3.

PP96 For UN 2037 waste gas cartridges transported in accordance with special provision 327, the packagings shall be adequately ventilated to prevent the creation of dangerous atmospheres and the build-up of pressure.

P004	PACKING INSTRUCTION	P004

This instruction applies to UN Nos. 3473, 3476, 3477, 3478 and 3479.

(1) For fuel cell cartridges, provided that the general provisions of **4.1.1.1, 4.1.1.2, 4.1.1.3, 4.1.1.6** and **4.1.3** are met:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

Packagings shall conform to the packing group II performance level.

(2) For fuel cell cartridges packed with equipment: strong outer packagings which meet the general provisions of **4.1.1.1, 4.1.1.2, 4.1.1.6** and **4.1.3**.

When fuel cell cartridges are packed with equipment, they shall be packed in inner packagings or placed in the outer packaging with cushioning material or divider(s) so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the contents within the outer packaging.

The equipment shall be secured against movement within the outer packaging.

For the purpose of this packing instruction, "equipment" means apparatus requiring the fuel cell cartridges with which it is packed for its operation.

(3) For fuel cell cartridges contained in equipment: strong outer packagings which meet the general provisions of **4.1.1.1, 4.1.1.2, 4.1.1.6** and **4.1.3**.

Large robust equipment (see 4.1.3.8) containing fuel cell cartridges may be transported unpackaged. For fuel cell cartridges contained in equipment, the entire system shall be protected against short circuit and inadvertent operation.

NOTE: *The packagings authorized in (2) and (3) may exceed a net mass of 400 kg (see 4.1.3.3).*

P005	PACKING INSTRUCTION	P005

This instruction applies to UN Nos. 3528, 3529 and 3530.

If the engine or machinery is constructed and designed so that the means of containment containing the dangerous goods affords adequate protection, an outer packaging is not required.

Dangerous goods in engines or machinery shall otherwise be packed in outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, and meeting the applicable requirements of 4.1.1.1, or they shall be fixed in such a way that they will not become loose during normal conditions of transport, e.g. in cradles or crates or other handling devices.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

In addition, the manner in which means of containment are contained within the engine or machinery, shall be such that under normal conditions of transport, damage to the means of containment containing the dangerous goods is prevented; and in the event of damage to the means of containment containing liquid dangerous goods, no leakage of the dangerous goods from the engine or machinery is possible (a leakproof liner may be used to satisfy this requirement).

Means of containment containing dangerous goods shall be so installed, secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the engine or machinery during normal conditions of transport. Cushioning material shall not react dangerously with the content of the means of containment. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material.

Additional requirement:

Other dangerous goods (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for the functioning or safe operation of the engine or machinery shall be securely mounted in the engine or machine.

P006	PACKING INSTRUCTION	P006

This instruction applies to UN Nos. 3537, 3538, 3540, 3541, 3546, 3547 and 3548.

(1) The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2)

Packagings shall conform to the packing group II performance level.

(2) In addition, for robust articles the following packagings are authorized:

Strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use. The packagings shall meet the provisions of 4.1.1.1, 4.1.1.2, 4.1.1.8 and 4.1.3 in order to achieve a level of protection that is at least equivalent to that provided by Chapter 6.1. Articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

(3) Additionally, the following conditions shall be met:

(a) Receptacles within articles containing liquids or solids shall be constructed of suitable materials and secured in the article in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the article itself or the outer packaging;

(b) Receptacles containing liquids with closures shall be packed with their closures correctly oriented. The receptacles shall in addition conform to the internal pressure test provisions of 6.1.5.5;

(c) Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials shall be properly secured. Any leakage of the contents shall not substantially impair the protective properties of the article or of the outer packaging;

(d) Receptacles within articles containing gases shall meet the requirements of Section 4.1.6 and Chapter 6.2 as appropriate or be capable of providing an equivalent level of protection as packing instructions P200 or P208;

(e) Where there is no receptacle within the article, the article shall fully enclose the dangerous substances and prevent their release under normal conditions of transport.

(4) Articles shall be packed to prevent movement and inadvertent operation during normal conditions of transport.

P010	**PACKING INSTRUCTION**	**P010**
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:		
		Maximum net mass (see 4.1.3.3)
Combination packagings		
Inner packagings	**Outer packagings**	
Glass 1 *l*	**Drums**	
Steel 40 *l*	steel (1A1, 1A2)	400 kg
	plastics (1H1,1H2)	400 kg
	plywood (1D)	400 kg
	fibre (1G)	400 kg
	Boxes	
	steel (4A)	400 kg
	natural wood (4C1, 4C2)	400 kg
	plywood (4D)	400 kg
	reconstituted wood (4F)	400 kg
	fibreboard (4G)	400 kg
	expanded plastics (4H1)	60 kg
	solid plastics (4H2)	400 kg
		Maximum capacity (see 4.1.3.3)
Single packagings		
Drums		
steel, non-removable head (1A1)		450 *l*
Jerricans		
steel, non-removable head (3A1)		60 *l*
Composite packagings		
plastics receptacle in steel drums (6HA1)		250 *l*
Steel pressure receptacles, provided that the general provisions of 4.1.3.6 are met.		

P099	**PACKING INSTRUCTION**	**P099**
Only packagings which are approved by the competent authority for these goods may be used (see **4.1.3.7**). A copy of the competent authority approval shall accompany each consignment or the transport document shall include an indication that the packaging was approved by the competent authority.		

P101	**PACKING INSTRUCTION**	**P101**
Only packagings which are approved by the competent authority may be used. The distinguishing sign used on vehicles in international road traffic[a] of the country for which the authority acts, shall be marked on the transport documents as follows: "Packaging approved by the competent authority of... "		

[a] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

P110(a)	PACKING INSTRUCTION	P110(a)
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags plastics textile, plastic coated or lined rubber textile, rubberised textile **Receptacles** wood	**Bags** plastics textile, plastic coated or lined rubber textile, rubberized **Receptacles** plastics metal wood	**Drums** steel (1A1, 1A2) metal, other than steel or aluminium (1N1, 1N2) plastics (1H1, 1H2)
Additional requirements: 1. The intermediate packagings shall be filled with water saturated material such as an anti-freeze solution or wetted cushioning. 2. Outer packagings shall be filled with water saturated material such as an anti-freeze solution or wetted cushioning. Outer packagings shall be constructed and sealed to prevent evaporation of the wetting solution, except for UN 0224 when carried dry.		

P110(b)	PACKING INSTRUCTION	P110(b)
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Receptacles metal wood rubber, conductive plastics, conductive **Bags** rubber, conductive plastics, conductive	**Dividing partitions** metal wood plastics fibreboard	**Boxes** natural wood, sift-proof wall (4C2) plywood (4D) reconstituted wood (4F)
Special packing provision: **PP42** For UN Nos. 0074, 0113, 0114, 0129, 0130, 0135 and 0224, the following conditions shall be met: (a) Inner packagings shall not contain more than 50 g of explosive substance (quantity corresponding to dry substance); (b) Compartments between dividing partitions shall not contain more than one inner packaging, firmly fitted; and (c) The outer packaging may be partitioned into up to 25 compartments.		

P111	PACKING INSTRUCTION	P111
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper, waterproofed plastics textile, rubberized **Receptacles** wood **Sheets** plastics textile, rubberized	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Special packing provision: **PP43** For UN 0159, inner packagings are not required when metal (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2) or plastics (1H1 or 1H2) drums are used as outer packagings.		

P112(a)	PACKING INSTRUCTION (Solid wetted, 1.1D)	P112(a)
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper, multiwall, water-resistant plastics textile textile, rubberised woven plastics **Receptacles** metal plastics wood	**Bags** plastics textile, plastic coated or lined **Receptacles** metal plastics wood	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Additional requirement: Intermediate packagings are not required if leakproof removable head drums are used as the outer packaging.		
Special packing provisions: **PP26** For UN Nos. 0004, 0076, 0078, 0154, 0219 and 0394, packagings shall be lead free. **PP45** For UN 0072 and UN 0226, intermediate packagings are not required.		

P112(b)	PACKING INSTRUCTION (Solid dry, other than powder 1.1D)	P112(b)

The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings	Intermediate packagings	Outer packagings
Bags paper, kraft paper, multiwall, water-resistant plastics textile textile, rubberised woven plastics	**Bags** (for UN 0150 only) plastics textile, plastic coated or lined	**Bags** woven plastics, sift-proof (5H2) woven plastics, water-resistant (5H3) plastics, film (5H4) textile, sift-proof (5L2) textile, water-resistant (5L3) paper, multiwall, water-resistant (5M2) **Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

Special packing provisions:

PP26 For UN Nos. 0004, 0076, 0078, 0154, 0216, 0219 and 0386, packagings shall be lead free.

PP46 For UN 0209, bags, sift-proof (5H2) are recommended for flake or prilled TNT in the dry state and a maximum net mass of 30 kg.

PP47 For UN 0222 inner packagings are not required when the outer packaging is a bag.

P112(c)	PACKING INSTRUCTION (Solid dry powder 1.1D)	P112(c)

The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings	Intermediate packagings	Outer packagings
Bags paper, multiwall, water-resistant plastics woven plastics **Receptacles** fibreboard metal plastics wood	**Bags** paper, multiwall, water-resistant with inner lining plastics **Receptacles** metal plastics wood	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

Additional requirements:

1. Inner packagings are not required if drums are used as the outer packaging.
2. The packaging shall be sift-proof.

Special packing provision:

PP26 For UN Nos. 0004, 0076, 0078, 0154, 0216, 0219 and 0386, packagings shall be lead free.

PP46 For UN 0209, bags, sift-proof (5H2) are recommended for flake or prilled TNT in the dry state and a maximum net mass of 30 kg.

PP48 For UN 0504, metal packagings shall not be used. Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6.1.4, are not considered metal packagings.

P113	PACKING INSTRUCTION	P113
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper plastics textile, rubberised **Receptacles** fibreboard metal plastics wood	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Additional requirement: The packaging shall be sift-proof.		
Special packing provisions: **PP49** For UN 0094 and UN 0305, no more than 50 g of substance shall be packed in an inner packaging. **PP50** For UN 0027, inner packagings are not necessary when drums are used as the outer packaging. **PP51** For UN 0028, paper kraft or waxed paper sheets may be used as inner packagings.		

P114(a)	PACKING INSTRUCTION (Solid wetted)	P114(a)

The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings	Intermediate packagings	Outer packagings
Bags plastics textile woven plastics **Receptacles** metal plastics wood	**Bags** plastics textile, plastics coated or lined **Receptacles** metal plastics **Dividing partitions** wood	**Boxes** steel (4A) metal, other than steel or aluminium (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

Additional requirement:

Intermediate packagings are not required if leakproof removable head drums are used as the outer packaging.

Special packing provisions:

PP26 For UN Nos. 0077, 0132, 0234, 0235 and 0236, packagings shall be lead free.

PP43 For UN 0342, inner packagings are not required when metal (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2) or plastics (1H1 or 1H2) drums are used as outer packagings.

P114(b)	PACKING INSTRUCTION (Solid dry)	P114(b)

The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings	Intermediate packagings	Outer packagings
Bags paper, kraft plastics textile, sift-proof woven plastics, sift-proof **Receptacles** fibreboard metal paper woven plastics, sift-proof wood plastics	Not necessary	**Boxes** natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

Special packing provisions:

PP26 For UN Nos. 0077, 0132, 0234, 0235 and 0236, packagings shall be lead free.

PP48 For UN Nos. 0508 and 0509, metal packagings shall not be used. Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6.1.4, are not considered metal packagings.

PP50 For UN Nos. 0160, 0161 and 0508, inner packagings are not necessary if drums are used as the outer packaging.

PP52 For UN 0160 and UN 0161, when metal drums (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2) are used as the outer packaging, metal packagings shall be so constructed that the risk of explosion, by reason of increase internal pressure from internal or external causes is prevented.

P115	PACKING INSTRUCTION	P115
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Receptacles plastics wood	**Bags** plastics in metal receptacles **Drums** metal **Receptacles** wood	**Boxes** natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

Special packing provisions:

PP45 For UN 0144, intermediate packagings are not required.

PP53 For UN Nos. 0075, 0143, 0495 and 0497, when boxes are used as the outer packaging, inner packagings shall have taped screw cap closures and be not more than 5 litres capacity each. Inner packagings shall be surrounded with non-combustible absorbent cushioning materials. The amount of absorbent cushioning material shall be sufficient to absorb the liquid contents. Metal receptacles shall be cushioned from each other. Net mass of propellant is a limited to 30 kg for each package when outer packagings are boxes.

PP54 For UN Nos. 0075, 0143, 0495 and 0497, when drums are used as the outer packaging and when intermediate packagings are drums, they shall be surrounded with non-combustible cushioning material in a quantity sufficient to absorb the liquid contents. A composite packaging consisting of a plastic receptacle in a metal drum may be used instead of the inner and intermediate packagings. The net volume of propellant in each package shall not exceed 120 litres.

PP55 For UN 0144, absorbent cushioning material shall be inserted.

PP56 For UN 0144, metal receptacles may be used as inner packagings.

PP57 For UN Nos. 0075, 0143, 0495 and 0497, bags shall be used as intermediate packagings when boxes are used as outer packagings.

PP58 For UN Nos. 0075, 0143, 0495 and 0497, drums shall be used as intermediate packagings when drums are used as outer packagings.

PP59 For UN 0144, fibreboard boxes (4G) may be used as outer packagings.

PP60 For UN 0144, aluminium drums (1B1 and 1B2) and metal, other than steel or aluminium, drums (1N1 and 1N2) shall not be used.

P116	PACKING INSTRUCTION	P116
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper, water and oil resistant plastics textile, plastic coated or lined woven plastics, sift-proof **Receptacles** fibreboard, water-resistant metal plastics wood, sift-proof **Sheets** paper, water-resistant paper, waxed plastics	Not necessary	**Bags** woven plastics (5H1, 5H2, 5H3) paper, multiwall, water-resistant (5M2) plastics, film (5H4) textile, sift-proof (5L2) textile, water-resistant (5L3) **Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2) **Jerricans** steel (3A1, 3A2) plastics (3H1, 3H2)

Special packing provisions:

PP61 For UN Nos. 0082, 0241, 0331 and 0332, inner packagings are not required if leakproof removable head drums are used as the outer packaging.

PP62 For UN Nos. 0082, 0241, 0331 and 0332, inner packagings are not required when the explosive is contained in a material impervious to liquid.

PP63 For UN 0081, inner packagings are not required when contained in rigid plastics which is impervious to nitric esters.

PP64 For UN 0331, inner packagings are not required when bags (5H2), (5H3) or (5H4) are used as outer packagings.

PP65 *Deleted.*

PP66 For UN 0081, bags shall not be used as outer packagings.

P130	PACKING INSTRUCTION	P130
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Not necessary	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

Special packing provision:

PP67 The following applies to UN Nos. 0006, 0009, 0010, 0015, 0016, 0018, 0019, 0034, 0035, 0038, 0039, 0048, 0056, 0137, 0138, 0168, 0169, 0171, 0181, 0182, 0183, 0186, 0221, 0243, 0244, 0245, 0246, 0254, 0280, 0281, 0286, 0287, 0297, 0299, 0300, 0301, 0303, 0321, 0328, 0329, 0344, 0345, 0346, 0347, 0362, 0363, 0370, 0412, 0424, 0425, 0434, 0435, 0436, 0437, 0438, 0451, 0488, 0502 and 0510: Large and robust explosives articles, normally intended for military use, without their means of initiation or with their means of initiation containing at least two effective protective features, may be carried unpackaged. When such articles have propelling charges or are self-propelled, their ignition systems shall be protected against stimuli encountered during normal conditions of transport. A negative result in test series 4 on an unpackaged article indicates that the article can be considered for transport unpackaged. Such unpackaged articles may be fixed to cradles or contained in crates or other suitable handling devices.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

P131	PACKING INSTRUCTION	P131
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper plastics **Receptacles** fibreboard metal plastics wood **Reels**	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Special packing provision: **PP68** For UN Nos. 0029, 0267 and 0455, bags and reels shall not be used as inner packagings.		

P132(a)	PACKING INSTRUCTION **(Articles consisting of closed metal, plastics or fibreboard casings that contain a detonating explosive, or consisting of plastics-bonded detonating explosives)**	P132(a)
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Not necessary	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) wood, natural, ordinary (4C1) wood, natural, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2)

P132(b)	PACKING INSTRUCTION (Articles without closed casings)	P132(b)
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Receptacles fibreboard metal plastics wood **Sheets** paper plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2)

P133	PACKING INSTRUCTION	P133
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Receptacles fibreboard metal plastics wood **Trays, fitted with dividing partitions** fibreboard plastics wood	**Receptacles** fibreboard metal plastics wood	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2)
Additional requirement: Receptacles are only required as intermediate packagings when the inner packagings are trays.		
Special packing provision: **PP69** For UN Nos. 0043, 0212, 0225, 0268 and 0306, trays shall not be used as inner packagings.		

P134	PACKING INSTRUCTION	P134
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags water-resistant **Receptacles** fibreboard metal plastics wood **Sheets** fibreboard, corrugated **Tubes** fibreboard	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

P135	PACKING INSTRUCTION	P135
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper plastics **Receptacles** fibreboard metal plastics wood **Sheets** paper plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

P136	PACKING INSTRUCTION	P136
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags plastics textile **Boxes** fibreboard plastics wood **Dividing partitions in the outer packagings**	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

P137	PACKING INSTRUCTION	P137
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags plastics **Boxes** fibreboard wood **Tubes** fibreboard metal plastics **Dividing partitions in the outer packagings**	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Special packing provision: **PP70** For UN Nos. 0059, 0439, 0440 and 0441, when the shaped charges are packed singly, the conical cavity shall face downwards and the package shall be marked as illustrated in figures 5.2.3 or 5.2.4. When the shaped charges are packed in pairs, the conical cavities shall face inwards to minimize the jetting effect in the event of accidental initiation.		

P138	PACKING INSTRUCTION	P138
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Additional requirement: If the ends of the articles are sealed, inner packagings are not necessary.		

P139	PACKING INSTRUCTION	P139
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags plastics **Receptacles** fibreboard metal plastics wood **Reels** **Sheets** paper plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Special packing provisions: **PP71** For UN Nos. 0065, 0102, 0104, 0289 and 0290, the ends of the detonating cord shall be sealed, for example, by a plug firmly fixed so that the explosive cannot escape. The ends of flexible detonating cord shall be fastened securely. **PP72** For UN 0065 and UN 0289, inner packagings are not required when they are in coils.		

P140	PACKING INSTRUCTION	P140
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags plastics **Receptacles** wood **Reels** **Sheets** paper, kraft plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Special packing provisions: **PP73** For UN 0105, no inner packagings are required if the ends are sealed. **PP74** For UN 0101, the packaging shall be sift-proof except when the fuse is covered by a paper tube and both ends of the tube are covered with removable caps. **PP75** For UN 0101, steel, aluminium or other metal boxes or drums shall not be used.		

P141	PACKING INSTRUCTION	P141
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Receptacles fibreboard metal plastics wood **Trays, fitted with dividing partitions** plastics wood **Dividing partitions in the outer packagings**	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

P142	PACKING INSTRUCTION	P142
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper plastics **Receptacles** fibreboard metal plastics wood **Sheets** paper **Trays, fitted with dividing partitions** plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)

P143	PACKING INSTRUCTION	P143
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags paper, kraft plastics textile textile, rubberized **Receptacles** fibreboard metal plastics wood **Trays, fitted with dividing partitions** plastics wood	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plywood (1D) fibre (1G) plastics (1H1, 1H2)
Additional requirement: Instead of the above inner and outer packagings, composite packagings (6HH2) (plastic receptacle with outer solid box) may be used.		
Special packing provision: **PP76** For UN Nos. 0271, 0272, 0415 and 0491, when metal packagings are used, metal packagings shall be so constructed that the risk of explosion, by reason of increase in internal pressure from internal or external causes is prevented.		

P144	PACKING INSTRUCTION	P144
The following packagings are authorized, provided that the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Receptacles fibreboard metal plastics wood **Dividing partitions in the outer packagings**	Not necessary	**Boxes** steel (4A) aluminium (4B) other metal (4N) natural wood, ordinary (4C1) with metal liner plywood (4D) with metal liner reconstituted wood (4F) with metal liner plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel (1A1, 1A2) aluminium (1B1, 1B2) other metal (1N1, 1N2) plastics (1H1, 1H2)
Special packing provision: **PP77** For UN Nos. 0248 and 0249, packagings shall be protected against the ingress of water. When water-activated contrivances are transported unpackaged, they shall be provided with at least two independent protective features which prevent the ingress of water. ***NOTE:*** *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*		

For pressure receptacles, the general packing requirements of **4.1.6.1** shall be met. In addition, for MEGCs, the general requirements of **4.2.4** shall be met.

Cylinders, tubes, pressure drums, bundles of cylinders constructed as specified in Chapter 6.2 and MEGCs constructed as specified in 6.7.5 are authorised for the transport of a specific substance when specified in the following tables. For some substances the special packing provisions may prohibit a particular type of cylinder, tube, pressure drum or bundle of cylinders.

(1) Pressure receptacles containing toxic substances with an LC_{50} less than or equal to 200 ml/m^3 (ppm) as specified in the table shall not be equipped with any pressure relief device. Pressure relief devices shall be fitted on pressure receptacles used for the transport of UN 1013 carbon dioxide and UN 1070 nitrous oxide. Other pressure receptacles shall be fitted with a pressure relief device if specified by the competent authority of the country of use. The type of pressure relief device, the set to discharge pressure and relief capacity of pressure relief devices, if required, shall be specified by the competent authority of the country of use.

(2) The following three tables cover compressed gases (Table 1), liquefied and dissolved gases (Table 2) and substances not in Class 2 (Table 3). They provide:

(a) The UN number, name and description, and classification of the substance;

(b) The LC_{50} for toxic substances;

(c) The types of pressure receptacles authorised for the substance, shown by the letter "X";

(d) The maximum test period for periodic inspection of the pressure receptacles.
NOTE: *For pressure receptacles which make use of composite materials, the maximum test period shall be 5 years. The test period may be extended to that specified in Tables 1 and 2 (i.e. up to 10 years), if approved by the competent authority of the country of use.*

(e) The minimum test pressure of the pressure receptacles;

(f) The maximum working pressure of the pressure receptacles for compressed gases (where no value is given, the working pressure shall not exceed two thirds of the test pressure) or the maximum filling ratio(s) dependent on the test pressure(s) for liquefied and dissolved gases;

(g) Special packing provisions that are specific to a substance.

(3) In no case shall pressure receptacles be filled in excess of the limit permitted in the following requirements.

(a) For compressed gases, the working pressure shall be not more than two thirds of the test pressure of the pressure receptacles. Restrictions to this upper limit on working pressure are imposed by (5), special packing provision "o". In no case shall the internal pressure at 65 °C exceed the test pressure;

(b) For high pressure liquefied gases, the filling ratio shall be such that the settled pressure at 65 °C does not exceed the test pressure of the pressure receptacles.

The use of test pressures and filling ratios other than those in the table is permitted, except where (5), special packing provision "o" applies, provided that:

(i) the criterion of (5), special packing provision "r" is met when applicable; or

(ii) the above criterion is met in all other cases.

For high pressure liquefied gases and gas mixtures for which relevant data are not available, the maximum filling ratio (FR) shall be determined as follows:

$$FR = 8.5 \times 10^{-4} \times d_g \times P_h$$

where FR = maximum filling ratio
d_g = gas density (at 15 °C, 1 bar)(in g/l)
P_h = minimum test pressure (in bar)

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If the density of the gas is unknown, the maximum filling ratio shall be determined as follows:

$$FR = \frac{P_h \times MM \times 10^{-3}}{R \times 338}$$

where FR = maximum filling ratio
P_h = minimum test pressure (in bar)
MM = molecular mass (in g/mol)
R = 8.31451×10^{-2} bar·l/mol·K (gas constant)

For gas mixtures, the average molecular mass is to be taken, taking into account the volumetric concentrations of the various components;

(c) For low pressure liquefied gases, the maximum mass of contents per litre of water capacity shall equal 0.95 times the density of the liquid phase at 50 °C; in addition, the liquid phase shall not fill the pressure receptacle at any temperature up to 60 °C. The test pressure of the pressure receptacle shall be at least equal to the vapour pressure (absolute) of the liquid at 65 °C, minus 100 kPa (1 bar).

For low pressure liquefied gases and gas mixtures for which relevant data are not available, the maximum filling ratio shall be determined as follows:

$$FR = (0.0032 \times BP - 0.24) \times d_1$$

where FR = maximum filling ratio
BP = boiling point (in Kelvin)
d_1 = density of the liquid at boiling point (in kg/l);

(d) For UN 1001, acetylene, dissolved, and UN 3374 acetylene, solvent free, see (5), special packing provision "p".

(e) For liquefied gases charged with compressed gases, both components – the liquefied gas and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle.

The maximum mass of contents per litre of water capacity shall not exceed 0.95 times the density of the liquid phase at 50 °C; in addition, the liquid phase shall not completely fill the pressure receptacle at any temperature up to 60 °C.

When filled, the internal pressure at 65 °C shall not exceed the test pressure of the pressure receptacles. The vapour pressures and volumetric expansions of all substances in the pressure receptacles shall be considered. When experimental data is not available, the following steps shall be carried out:

(i) Calculation of the vapour pressure of the liquefied gas and of the partial pressure of the compressed gas at 15 °C (filling temperature);

(ii) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the gaseous phase;

(iii) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the liquid phase;

NOTE: *The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.*

(iv) Calculation of the vapour pressure of the liquefied gas at 65 °C;

(v) The total pressure is the sum of the vapour pressure of the liquefied gas and the partial pressure of the compressed gas at 65 °C;

(vi) Consideration of the solubility of the compressed gas at 65 °C in the liquid phase;

The test pressure of the pressure receptacle shall not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the liquid phase is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (vi)) into account.

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(4) The filling of pressure receptacles shall be carried out by qualified staff using appropriate equipment and procedures.

The procedures should include checks of:

- The conformity of receptacles and accessories with these Regulations;
- Their compatibility with the product to be transported;
- The absence of damage which might affect safety;
- Compliance with the degree or pressure of filling, as appropriate;
- Marks and identification.

These requirements are deemed to be met if the following standards are applied:

- ISO 10691:2004	Gas cylinders – Refillable welded steel cylinders for liquefied petroleum gas (LPG) – Procedures for checking before, during and after filling.
- ISO 11372:2011	Gas cylinders – Acetylene cylinders – Filling conditions and filling inspection
- ISO 11755:2005	Gas cylinders – Cylinder bundles for compressed and liquefied gases (excluding acetylene) – Inspection at time of filling
- ISO 13088:2011	Gas cylinders – Acetylene cylinder bundles – Filling conditions and filling inspection
- ISO 24431:2006	Gas cylinders – Seamless, welded and composite cylinders for compressed and liquefied gases (excluding acetylene) – Inspection at time of filling

(5) Special packing provisions:

Material compatibility

a: Aluminium alloy pressure receptacles shall not be used.

b: Copper valves shall not be used.

c: Metal parts in contact with the contents shall not contain more than 65 % copper.

d: When steel pressure receptacles or composite pressure receptacles with steel liners are used, only those bearing the "H" mark in accordance with 6.2.2.7.4 (p) are permitted.

Requirements for toxic substances with an LC_{50} less than or equal to 200 ml/m^3 (ppm)

k: Valve outlets shall be fitted with pressure retaining gas-tight plugs or caps having threads that match those of the valve outlets.

Each cylinder within a bundle shall be fitted with an individual valve that shall be closed during transport. After filling, the manifold shall be evacuated, purged and plugged.

Bundles containing UN 1045 Fluorine, compressed, may be constructed with isolation valves on groups of cylinders not exceeding 150 litres total water capacity instead of isolation valves on every cylinder.

Cylinders and individual cylinders in a bundle shall have a test pressure greater than or equal to 200 bar and a minimum wall thickness of 3.5 mm for aluminium alloy or 2 mm for steel. Individual cylinders not complying with this requirement shall be transported in a rigid outer packaging that will adequately protect the cylinder and its fittings and meeting the packing group I performance level. Pressure drums shall have a minimum wall thickness as specified by the competent authority.

Pressure receptacles shall not be fitted with a pressure relief device.

Cylinders and individual cylinders in a bundle shall be limited to a maximum water capacity of 85 litres.

Each valve shall be capable of withstanding the test pressure of the pressure receptacle and be connected directly to the pressure receptacle by either a taper thread or other means which meets the requirements of ISO 10692-2:2001.

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Each valve shall either be of the packless type with non-perforated diaphragm, or be of a type which prevents leakage through or past the packing.

Each pressure receptacle shall be tested for leakage after filling.

Gas specific provisions

l: UN 1040 ethylene oxide may also be packed in hermetically sealed glass or metal inner packagings suitably cushioned in fibreboard, wooden or metal boxes meeting the packing group I performance level. The maximum quantity permitted in any glass inner packaging is 30 g, and the maximum quantity permitted in any metal inner packaging is 200 g. After filling, each inner packaging shall be determined to be leak-tight by placing the inner packaging in a hot water bath at a temperature, and for a period of time, sufficient to ensure that an internal pressure equal to the vapour pressure of ethylene oxide at 55 °C is achieved. The maximum net mass in any outer packaging shall not exceed 2.5 kg.

m: Pressure receptacles shall be filled to a working pressure not exceeding 5 bar.

n: Cylinders and individual cylinders in a bundle shall contain not more than 5 kg of the gas. When bundles containing UN 1045 fluorine, compressed are divided into groups of cylinders in accordance with special packing provision “k” each group shall contain not more than 5 kg of the gas.

o: In no case shall the working pressure or filling ratio shown in the table be exceeded.

p: For UN 1001 acetylene, dissolved and UN 3374 acetylene, solvent free: cylinders shall be filled with a homogeneous monolithic porous material; the working pressure and the quantity of acetylene shall not exceed the values prescribed in the approval or in ISO 3807-1:2000, ISO 3807-2:2000 or ISO 3807:2013, as applicable.

For UN 1001 acetylene, dissolved: cylinders shall contain a quantity of acetone or suitable solvent as specified in the approval (see ISO 3807-1:2000, ISO 3807-2:2000 or ISO 3807:2013, as applicable); cylinders fitted with pressure relief devices or manifolded together shall be transported vertically.

The test pressure of 52 bar applies only to cylinders fitted with a fusible plug.

q: Valve outlets of pressure receptacles for pyrophoric gases or flammable mixtures of gases containing more than 1 % of pyrophoric compounds shall be fitted with gas-tight plugs or caps. When these pressure receptacles are manifolded in a bundle, each of the pressure receptacles shall be fitted with an individual valve that shall be closed during transport, and the outlet of the manifold valve shall be fitted with a pressure retaining gas-tight plug or cap. Gas-tight plugs or caps shall have threads that match those of the valve outlets.

r: The filling ratio of this gas shall be limited such that, if complete decomposition occurs, the pressure does not exceed two thirds of the test pressure of the pressure receptacle.

ra: This gas may also be packed in capsules under the following conditions:

(a) The mass of gas shall not exceed 150 g per capsule;

(b) The capsules shall be free from faults liable to impair the strength;

(c) The leakproofness of the closure shall be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any leakage of the closure during transport;

(d) The capsules shall be placed in an outer packaging of sufficient strength. A package shall not weigh more than 75 kg.

s: Aluminium alloy pressure receptacles shall be:

- Equipped only with brass or stainless steel valves; and
- Cleaned in accordance with ISO 11621:1997 and not contaminated with oil.

t: (i) The wall thickness of pressure receptacles shall be not less than 3 mm.

(ii) Prior to transport it shall be ensured that the pressure has not risen due to potential hydrogen generation.

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Periodic inspection

u: The interval between periodic tests may be extended to 10 years for aluminium alloy pressure receptacles when the alloy of the pressure receptacle has been subjected to stress corrosion testing as specified in ISO 7866:2012 + Cor 1:2014.

v: The interval between periodic inspections for steel cylinders may be extended to 15 years if approved by the competent authority of the country of use.

Requirements for N.O.S. descriptions and for mixtures

z: The construction materials of the pressure receptacles and their accessories shall be compatible with the contents and shall not react to form harmful or dangerous compounds therewith.

The test pressure and filling ratio shall be calculated in accordance with the relevant requirements of (3).

Toxic substances with an LC_{50} less than or equal to 200 ml/m^3 shall not be transported in tubes, pressure drums or MEGCs and shall meet the requirements of special packing provision "k". However, UN 1975 nitric oxide and dinitrogen tetroxide mixture may be transported in pressure drums.

For pressure receptacles containing pyrophoric gases or flammable mixtures of gases containing more than 1 % pyrophoric compounds, the requirements of special packing provision "q" shall be met.

The necessary steps shall be taken to prevent dangerous reactions (i.e. polymerisation or decomposition) during transport. If necessary, stabilisation or addition of an inhibitor shall be required.

Mixtures containing UN 1911 diborane, shall be filled to a pressure such that, if complete decomposition of the diborane occurs, two thirds of the test pressure of the pressure receptacle shall not be exceeded.

Mixtures containing UN 2192 germane, other than mixtures of up to 35 % germane in hydrogen or nitrogen or up to 28 % germane in helium or argon, shall be filled to a pressure such that, if complete decomposition of the germane occurs, two thirds of the test pressure of the pressure receptacle shall not be exceeded.

Mixtures of fluorine and nitrogen with a fluorine concentration below 35 % by volume may be filled in pressure receptacles up to a maximum allowable working pressure for which the partial pressure of fluorine does not exceed 31 bar (abs.).

$$working\ pressure\ (\text{bar}) < \frac{31}{x_f} - 1$$

in which x_f = fluorine concentration in % by volume/100.

Mixtures of fluorine and inert gases with a fluorine concentration below 35 % by volume may be filled in pressure receptacles up to a maximum allowable working pressure for which the partial pressure of fluorine does not exceed 31 bar (abs.), additionally taking the coefficient of nitrogen equivalency in accordance with ISO 10156:2017 into account when calculating the partial pressure.

$$working\ pressure\ (\text{bar}) < \frac{31}{x_f}\left(x_f + K_k \times x_k\right) - 1$$

in which x_f = fluorine concentration in % by volume/100;

K_k = coefficient of equivalency of an inert gas relative to nitrogen (coefficient of nitrogen equivalency);

x_k = inert gas concentration in % by volume/100.

However, the working pressure for mixtures of fluorine and inert gases shall not exceed 200 bar. The minimum test pressure of pressure receptacles for mixtures of fluorine and inert gases equals 1.5 times the working pressure or 200 bar, with the greater value to be applied.

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Table 1: COMPRESSED GASES

UN No	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure[a] (bar)	Maximum working pressure[a] (bar)	Special packing provisions
1002	AIR, COMPRESSED	2.2			X	X	X	X	X	10			
1006	ARGON, COMPRESSED	2.2			X	X	X	X	X	10			
1016	CARBON MONOXIDE, COMPRESSED	2.3	2.1	3 760	X	X	X	X	X	5			u
1023	COAL GAS, COMPRESSED	2.3	2.1		X	X	X	X	X	5			
1045	FLUORINE, COMPRESSED	2.3	5.1 8	185	X			X		5	200	30	a, k, n, o
1046	HELIUM, COMPRESSED	2.2			X	X	X	X	X	10			
1049	HYDROGEN, COMPRESSED	2.1			X	X	X	X	X	10			d
1056	KRYPTON, COMPRESSED	2.2			X	X	X	X	X	10			
1065	NEON, COMPRESSED	2.2			X	X	X	X	X	10			
1066	NITROGEN, COMPRESSED	2.2			X	X	X	X	X	10			
1071	OIL GAS, COMPRESSED	2.3	2.1		X	X	X	X	X	5			
1072	OXYGEN, COMPRESSED	2.2	5.1		X	X	X	X	X	10			s
1612	HEXAETHYL TETRAPHOSPHATE AND COMPRESSED GAS MIXTURE	2.3			X	X	X	X	X	5			z
1660	NITRIC OXIDE, COMPRESSED	2.3	5.1 8	115	X			X		5	225	33	k, o
1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1	≤ 5 000	X	X	X	X	X	5			z
1954	COMPRESSED GAS, FLAMMABLE, N.O.S	2.1			X	X	X	X	X	10			z
1955	COMPRESSED GAS, TOXIC, N.O.S.	2.3		≤ 5 000	X	X	X	X	X	5			z
1956	COMPRESSED GAS, N.O.S.	2.2			X	X	X	X	X	10			z
1957	DEUTERIUM, COMPRESSED	2.1			X	X	X	X	X	10			d
1964	HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S	2.1			X	X	X	X	X	10			z
1971	METHANE, COMPRESSED or NATURAL GAS, COMPRESSED with high methane content	2.1			X	X	X	X	X	10			

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[a] *Where the entries are blank, the working pressure shall not exceed two thirds of the test pressure.*

Table 1: COMPRESSED GASES

UN No	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure[a] (bar)	Maximum working pressure[a] (bar)	Special packing provisions
2034	HYDROGEN AND METHANE MIXTURE, COMPRESSED	2.1			X	X	X	X	X	10			d
2190	OXYGEN DIFLUORIDE, COMPRESSED	2.3	5.1 8	2.6	X			X		5	200	30	a, k, n, o
3156	COMPRESSED GAS, OXIDIZING, N.O.S.	2.2	5.1		X	X	X	X	X	10			z
3303	COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	5.1	≤ 5 000	X	X	X	X	X	5			z
3304	COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	8	≤ 5 000	X	X	X	X	X	5			z
3305	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	2.1 8	≤ 5 000	X	X	X	X	X	5			z
3306	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	5.1 8	≤ 5 000	X	X	X	X	X	5			z

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[a] *Where the entries are blank, the working pressure shall not exceed two thirds of the test pressure.*

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
1001	ACETYLENE, DISSOLVED	2.1			X			X		10	60 52		c, p
1005	AMMONIA, ANHYDROUS	2.3	8	4 000	X	X	X	X	X	5	29	0.54	b
1008	BORON TRIFLUORIDE	2.3	8	864	X	X	X	X	X	5	225 300	0.715 0.86	a
1009	BROMOTRIFLUORO-METHANE (REFRIGERANT GAS R 13B1)	2.2			X	X	X	X	X	10	42 120 250	1.13 1.44 1.60	
1010	BUTADIENES, STABILIZED (1,2-butadiene), or	2.1			X	X	X	X	X	10	10	0.59	
1010	BUTADIENES, STABILIZED (1,3-butadiene), or	2.1			X	X	X	X	X	10	10	0.55	
1010	BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, containing more than 40 % butadienes	2.1			X	X	X	X	X	10			v, z
1011	BUTANE	2.1			X	X	X	X	X	10	10	0.52	v
1012	BUTYLENE (butylenes mixture) or	2.1			X	X	X	X	X	10	10	0.50	z
1012	BUTYLENE (1-butylene) or	2.1			X	X	X	X	X	10	10	0.53	
1012	BUTYLENE (cis-2-butylene) or	2.1			X	X	X	X	X	10	10	0.55	
1012	BUTYLENE (trans-2 butylene)	2.1			X	X	X	X	X	10	10	0.54	
1013	CARBON DIOXIDE	2.2			X	X	X	X	X	10	190 250	0.68 0.76	
1017	CHLORINE	2.3	5.1 8	293	X	X	X	X	X	5	22	1.25	a
1018	CHLORODIFLUORO-METHANE (REFRIGERANT GAS R 22)	2.2			X	X	X	X	X	10	27	1.03	
1020	CHLOROPENTA-FLUOROETHANE (REFRIGERANT GAS R 115)	2.2			X	X	X	X	X	10	25	1.05	
1021	1-CHLORO-1,2,2,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 124)	2.2			X	X	X	X	X	10	11	1.20	
1022	CHLOROTRIFLUORO-METHANE (REFRIGERANT GAS R 13)	2.2			X	X	X	X	X	10	100 120 190 250	0.83 0.90 1.04 1.11	
1026	CYANOGEN	2.3	2.1	350	X	X	X	X	X	5	100	0.70	u
1027	CYCLOPROPANE	2.1			X	X	X	X	X	10	18	0.55	

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Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
1028	DICHLORODIFLUORO-METHANE (REFRIGERANT GAS R 12)	2.2			X	X	X	X	X	10	16	1.15	
1029	DICHLOROFLUORO-METHANE (REFRIGERANT GAS R 21)	2.2			X	X	X	X	X	10	10	1.23	
1030	1,1-DIFLUOROETHANE (REFRIGERANT GAS R 152a)	2.1			X	X	X	X	X	10	16	0.79	
1032	DIMETHYLAMINE, ANHYDROUS	2.1			X	X	X	X	X	10	10	0.59	b
1033	DIMETHYL ETHER	2.1			X	X	X	X	X	10	18	0.58	
1035	ETHANE	2.1			X	X	X	X	X	10	95 120 300	0.25 0.30 0.40	
1036	ETHYLAMINE	2.1			X	X	X	X	X	10	10	0.61	b
1037	ETHYL CHLORIDE	2.1			X	X	X	X	X	10	10	0.80	a, ra
1039	ETHYL METHYL ETHER	2.1			X	X	X	X	X	10	10	0.64	
1040	ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1MPa (10 bar) at 50 °C	2.3	2.1	2 900	X	X	X	X	X	5	15	0.78	l
1041	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9 % ethylene oxide but not more than 87 %	2.1			X	X	X	X	X	10	190 250	0.66 0.75	
1043	FERTILIZER AMMONIATING SOLUTION with free ammonia	2.2			X		X	X		5			b, z
1048	HYDROGEN BROMIDE, ANHYDROUS	2.3	8	2 860	X	X	X	X	X	5	60	1.51	a, d
1050	HYDROGEN CHLORIDE, ANHYDROUS	2.3	8	2 810	X	X	X	X	X	5	100 120 150 200	0.30 0.56 0.67 0.74	a, d a, d a, d a, d
1053	HYDROGEN SULPHIDE	2.3	2.1	712	X	X	X	X	X	5	48	0.67	d, u
1055	ISOBUTYLENE	2.1			X	X	X	X	X	10	10	0.52	
1058	LIQUEFIED GASES, non-flammable, charged with nitrogen, carbon dioxide or air	2.2			X	X	X	X	X	10			z
1060	METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED or	2.1			X	X	X	X	X	10			c, z
	METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED (Propadiene with 1 % to 4 % methylacetylene)	2.1			X	X	X	X	X	10	22	0.52	c

Cont'd on next page

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
1061	METHYLAMINE, ANHYDROUS	2.1			X	X	X	X	X	10	13	0.58	b
1062	METHYL BROMIDE	2.3		850	X	X	X	X	X	5	10	1.51	a
1063	METHYL CHLORIDE (REFRIGERANT GAS R 40)	2.1			X	X	X	X	X	10	17	0.81	a
1064	METHYL MERCAPTAN	2.3	2.1	1 350	X	X	X	X	X	5	10	0.78	d, u
1067	DINITROGEN TETROXIDE (NITROGEN DIOXIDE)	2.3	5.1 8	115	X		X	X		5	10	1.30	k
1069	NITROSYL CHLORIDE	2.3	8	35	X			X		5	13	1.10	k
1070	NITROUS OXIDE	2.2	5.1		X	X	X	X	X	10	180 225 250	0.68 0.74 0.75	
1075	PETROLEUM GASES, LIQUEFIED	2.1			X	X	X	X	X	10			v, z
1076	PHOSGENE	2.3	8	5	X		X	X		5	20	1.23	a, k
1077	PROPYLENE	2.1			X	X	X	X	X	10	27	0.43	
1078	REFRIGERANT GAS, N.O.S.	2.2			X	X	X	X	X	10			z
1079	SULPHUR DIOXIDE	2.3	8	2 520	X	X	X	X	X	5	12	1.23	
1080	SULPHUR HEXAFLUORIDE	2.2			X	X	X	X	X	10	70 140 160	1.06 1.34 1.38	
1081	TETRAFLUORO-ETHYLENE, STABILIZED	2.1			X	X	X	X	X	10	200		m, o
1082	TRIFLUOROCHLORO-ETHYLENE, STABILIZED (Refrigerant gas R1113)	2.3	2.1	2 000	X	X	X	X	X	5	19	1.13	u
1083	TRIMETHYLAMINE, ANHYDROUS	2.1			X	X	X	X	X	10	10	0.56	b
1085	VINYL BROMIDE, STABILIZED	2.1			X	X	X	X	X	10	10	1.37	a
1086	VINYL CHLORIDE, STABILIZED	2.1			X	X	X	X	X	10	12	0.81	a
1087	VINYL METHYL ETHER, STABILIZED	2.1			X	X	X	X	X	10	10	0.67	
1581	CHLOROPICRIN AND METHYL BROMIDE MIXTURE	2.3		850	X	X	X	X	X	5	10	1.51	a
1582	CHLOROPICRIN AND METHYL CHLORIDE MIXTURE	2.3			X	X	X	X	X	5	17	0.81	a
1589	CYANOGEN CHLORIDE, STABILIZED	2.3	8	80	X			X		5	20	1.03	k
1741	BORON TRICHLORIDE	2.3	8	2 541	X	X	X	X	X	5	10	1.19	a
1749	CHLORINE TRIFLUORIDE	2.3	5.1 8	299	X	X	X	X	X	5	30	1.40	a
1858	HEXAFLUORO-PROPYLENE (REFRIGERANT GAS R 1216)	2.2			X	X	X	X	X	10	22	1.11	
1859	SILICON TETRAFLUORIDE	2.3	8	922	X	X	X	X	X	5	200 300	0.74 1.10	a

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Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
1860	VINYL FLUORIDE, STABILIZED	2.1			X	X	X	X	X	10	250	0.64	a
1911	DIBORANE	2.3	2.1	80	X			X		5	250	0.07	d, k, o
1912	METHYL CHLORIDE AND METHYLENE CHLORIDE MIXTURE	2.1			X	X	X	X	X	10	17	0.81	a
1952	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with not more than 9 % ethylene oxide	2.2			X	X	X	X	X	10	190 250	0.66 0.75	
1958	1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 114)	2.2			X	X	X	X	X	10	10	1.30	
1959	1,1-DIFLUORO-ETHYLENE (REFRIGERANT GAS R 1132a)	2.1			X	X	X	X	X	10	250	0.77	
1962	ETHYLENE	2.1			X	X	X	X	X	10	225 300	0.34 0.38	
1965	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S.	2.1			X	X	X	X	X	10			v, z
1967	INSECTICIDE GAS, TOXIC, N.O.S.	2.3			X	X	X	X	X	5			z
1968	INSECTICIDE GAS, N.O.S.	2.2			X	X	X	X	X	10			z
1969	ISOBUTANE	2.1			X	X	X	X	X	10	10	0.49	v
1973	CHLORODIFLUORO-METHANE AND CHLOROPENTA-FLUOROETHANE MIXTURE with fixed boiling point, with approximately 49 % chlorodifluoromethane (REFRIGERANT GAS R 502)	2.2			X	X	X	X	X	10	31	1.01	
1974	CHLORODIFLUORO-BROMOMETHANE (REFRIGERANT GAS R 12B1)	2.2			X	X	X	X	X	10	10	1.61	
1975	NITRIC OXIDE AND DINITROGEN TETROXIDE MIXTURE (NITRIC OXIDE AND NITROGEN DIOXIDE MIXTURE)	2.3	5.1 8	115	X		X	X		5			k, z
1976	OCTAFLUOROCYCLO-BUTANE (REFRIGERANT GAS RC 318)	2.2			X	X	X	X	X	10	11	1.32	
1978	PROPANE	2.1			X	X	X	X	X	10	23	0.43	v
1982	TETRAFLUORO-METHANE (REFRIGERANT GAS R 14)	2.2			X	X	X	X	X	10	200 300	0.71 0.90	

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Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
1983	1-CHLORO-2,2,2-TRIFLUOROETHANE (REFRIGERANT GAS R 133a)	2.2			X	X	X	X	X	10	10	1.18	
1984	TRIFLUOROMETHANE (REFRIGERANT GAS R 23)	2.2			X	X	X	X	X	10	190 250	0.88 0.96	
2035	1,1,1-TRIFLUORO-ETHANE (REFRIGERANT GAS R 143a)	2.1			X	X	X	X	X	10	35	0.73	
2036	XENON	2.2			X	X	X	X	X	10	130	1.28	
2044	2,2-DIMETHYLPROPANE	2.1			X	X	X	X	X	10	10	0.53	
2073	AMMONIA SOLUTION, relative density less than 0.880 at 15 °C in water,	2.2											
	with more than 35 % but not more than 40 % ammonia				X	X	X	X	X	5	10	0.80	b
	with more than 40 % but not more than 50 % ammonia				X	X	X	X	X	5	12	0.77	b
2188	ARSINE	2.3	2.1	178	X			X		5	42	1.10	d, k
2189	DICHLOROSILANE	2.3	2.1 8	314	X	X	X	X	X	5	10 200	0.90 1.08	a
2191	SULPHURYL FLUORIDE	2.3		3 020	X	X	X	X	X	5	50	1.10	u
2192	GERMANE	2.3	2.1	620	X	X	X	X	X	5	250	0.064	d, q, r
2193	HEXAFLUOROETHANE (REFRIGERANT GAS R 116)	2.2			X	X	X	X	X	10	200	1.13	
2194	SELENIUM HEXAFLUORIDE	2.3	8	50	X			X		5	36	1.46	k
2195	TELLURIUM HEXAFLUORIDE	2.3	8	25	X			X		5	20	1.00	k
2196	TUNGSTEN HEXAFLUORIDE	2.3	8	218	X	X	X	X	X	5	10	3.08	a
2197	HYDROGEN IODIDE, ANHYDROUS	2.3	8	2 860	X	X	X	X	X	5	23	2.25	a, d
2198	PHOSPHORUS PENTAFLUORIDE	2.3	8	261	X	X	X	X	X	5	200 300	0.90 1.25	
2199	PHOSPHINE	2.3	2.1	20	X			X		5	225 250	0.30 0.45	d, k, q d, k, q
2200	PROPADIENE, STABILIZED	2.1			X	X	X	X	X	10	22	0.50	
2202	HYDROGEN SELENIDE, ANHYDROUS	2.3	2.1	51	X			X		5	31	1.60	k
2203	SILANE	2.1			X	X	X	X	X	10	225 250	0.32 0.36	q q
2204	CARBONYL SULPHIDE	2.3	2.1	1 700	X	X	X	X	X	5	30	0.87	u
2417	CARBONYL FLUORIDE	2.3	8	360	X	X	X	X	X	5	200 300	0.47 0.70	
2418	SULPHUR TETRAFLUORIDE	2.3	8	40	X			X		5	30	0.91	a, k

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Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
2419	BROMOTRIFLUORO-ETHYLENE	2.1			X	X	X	X	X	10	10	1.19	
2420	HEXAFLUOROACETONE	2.3	8	470	X	X	X	X	X	5	22	1.08	
2421	NITROGEN TRIOXIDE	2.3	5.1 8	57	X			X		5			k
2422	OCTAFLUOROBUT-2-ENE (REFRIGERANT GAS R 1318)	2.2			X	X	X	X	X	10	12	1.34	
2424	OCTAFLUOROPROPANE (REFRIGERANT GAS R 218)	2.2			X	X	X	X	X	10	25	1.04	
2451	NITROGEN TRIFLUORIDE	2.2	5.1		X	X	X	X	X	10	200	0.50	
2452	ETHYLACETYLENE, STABILIZED	2.1			X	X	X	X	X	10	10	0.57	c
2453	ETHYL FLUORIDE (REFRIGERANT GAS R 161)	2.1			X	X	X	X	X	10	30	0.57	
2454	METHYL FLUORIDE (REFRIGERANT GAS R 41)	2.1			X	X	X	X	X	10	300	0.63	
2455	METHYL NITRITE	2.2											
2517	1-CHLORO-1,1-DIFLUOROETHANE (REFRIGERANT GAS R 142b)	2.1			X	X	X	X	X	10	10	0.99	
2534	METHYLCHLORO-SILANE	2.3	2.1 8	2810	X	X	X	X	X	5			z
2548	CHLORINE PENTAFLUORIDE	2.3	5.1 8	122	X			X		5	13	1.49	a, k
2599	CHLOROTRIFLUORO-METHANE AND TRIFLUOROMETHANE AZEOTROPIC MIXTURE with approximately 60 % chlorotrifluoromethane (REFRIGERANT GAS R 503)	2.2			X	X	X	X	X	10	31 42 100	0.12 0.17 0.64	
2601	CYCLOBUTANE	2.1			X	X	X	X	X	10	10	0.63	
2602	DICHLORODIFLUORO-METHANE AND DIFLUOROETHANE AZEOTROPIC MIXTURE with approximately 74 % dichlorodifluoromethane (REFRIGERANT GAS R 500)	2.2			X	X	X	X	X	10	22	1.01	
2676	STIBINE	2.3	2.1	178	X			X		5	200	0.49	k, r
2901	BROMINE CHLORIDE	2.3	5.1 8	290	X	X	X	X	X	5	10	1.50	a
3057	TRIFLUOROACETYL CHLORIDE	2.3	8	10	X		X	X		5	17	1.17	k

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Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
3070	ETHYLENE OXIDE AND DICHLORODIFLUORO-METHANE MIXTURE with not more than 12.5 % ethylene oxide	2.2			X	X	X	X	X	10	18	1.09	
3083	PERCHLORYL FLUORIDE	2.3	5.1	770	X	X	X	X	X	5	33	1.21	u
3153	PERFLUORO (METHYL VINYL ETHER)	2.1			X	X	X	X	X	10	20	0.75	
3154	PERFLUORO (ETHYL VINYL ETHER)	2.1			X	X	X	X	X	10	10	0.98	
3157	LIQUEFIED GAS, OXIDIZING, N.O.S.	2.2	5.1		X	X	X	X	X	10			z
3159	1,1,1,2-TETRAFLUORO-ETHANE (REFRIGERANT GAS R 134a)	2.2			X	X	X	X	X	10	18	1.05	
3160	LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1	≤ 5 000	X	X	X	X	X	5			z
3161	LIQUEFIED GAS, FLAMMABLE, N.O.S.	2.1			X	X	X	X	X	10			z
3162	LIQUEFIED GAS, TOXIC, N.O.S.	2.3		≤ 5 000	X	X	X	X	X	5			z
3163	LIQUEFIED GAS, N.O.S.	2.2			X	X	X	X	X	10			z
3220	PENTAFLUOROETHANE (REFRIGERANT GAS R 125)	2.2			X	X	X	X	X	10	49 35	0.95 0.87	
3252	DIFLUOROMETHANE (REFRIGERANT GAS R 32)	2.1			X	X	X	X	X	10	48	0.78	
3296	HEPTAFLUORO-PROPANE (REFRIGERANT GAS R 227)	2.2			X	X	X	X	X	10	13	1.21	
3297	ETHYLENE OXIDE AND CHLOROTETRA-FLUOROETHANE MIXTURE with not more than 8.8 % ethylene oxide	2.2			X	X	X	X	X	10	10	1.16	
3298	ETHYLENE OXIDE AND PENTAFLUOROETHANE MIXTURE with not more than 7.9 % ethylene oxide	2.2			X	X	X	X	X	10	26	1.02	
3299	ETHYLENE OXIDE AND TETRAFLUOROETHANE MIXTURE with not more than 5.6 % ethylene oxide	2.2			X	X	X	X	X	10	17	1.03	
3300	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87 % ethylene oxide	2.3	2.1	More than 2 900	X	X	X	X	X	5	28	0.73	
3307	LIQUEFIED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	5.1	≤ 5 000	X	X	X	X	X	5			z

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Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
3308	LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	8	≤ 5 000	X	X	X	X	X	5			z
3309	LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	2.1 8	≤ 5 000	X	X	X	X	X	5			z
3310	LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	5.1 8	≤ 5 000	X	X	X	X	X	5			z
3318	AMMONIA SOLUTION, relative density less than 0.880 at 15 °C in water, with more than 50 % ammonia	2.3	8		X	X	X	X	X	5			b
3337	REFRIGERANT GAS R 404A	2.2			X	X	X	X	X	10	36	0.82	
3338	REFRIGERANT GAS R 407A	2.2			X	X	X	X	X	10	32	0.94	
3339	REFRIGERANT GAS R 407B	2.2			X	X	X	X	X	10	33	0.93	
3340	REFRIGERANT GAS R 407C	2.2			X	X	X	X	X	10	30	0.95	
3354	INSECTICIDE GAS, FLAMMABLE, N.O.S	2.1			X	X	X	X	X	10			z
3355	INSECTICIDE GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1		X	X	X	X	X	5			z
3374	ACETYLENE, SOLVENT FREE	2.1			X			X		5	60 52		c, p

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P200	PACKING INSTRUCTION *(cont'd)*	P200

Table 3: SUBSTANCES NOT IN CLASS 2

UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} (ml/m³)	Cylinders	Tubes	Pressure drums	Bundles of cylinders	MEGCs	Test period (years)	Test pressure (bar)	Filling ratio	Special packing provisions
1051	HYDROGEN CYANIDE, STABILIZED containing less than 3 % water	6.1	3	40	X			X		5	100	0.55	k
1052	HYDROGEN FLUORIDE, ANHYDROUS	8	6.1	1307	X		X	X		5	10	0.84	a, t
1745	BROMINE PENTAFLUORIDE	5.1	6.1 8	25	X		X	X		5	10	[a]	k
1746	BROMINE TRIFLUORIDE	5.1	6.1 8	50	X		X	X		5	10	[a]	k
2495	IODINE PENTAFLUORIDE	5.1	6.1 8	120	X		X	X		5	10	[a]	k

[a] *A minimum ullage of 8 % by volume is required.*

P201	PACKING INSTRUCTION	P201

This instruction applies to UN Nos. 3167, 3168 and 3169.

The following packagings are authorized:

(1) Cylinders and gas receptacles conforming to the construction, testing and filling requirements approved by the competent authority.

(2) The following combination packagings provided that the general provisions of **4.1.1** and **4.1.3** are met:

Outer packagings:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);
Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);
Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2).

Inner packagings:

(a) For non-toxic gases, hermetically sealed inner packagings of glass or metal with a maximum capacity of 5 litres per package;

(b) For toxic gases, hermetically sealed inner packagings of glass or metal with a maximum capacity of 1 litre per package.

Packagings shall conform to the packing group III performance level.

P202	PACKING INSTRUCTION	P202

(Reserved)

P203	PACKING INSTRUCTION	P203

This instruction applies to Class 2 refrigerated liquefied gases.

Requirements for closed cryogenic receptacles:

(1) The general requirements of 4.1.6.1 shall be met.

(2) The requirements of Chapter 6.2 shall be met.

(3) The closed cryogenic receptacles shall be so insulated that they do not become coated with frost.

(4) Test pressure

Refrigerated liquids shall be filled in closed cryogenic receptacles with the following minimum test pressures:

(a) For closed cryogenic receptacles with vacuum insulation, the test pressure shall not be less than 1.3 times the sum of the maximum internal pressure of the filled receptacle, including during filling and discharge, plus 100 kPa (1 bar);

(b) For other closed cryogenic receptacles, the test pressure shall be not less than 1.3 times the maximum internal pressure of the filled receptacle, taking into account the pressure developed during filling and discharge.

(5) Degree of filling

For non-flammable, non-toxic refrigerated liquefied gases the volume of liquid phase at the filling temperature and at a pressure of 100 kPa (1 bar) shall not exceed 98 % of the water capacity of the pressure receptacle.

For flammable refrigerated liquefied gases the degree of filling shall remain below the level at which, if the contents were raised to the temperature at which the vapour pressure equalled the opening pressure of the relief valve, the volume of the liquid phase would reach 98 % of the water capacity at that temperature.

(6) Pressure-relief devices

Closed cryogenic receptacles shall be fitted with at least one pressure-relief device.

(7) Compatibility

Materials used to ensure the leakproofness of the joints or for the maintenance of the closures shall be compatible with the contents. In the case of receptacles intended for the transport of oxidizing gases (i.e. with a subsidiary hazard of 5.1), these materials shall not react with these gases in a dangerous manner.

(8) Periodic inspection

The periodic inspection and test frequencies of pressure relief valves in accordance with 6.2.1.6.3 shall not exceed five years.

Requirements for open cryogenic receptacles:

Only the following non oxidizing refrigerated liquefied gases of Division 2.2 may be transported in open cryogenic receptacles: UN Nos. 1913, 1951, 1963, 1970, 1977, 2591, 3136 and 3158.

Open cryogenic receptacles shall be constructed to meet the following requirements:

(1) The receptacles shall be designed, manufactured, tested and equipped in such a way as to withstand all conditions, including fatigue, to which they will be subjected during their normal use and during normal conditions of transport.

(2) The capacity shall be not more than 450 litres.

(3) The receptacle shall have a double wall construction with the space between the inner and outer wall being evacuated (vacuum insulation). The insulation shall prevent the formation of hoar frost on the exterior of the receptacle.

(4) The materials of construction shall have suitable mechanical properties at the service temperature.

(5) Materials which are in direct contact with the dangerous goods shall not be affected or weakened by the dangerous goods intended to be transported and shall not cause a dangerous effect, e.g. catalysing a reaction or reacting with the dangerous goods.

(6) Receptacles of glass double wall construction shall have an outer packaging with suitable cushioning or absorbent materials which withstand the pressures and impacts liable to occur under normal conditions of transport.

(7) The receptacle shall be designed to remain in an upright position during transport, e.g. have a base whose smaller horizontal dimension is greater than the height of the centre of gravity when filled to capacity or be mounted on gimbals.

Cont'd on next page

P203	PACKING INSTRUCTION *(cont'd)*	P203

(8) The openings of the receptacles shall be fitted with devices allowing gases to escape, preventing any splashing out of liquid, and so configured that they remain in place during transport.

(9) Open cryogenic receptacles shall bear the following marks permanently affixed e.g. by stamping, engraving or etching:

- The manufacturer's name and address;
- The model number or name;
- The serial or batch number;
- The UN number and proper shipping name of gases for which the receptacle is intended;
- The capacity of the receptacle in litres.

P205	PACKING INSTRUCTION	P205

This instruction applies to UN No. 3468.

(1) For metal hydride storage systems, the general packing requirements of 4.1.6.1 shall be met.

(2) Only pressure receptacles not exceeding 150 litres in water capacity and having a maximum developed pressure not exceeding 25 MPa are covered by this packing instruction.

(3) Metal hydride storage systems meeting the applicable requirements for the construction and testing of pressure receptacles containing gas of Chapter 6.2 are authorised for the transport of hydrogen only.

(4) When steel pressure receptacles or composite pressure receptacles with steel liners are used, only those bearing the "H" mark, in accordance with 6.2.2.9.2 (j) shall be used.

(5) Metal hydride storage systems shall meet the service conditions, design criteria, rated capacity, type tests, batch tests, routine tests, test pressure, rated charging pressure and provisions for pressure relief devices for transportable metal hydride storage systems specified in ISO 16111:2008 or ISO 16111:2018 and their conformity and approval shall be assessed in accordance with 6.2.2.5.

(6) Metal hydride storage systems shall be filled with hydrogen at a pressure not exceeding the rated charging pressure shown in the permanent mark on the system as specified by ISO 16111:2008 or ISO 16111:2018.

(7) The periodic test requirements for a metal hydride storage system shall be in accordance with ISO 16111:2008 or ISO 16111:2018 and carried out in accordance with 6.2.2.6, and the interval between periodic inspections shall not exceed five years. See 6.2.2.4 to determine which standard is applicable at the time of periodic inspection and test.

P206	PACKING INSTRUCTION	P206

This instruction applies to UN Nos. 3500, 3501, 3502, 3503, 3504 and 3505.

Unless otherwise indicated in these Regulations, cylinders and pressure drums conforming to the applicable requirements of Chapter 6.2 are authorized.

(1) The general packing requirements of **4.1.6.1** shall be met.

(2) The maximum test period for periodic inspection shall be 5 years.

(3) Cylinders and pressure drums shall be so filled that at 50 °C the non-gaseous phase does not exceed 95 % of their water capacity and they are not completely filled at 60 °C. When filled, the internal pressure at 65 °C shall not exceed the test pressure of the cylinders and pressure drums. The vapour pressures and volumetric expansion of all substances in the cylinders and pressure drums shall be taken into account.

For liquids charged with a compressed gas both components – the liquid and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle. When experimental data is not available, the following steps shall be carried out:

(a) Calculation of the vapour pressure of the liquid and of the partial pressure of the compressed gas at 15 °C (filling temperature);

(b) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the gaseous phase;

(c) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the liquid phase;

NOTE: *The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.*

(d) Calculation of the vapour pressure of the liquid at 65 °C;

(e) The total pressure is the sum of the vapour pressure of the liquid and the partial pressure of the compressed gas at 65 °C;

(f) Consideration of the solubility of the compressed gas at 65 °C in the liquid phase.

The test pressure of the cylinders or pressure drums shall not be less than the calculated total pressure minus 100 kPa (1 bar).

If the solubility of the compressed gas in the liquid phase is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (f)) into account.

(4) The minimum test pressure shall be in accordance with P200 for the propellant but shall not be less than 20 bar.

Additional requirement:

Cylinders and pressure drums shall not be offered for transport when connected with spray application equipment such as a hose and wand assembly.

Special packing provisions:

PP89 For UN Nos. 3501, 3502, 3503, 3504 and 3505, notwithstanding 4.1.6.1.9 (b), non-refillable cylinders used may have a water capacity in litres not exceeding 1 000 litres divided by the test pressure expressed in bars provided capacity and pressure restrictions of the construction standard comply with ISO 11118:1999, which limits the maximum capacity to 50 litres.

PP97 For fire extinguishing agents assigned to UN 3500 the maximum test period for periodic inspection shall be 10 years. They may be transported in tubes of a maximum water capacity of 450 *l* conforming to the applicable requirements of Chapter 6.2.

P207	PACKING INSTRUCTION	P207

This instruction applies to UN No. 1950.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(a) Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);
Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2).
Packagings shall conform to the packing group II performance level.

(b) Rigid outer packagings with a maximum net mass as follows:
Fibreboard 55 kg
Other than fibreboard 125 kg
The provisions of 4.1.1.3 need not be met.

The packagings shall be designed and constructed to prevent excessive movement of the aerosols and inadvertent discharge during normal conditions of transport.

Special packing provision:

PP87 For UN 1950 waste aerosols transported in accordance with special provision 327, the packagings shall have a means of retaining any free liquid that might escape during transport, e.g. absorbent material. The packagings shall be adequately ventilated to prevent the creation of dangerous atmospheres and the build-up of pressure.

P208	PACKING INSTRUCTION	P208

This instruction applies to Class 2 adsorbed gases.

(1) The following packagings are authorized provided the general packing requirements of **4.1.6.1** are met:

(a) Cylinders constructed as specified in 6.2.2 and in accordance with ISO 11513:2011, ISO 11513:2019, ISO 9809-1:2010 or ISO 9809-1:2019; and

(b) Cylinders constructed before 1 January 2016 in accordance with 6.2.3 and a specification approved by the competent authorities of the countries of transport and use.

(2) The pressure of each filled cylinder shall be less than 101.3 kPa at 20 °C and less than 300 kPa at 50 °C.

(3) The minimum test pressure of the cylinder shall be 21 bar.

(4) The minimum burst pressure of the cylinder shall be 94.5 bar.

(5) The internal pressure at 65 °C of the filled cylinder shall not exceed the test pressure of the cylinder.

(6) The adsorbent material shall be compatible with the cylinder and shall not form harmful or dangerous compounds with the gas to be adsorbed. The gas in combination with the adsorbent material shall not affect or weaken the cylinder or cause a dangerous reaction (e.g. a catalyzing reaction).

(7) The quality of the adsorbent shall be verified at the time of each fill to assure the pressure and chemical stability requirements of this packing instruction are met each time an adsorbed gas package is offered for transport.

(8) The adsorbent material shall not meet the criteria of any of the Classes or Divisions in these Regulations.

(9) Requirements for cylinders and closures containing toxic gases with an LC_{50} less than or equal to 200 ml/m^3 (ppm) (see Table 1) shall be as follows:

(a) Valve outlets shall be fitted with pressure retaining gas-tight plugs or caps having threads matching those of the valve outlets.

(b) Each valve shall either be of the packless type with non-perforated diaphragm, or be of a type which prevents leakage through or past the packing.

(c) Each cylinder and closure shall be tested for leakage after filling.

(d) Each valve shall be capable of withstanding the test pressure of the cylinder and be directly connected to the cylinder by either a taper-thread or other means which meets the requirements of ISO 10692-2:2001.

Cylinders and valves shall not be fitted with a pressure relief device.

(10) Valve outlets for cylinders containing pyrophoric gases shall be fitted with gas-tight plugs or caps having threads matching those of the valve outlets.

(11) The filling procedure shall be in accordance with Annex A of ISO 11513:2011 (applicable until 31 December 2024) or Annex A of ISO 11513:2019.

(12) The maximum period for periodic inspections shall be 5 years.

(13) Special packing provisions that are specific to a substance (see Table 1).

Material compatibility

a: Aluminium alloy cylinders shall not be used.

d: When steel cylinders are used, only those bearing the "H" mark in accordance with 6.2.2.7.4 (p) are permitted.

Gas specific provisions

r: The filling of this gas shall be limited such that, if complete decomposition occurs, the pressure does not exceed two thirds of the test pressure of the cylinder.

Material compatibility for n.o.s. adsorbed gas entries

z: The construction materials of the cylinders and their accessories shall be compatible with the contents and shall not react to form harmful or dangerous compounds therewith.

Cont'd on next page

P208	PACKING INSTRUCTION *(cont'd)*				P208
Table 1: ADSORBED GASES					
UN No.	Name and description	Class or Division	Subsidiary hazard	LC_{50} ml/m^3	Special packing provisions
(1)	(2)	(3)	(4)	(5)	(6)
3510	ADSORBED GAS, FLAMMABLE, N.O.S.	2.1			z
3511	ADSORBED GAS, N.O.S.	2.2			z
3512	ADSORBED GAS, TOXIC, N.O.S.	2.3		≤ 5000	z
3513	ADSORBED GAS, OXIDIZING, N.O.S.	2.2	5.1		z
3514	ADSORBED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3	2.1	≤ 5000	z
3515	ADSORBED GAS, TOXIC, OXIDIZING, N.O.S.	2.3	5.1	≤ 5000	z
3516	ADSORBED GAS, TOXIC, CORROSIVE, N.O.S.	2.3	8	≤ 5000	z
3517	ADSORBED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2.3	2.1 8	≤ 5000	z
3518	ADSORBED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2.3	5.1 8	≤ 5000	z
3519	BORON TRIFLUORIDE, ADSORBED	2.3	8	387	a
3520	CHLORINE, ADSORBED	2.3	5.1 8	293	a
3521	SILICON TETRAFLUORIDE, ADSORBED	2.3	8	450	a
3522	ARSINE, ADSORBED	2.3	2.1	20	d
3523	GERMANE, ADSORBED	2.3	2.1	620	d, r
3524	PHOSPHORUS PENTAFLUORIDE, ADSORBED	2.3	8	190	
3525	PHOSPHINE, ADSORBED	2.3	2.1	20	d
3526	HYDROGEN SELENIDE, ADSORBED	2.3	2.1	2	

P300	PACKING INSTRUCTION	P300
This instruction applies to UN No. 3064.		
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met: Combination packagings consisting of inner metal cans of not more than 1 litre capacity each and outer wooden boxes (4C1, 4C2, 4D or 4F) containing not more than 5 litres of solution.		
Additional requirements: 1. Metal cans shall be completely surrounded with absorbent cushioning material. 2. Wooden boxes shall be completely lined with suitable material impervious to water and nitroglycerin.		

P301	PACKING INSTRUCTION	P301

This instruction applies to UN No. 3165.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Aluminium pressure receptacle made from tubing and having welded heads.

Primary containment of the fuel within this receptacle shall consist of a welded aluminium bladder having a maximum internal volume of 46 litres.

The outer receptacle shall have a minimum design gauge pressure of 1 275 kPa and a minimum burst gauge pressure of 2 755 kPa.

Each receptacle shall be leak checked during manufacture and before shipment and shall be found leakproof.

The complete inner unit shall be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings.

Maximum quantity of fuel per primary containment and package is 42 litres.

(2) Aluminium pressure receptacle.

Primary containment of the fuel within this receptacle shall consist of a welded vapour tight fuel compartment with an elastomeric bladder having a maximum internal volume of 46 litres.

The pressure receptacle shall have a minimum design gauge pressure of 2 680 kPa and a minimum burst pressure of 5 170 kPa.

Each receptacle shall be leak-checked during manufacture and before shipment and shall be securely packed in non-combustible cushioning material such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings.

Maximum quantity of fuel per primary containment and package is 42 litres.

P302	PACKING INSTRUCTION	P302

This instruction applies to UN No. 3269.

The following combination packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Outer packagings:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2);

Inner packagings:

The activator (organic peroxide) shall have a maximum quantity of 125 ml per inner packaging if liquid, and 500 g per inner packaging if solid.

The base material and the activator shall be each separately packed in inner packagings.

The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of a leakage.

Packagings shall conform to the packing group II or III performance level according to the criteria for Class 3 applied to the base material.

P400	PACKING INSTRUCTION	P400

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Pressure receptacles, provided that the general provisions of 4.1.3.6 are met. They shall be made of steel and shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 1MPa (10 bar) (gauge pressure). During transport, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

(2) Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F or 4G), drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1D or 1G) or jerricans (3A1, 3A2, 3B1 or 3B2) enclosing hermetically sealed metal cans with inner packagings of glass or metal, with a capacity of not more than 1 litre each, having closures with gaskets. Inner packagings shall have threaded closures or closures physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport. Inner packagings shall be cushioned on all sides with dry, absorbent, non-combustible material in a quantity sufficient to absorb the entire contents. Inner packagings shall not be filled to more than 90 % of their capacity. Outer packagings shall have a maximum net mass of 125 kg.

(3) Steel, aluminium or metal drums (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2), jerricans (3A1, 3A2, 3B1 or 3B2)or boxes (4A, 4B or 4N) with a maximum net mass of 150 kg each with hermetically sealed inner metal cans not more than 4 litre capacity each, with closures fitted with gaskets. Inner packagings shall have threaded closures or closures physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport. Inner packagings shall be cushioned on all sides with dry, absorbent, non-combustible material in a quantity sufficient to absorb the entire contents. Each layer of inner packagings shall be separated by a dividing partition in addition to cushioning material. Inner packagings shall not be filled to more than 90 % of their capacity.

Special packing provision:

PP86 For UN Nos. 3392 and 3394, air shall be eliminated from the vapour space by nitrogen or other means.

P401	PACKING INSTRUCTION	P401

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Pressure receptacles, provided that the general provisions of 4.1.3.6 are met. They shall be made of steel and subjected to an initial test and periodic tests every 10 years at a pressure of not less than 0.6 MPa (6 bar) (gauge pressure). During transport, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

(2) Combination packagings:

Outer packagings:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);
Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);
Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2).

Inner packagings:

Glass, metal or plastics which have threaded closures with a maximum capacity of 1 litre.

Each inner packaging shall be surrounded by inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents.

The maximum net mass per outer packaging shall not exceed 30 kg.

P402	PACKING INSTRUCTION	P402

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Pressure receptacles, provided that the general provisions of 4.1.3.6 are met. They shall be made of steel and subjected to an initial test and periodic tests every 10 years at a pressure of not less than 0.6 MPa (6 bar) (gauge pressure). During transport, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

(2) Combination packagings:

Outer packagings:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);
Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);
Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2).

Inner packagings with a maximum net mass as follows:

Glass	10 kg
Metal or plastics	15 kg

Each inner packaging shall be fitted with threaded closures.

Each inner packaging shall be surrounded by inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents.

The maximum net mass per outer packaging shall not exceed 125 kg.

(3) Steel drums (1A1) with a maximum capacity of 250 litres.

(4) Composite packagings consisting of plastics receptacle in a steel or aluminium drum (6HA1 or 6HB1) with a maximum capacity of 250 litres.

<table>
<tr><td colspan="3">P403 PACKING INSTRUCTION P403</td></tr>
<tr><td colspan="3">The following packagings are authorized, provided that the general provisions of 4.1.1 and 4.1.3 are met:</td></tr>
<tr><td colspan="3">Combination packagings</td></tr>
<tr><td>Inner packagings</td><td>Outer packagings</td><td>Maximum net mass</td></tr>
<tr><td rowspan="24">Glass 2 kg
Plastic 15 kg
Metal 20 kg
Inner packagings shall be hermetically sealed (e.g. by taping or by threaded closures)</td><td>Drums</td><td></td></tr>
<tr><td>steel (1A1, 1A2)</td><td>400 kg</td></tr>
<tr><td>aluminium (1B1, 1B2)</td><td>400 kg</td></tr>
<tr><td>other metal (1N1, 1N2)</td><td>400 kg</td></tr>
<tr><td>plastics (1H1, 1H2)</td><td>400 kg</td></tr>
<tr><td>plywood (1D)</td><td>400 kg</td></tr>
<tr><td>fibre (1G)</td><td>400 kg</td></tr>
<tr><td>Boxes</td><td></td></tr>
<tr><td>steel (4A)</td><td>400 kg</td></tr>
<tr><td>aluminium (4B)</td><td>400 kg</td></tr>
<tr><td>other metal (4N)</td><td>400 kg</td></tr>
<tr><td>natural wood (4C1)</td><td>250 kg</td></tr>
<tr><td>natural wood with sift proof walls (4C2)</td><td>250 kg</td></tr>
<tr><td>plywood (4D)</td><td>250 kg</td></tr>
<tr><td>reconstituted wood (4F)</td><td>125 kg</td></tr>
<tr><td>fibreboard (4G)</td><td>125 kg</td></tr>
<tr><td>expanded plastics (4H1)</td><td>60 kg</td></tr>
<tr><td>solid plastics (4H2)</td><td>250 kg</td></tr>
<tr><td>Jerricans</td><td></td></tr>
<tr><td>steel (3A1, 3A2)</td><td>120 kg</td></tr>
<tr><td>aluminium (3B1, 3B2)</td><td>120 kg</td></tr>
<tr><td>plastics (3H1, 3H2)</td><td>120 kg</td></tr>
<tr><td colspan="2">Single packagings</td><td>Maximum net mass</td></tr>
<tr><td colspan="2">Drums</td><td></td></tr>
<tr><td colspan="2">steel (1A1, 1A2)</td><td>250 kg</td></tr>
<tr><td colspan="2">aluminium (1B1, 1B2)</td><td>250 kg</td></tr>
<tr><td colspan="2">metal other than steel or aluminium (1N1, 1N2)</td><td>250 kg</td></tr>
<tr><td colspan="2">plastics (1H1, 1H2)</td><td>250 kg</td></tr>
<tr><td colspan="2">Jerricans</td><td></td></tr>
<tr><td colspan="2">steel (3A1, 3A2)</td><td>120 kg</td></tr>
<tr><td colspan="2">aluminium (3B1, 3B2)</td><td>120 kg</td></tr>
<tr><td colspan="2">plastics (3H1, 3H2)</td><td>120 kg</td></tr>
<tr><td colspan="2">Composite packagings</td><td></td></tr>
<tr><td colspan="2">plastics receptacle in steel or aluminium drums (6HA1 or 6HB1)</td><td>250 kg</td></tr>
<tr><td colspan="2">plastics receptacle in fibre, plastics or plywood drums (6HG1, 6HH1 or 6HD1)</td><td>75 kg</td></tr>
<tr><td colspan="2">plastics receptacle in steel, aluminium, wood, plywood, fibreboard or solid plastics boxes (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)</td><td>75 kg</td></tr>
<tr><td colspan="3">Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.</td></tr>
<tr><td colspan="3">Special packing provision:
PP83 Deleted</td></tr>
</table>

P404	PACKING INSTRUCTION	P404

This instruction applies to pyrophoric solids: UN Nos.: 1383, 1854, 1855, 2005, 2008, 2441, 2545, 2546, 2846, 2881, 3200, 3391 and 3393.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) **Combination packagings**

Outer packagings: (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1,4C2, 4D, 4F, 4G or 4H2)

Inner packagings: Metal receptacles with a maximum net mass of 15 kg each. Inner packagings shall be hermetically sealed;

Glass receptacles, with a maximum net mass of 1 kg each, having closures with gaskets, cushioned on all sides and contained in hermetically sealed metal cans.

Outer packagings shall have a maximum net mass of 125 kg.

Inner packagings shall have threaded closures or closures physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport.

(2) **Metal packagings:** (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 3A1, 3A2, 3B1 and 3B2). Maximum gross mass: 150 kg

(3) **Composite packagings:** Plastics receptacle in a steel or aluminium drum (6HA1 or 6HB1) Maximum gross mass: 150 kg

Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.

Special packing provision:

PP86 For UN Nos. 3391 and 3393, air shall be eliminated from the vapour space by nitrogen or other means.

P405	PACKING INSTRUCTION	P405

This instruction applies to UN No. 1381.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) For UN1381, phosphorus wet:

(a) **Combination packagings**

Outer packagings: (4A, 4B, 4N, 4C1, 4C2, 4D or 4F). Maximum net mass: 75 kg

Inner packagings:

(i) hermetically sealed metal cans, with a maximum net mass of 15 kg; or

(ii) glass inner packagings cushioned on all sides with dry, absorbent, non-combustible material in a quantity sufficient to absorb the entire contents with a maximum net mass of 2 kg; or

(b) **Drums** (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2). Maximum net mass: 400 kg

Jerricans (3A1 or 3B1). Maximum net mass: 120 kg.

These packagings shall be capable of passing the leakproofness test specified in 6.1.5.4 at the packing group II performance level.

(2) For UN1381, dry phosphorus:

(a) When fused, **drums** (1A2, 1B2 or 1N2) with a maximum net mass of 400 kg; or

(b) In projectiles or hard cased articles when transported without Class 1 components as specified by the competent authority.

P406	PACKING INSTRUCTION	P406

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Combination packagings

Outer packagings: (4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 1G, 1D, 1H1, 1H2, 3H1 or 3H2)

Inner packagings: water-resistant packagings.

(2) Plastics, plywood or fibreboard drums (1H2, 1D or 1G) or boxes (4A, 4B, 4N, 4C1, 4D, 4F, 4C2, 4G and 4H2) with a water-resistant inner bag, plastics film lining or water-resistant coating.

(3) Metal drums (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2), plastics drums (1H1 or 1H2), metal jerricans (3A1, 3A2, 3B1 or 3B2), plastics jerricans (3H1 or 3H2), plastics receptacle in steel or aluminium drums (6HA1 or 6HB1), plastics receptacle in fibre, plastics or plywood drums (6HG1, 6HH1 or 6HD1), plastics receptacle in steel, aluminium, wood, plywood, fibreboard or solid plastics boxes (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2).

Additional requirements:

1. Packagings shall be designed and constructed to prevent the loss of water or alcohol content or the content of the phlegmatizer.
2. Packagings shall be so constructed and closed so as to avoid an explosive over pressure or pressure build-up of more than 300 kPa (3 bar).
3. The type of packaging and maximum permitted quantity per packaging are limited by the provisions of 2.1.3.6.

Special packing provisions:

PP24 UN 2852, 3364, 3365, 3366, 3367, 3368 and 3369 shall not be transported in quantities of more than 500 g per package.

PP25 UN 1347 shall not be transported in quantities of more than 15 kg per package.

PP26 For UN Nos. 1310, 1320, 1321, 1322, 1344, 1347, 1348, 1349, 1517, 2907, 3317, 3344 and 3376 packagings shall be lead free.

PP48 For UN 3474, metal packagings shall not be used. Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6.1.4, are not considered metal packagings.

PP78 UN 3370 shall not be transported in quantities of more than 11.5 kg per package.

PP80 For UN Nos. 2907 and 3344, packagings shall meet the packing group II performance level. Packagings meeting the test criteria of packing group I shall not be used.

P407	PACKING INSTRUCTION	P407

This instruction applies to UN Nos. 1331, 1944, 1945 and 2254.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Outer packagings:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2).

Inner packagings:

Matches shall be tightly packed in securely closed inner packagings to prevent accidental ignition under normal conditions of transport.

The maximum gross mass of the package shall not exceed 45 kg except for fibreboard boxes which shall not exceed 30 kg.

Packagings shall conform to the packing group III performance level.

Special packing provision:

PP27 UN 1331, Strike-anywhere matches shall not be packed in the same outer packaging with any other dangerous goods other than safety matches or wax Vesta matches, which shall be packed in separate inner packagings. Inner packagings shall not contain more than 700 strike-anywhere matches.

P408	PACKING INSTRUCTION	P408

This instruction applies to UN No. 3292.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) For cells:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

There shall be sufficient cushioning material to prevent contact between cells and between cells and the internal surfaces of the outer packaging and to ensure that no dangerous movement of the cells within the outer packaging occurs in transport.

Packagings shall conform to the packing group II performance level.

(2) Batteries may be transported unpacked or in protective enclosures (e.g. fully enclosed or wooden slatted crates). The terminals shall not support the weight of other batteries or materials packed with the batteries.

Packagings need not meet the requirements of 4.1.1.3.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

Additional requirement:

Cells and batteries shall be protected against short circuit and shall be isolated in such a manner as to prevent short circuits.

P409	PACKING INSTRUCTION	P409

This instruction applies to UN Nos. 2956, 3242 and 3251.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Fibre drum (1G) which may be fitted with a liner or coating; maximum net mass: 50 kg

(2) Combination packagings: Fibreboard box (4G) with a single inner plastic bag; maximum net mass 50 kg

(3) Combination packagings: Fibreboard box (4G) or fibre drum (1G) with inner plastic packagings each containing a maximum of 5 kg; maximum net mass: 25 kg

P410	PACKING INSTRUCTION	P410

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Combination packagings

Inner packagings		Outer packagings	Maximum net mass	
			Packing group II	Packing group III
Glass	10 kg	**Drums**		
Plastics [a]	30 kg	steel (1A1, 1A2)	400 kg	400 kg
Metal	40 kg	aluminium (1B1, 1B2)	400 kg	400 kg
Paper [a, b]	10 kg	other metal (1N1, 1N2)	400 kg	400 kg
Fibre [a, b]	10 kg	plastics (1H1, 1H2)	400 kg	400 kg
		plywood (1D)	400 kg	400 kg
		fibre (1G)[a]	400 kg	400 kg
		Boxes		
		steel (4A)	400 kg	400 kg
		aluminium (4B)	400 kg	400 kg
		other metal (4N)	400 kg	400 kg
		natural wood (4C1)	400 kg	400 kg
		natural wood with sift proof walls (4C2)	400 kg	400 kg
		plywood (4D)	400 kg	400 kg
		reconstituted wood (4F)	400 kg	400 kg
		fibreboard (4G)[a]	400 kg	400 kg
		expanded plastics (4H1)	60 kg	60 kg
		solid plastics (4H2)	400 kg	400 kg
		Jerricans		
		steel (3A1, 3A2)	120 kg	120 kg
		aluminium (3B1, 3B2)	120 kg	120 kg
		plastics (3H1, 3H2)	120 kg	120 kg
Single packagings				
Drums				
steel (1A1 or 1A2)			400 kg	400 kg
aluminium (1B1 or 1B2)			400 kg	400 kg
metal other than steel, or aluminium (1N1 or 1N2)			400 kg	400 kg
plastics (1H1 or 1H2)			400 kg	400 kg
Jerricans				
steel (3A1 or 3A2)			120 kg	120 kg
aluminium (3B1 or 3B2)			120 kg	120 kg
plastics (3H1 or 3H2)			120 kg	120 kg

Cont'd on next page

[a] *Packagings shall be siftproof.*

[b] *These inner packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).*

Single packagings (cont'd)	Maximum net mass	
	Packing group II	**Packing group III**
Boxes		
steel (4A) [c]	400 kg	400 kg
aluminium (4B) [c]	400 kg	400 kg
other metal (4N)[c]	400 kg	400 kg
natural wood (4C1) [c]	400 kg	400 kg
plywood (4D) [c]	400 kg	400 kg
reconstituted wood (4F) [c]	400 kg	400 kg
natural wood with sift proof walls (4C2) [c]	400 kg	400 kg
fibreboard (4G) [c]	400 kg	400 kg
solid plastics (4H2) [c]	400 kg	400 kg
Bags		
bags (5H3, 5H4, 5L3, 5M2) [c, d]	50 kg	50 kg
Composite packaging		
plastics receptacle in steel, aluminium, plywood, fibre or plastics drum (6HA1, 6HB1, 6HG1, 6HD1, or 6HH1)	400 kg	400 kg
plastics receptacle in steel or aluminium crate or box, wooden box, plywood box, fibreboard box or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)	75 kg	75 kg
glass receptacle in steel, aluminium, plywood or fibre drum (6PA1, 6PB1, 6PD1 or 6PG1) or in steel, aluminium, wooden, wickerwork hamper or fibreboard box (6PA2, 6PB2, 6PC, 6PD2, or 6PG2) or in expanded or solid plastics packaging (6PH1 or 6PH2)	75 kg	75 kg
Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.		

Special packing provisions:

PP39 For UN 1378, for metal packagings a venting device is required.

PP40 For UN Nos. 1326, 1352, 1358, 1437 and 1871, and for UN 3182, packing group II, bags are not allowed.

PP83 *Deleted*

[c] *These packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).*

[d] *For packing group II substances, these packagings may only be used when transported in a closed cargo transport unit.*

P411	**PACKING INSTRUCTION**	**P411**
This instruction applies to UN No. 3270.		
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met: Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2); Jerricans (3A2, 3B2, 3H2); provided that explosion is not possible by reason of increased internal pressure. The maximum net mass shall not exceed 30 kg.		

P412	**PACKING INSTRUCTION**	**P412**
This instruction applies to UN No. 3527		
The following combination packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met: (1) Outer packagings: Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2) Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2); (2) Inner packagings: (a) The activator (organic peroxide) shall have a maximum quantity of 125 ml per inner packaging if liquid, and 500 g per inner packaging if solid. (b) The base material and the activator shall be each separately packed in inner packagings. The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of a leakage. Packagings shall conform to the packing group II or III performance level according to the criteria for Division 4.1 applied to the base material.		

P500	**PACKING INSTRUCTION**	**P500**
This instruction applies to UN No. 3356.		
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met: Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2); Jerricans (3A2, 3B2, 3H2). Packagings shall conform to the packing group II performance level. The generator(s) shall be transported in a package which meets the following requirements when one generator in the package is actuated: (a) Other generators in the package will not be actuated; (b) Packaging material will not ignite; and (c) The outside surface temperature of the completed package shall not exceed 100 °C.		

P501	**PACKING INSTRUCTION**	**P501**
This instruction applies to UN No. 2015.		
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:		
Combination packagings	**Inner packaging maximum capacity**	**Outer packaging maximum net mass**
(1) Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4H2) or drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D) or jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2) with glass, plastics or metal inner packagings	5 *l*	125 kg
(2) Fibreboard box (4G) or fibre drum (1G), with plastics or metal inner packagings each in a plastics bag	2 *l*	50 kg
Single packagings	**Maximum capacity**	
Drums		
steel (1A1)	250 *l*	
aluminium (1B1)	250 *l*	
metal other than steel or aluminium (1N1)	250 *l*	
plastics (1H1)	250 *l*	
Jerricans		
steel (3A1)	60 *l*	
aluminium (3B1)	60 *l*	
plastics (3H1)	60 *l*	
Composite packagings		
plastics receptacle in steel or aluminium drum (6HA1, 6HB1)	250 *l*	
plastics receptacle in fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)	250 *l*	
plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)	60 *l*	
glass receptacle in steel, aluminium, fibre or plywood drum (6PA1, 6PB1, 6PD1 or 6PG1) or in a steel, aluminium, wood or fibreboard box or in wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2) or in expanded or solid plastics packaging (6PH1 or 6PH2).	60 *l*	
Additional requirements: 1. Packagings shall have a minimum ullage of 10 %. 2. Packagings shall be vented.		

P502	PACKING INSTRUCTION	P502
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:		
Combination packagings		
Inner packagings	**Outer packagings**	**Maximum net mass**
Glass 5 *l*	**Drums**	
Metal 5 *l*	steel (1A1, 1A2)	125 kg
Plastic 5 *l*	aluminium (1B1, 1B2)	125 kg
	other metal (1N1, 1N2)	125 kg
	plywood (1D)	125 kg
	fibre (1G)	125 kg
	plastics (1H1, 1H2)	125 kg
	Boxes	
	steel (4A)	125 kg
	aluminium (4B)	125 kg
	other metal (4N)	125 kg
	natural wood (4C1)	125 kg
	natural wood with sift proof walls (4C2)	125 kg
	plywood (4D)	125 kg
	reconstituted wood (4F)	125 kg
	fibreboard (4G)	125 kg
	expanded plastics (4H1)	60 kg
	solid plastics (4H2)	125 kg
Single packagings		**Maximum capacity**
Drums		
steel (1A1)		250 *l*
aluminium (1B1)		250 *l*
plastics (1H1)		250 *l*
Jerricans		
steel (3A1)		60 *l*
aluminium (3B1)		60 *l*
plastics (3H1)		60 *l*
Composite packagings		**Maximum capacity**
plastics receptacle in steel or aluminium drum (6HA1, 6HB1)		250 *l*
plastics receptacle in fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)		250 *l*
plastics receptacle in steel or aluminium crate or box or plastics receptacle in wood, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)		60 *l*
glass receptacle in steel, aluminium, fibre or plywood drum (6PA1, 6PB1, 6PD1 or 6PG1) or in a steel, aluminium, wood or fibreboard box or in wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2) or in expanded or solid plastics packaging (6PH1 or 6PH2).		60 *l*
Special packing provision:		
PP28 For UN No. 1873, parts of packagings which are in direct contact with perchloric acid shall be constructed of glass or plastics.		

P503	PACKING INSTRUCTION	P503
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:		
Combination packagings		
Inner packagings	**Outer packagings**	**Maximum net mass**
Glass 5 kg	**Drums**	
Metal 5 kg	steel (1A1, 1A2)	125 kg
Plastic 5 kg	aluminium (1B1, 1B2)	125 kg
	other metal (1N1, 1N2)	125 kg
	plywood (1D)	125 kg
	fibre (1G)	125 kg
	plastics (1H1, 1H2)	125 kg
	Boxes	
	steel (4A)	125 kg
	aluminium (4B)	125 kg
	other metal (4N)	125 kg
	natural wood (4C1)	125 kg
	natural wood with sift proof walls (4C2)	125 kg
	plywood (4D)	125 kg
	reconstituted wood (4F)	125 kg
	fibreboard (4G)	40 kg
	expanded plastics (4H1)	60 kg
	solid plastics (4H2)	125 kg
Single packagings		**Maximum capacity**
Drums		
Metal drums (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2)		250 kg
Fibreboard (1G) or plywood drums (1D) fitted with inner liners		200 kg

P504	PACKING INSTRUCTION	P504
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:		
Combination packagings		**Maximum net mass**
(1)	Outer packagings: (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H2) Inner packagings: Glass receptacles with a maximum capacity of 5 litres	75 kg
(2)	Outer packagings: (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H2) Inner packagings: Plastic receptacles with a maximum capacity of 30 litres	75 kg
(3)	Outer packagings: 1G, 4F or 4G Inner packagings: Metal receptacles with a maximum capacity of 40 litres	125 kg
(4)	Outer packagings: (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 4A, 4B, 4N, 4C1, 4C2, 4D, 4H2) Inner packagings: Metal receptacles with a maximum capacity of 40 litres	225 kg
Single packagings		**Maximum capacity**
Drums		
steel, non-removable head (1A1)		250 *l*
aluminium, non-removable head (1B1)		250 *l*
metal other than steel or aluminium, non-removable head (1N1)		250 *l*
plastics, non-removable head (1H1)		250 *l*
Jerricans		
steel non-removable head (3A1)		60 *l*
aluminium non-removable head (3B1)		60 *l*
plastics non-removable head (3H1)		60 *l*
Composite packagings		**Maximum capacity**
plastics receptacle in steel or aluminium drum (6HA1, 6HB1)		250 *l*
plastics receptacle in fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)		120 *l*
plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)		60 *l*
glass receptacle in steel, aluminium, fibre or plywood drum (6PA1, 6PB1, 6PD1 or 6PG1) or in a steel, aluminium, wood or fibreboard box or in wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2) or in expanded or solid plastics packaging (6PH1 or 6PH2).		60 *l*
Special packing provision:		
PP10 For UN Nos. 2014 and 3149, the packaging shall be vented.		

P505	PACKING INSTRUCTION	P505
This instruction applies to UN No. 3375		
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:		
Combination packagings:	**Inner packaging maximum capacity**	**Outer packaging maximum net mass**
Boxes (4B, 4C1, 4C2, 4D, 4G, 4H2) or drums (1B2, 1G, 1N2, 1H2, 1D) jerricans (3B2, 3H2) with glass, plastics or metal inner packagings	5 *l*	125 kg
Single packagings:	**Maximum capacity**	
Drums		
aluminium (1B1, 1B2)	250 *l*	
plastics (1H1, 1H2)	250 *l*	
Jerricans		
aluminium (3B1, 3B2)	60 *l*	
plastics (3H1, 3H2)	60 *l*	
Composite packagings		
plastics receptacle with outer aluminium drum (6HB1)	250 *l*	
plastics receptacle with outer fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)	250 *l*	
plastics receptacle with outer aluminium crate or box or plastics receptacle with outer wooden, plywood, fibreboard or solid plastics box (6HB2, 6HC, 6HD2, 6HG2 or 6HH2)	60 *l*	
glass receptacle with outer aluminium, fibre or plywood drum (6PB1, 6PG1, 6PD1) or with outer expanded plastics or solid plastics receptacles (6PH1 or 6PH2) or with outer aluminium crate or box or with outer wooden or fibreboard box or with outer wickerwork hamper (6PB2, 6PC, 6PG2 or 6PD2)	60 *l*	

P520 **PACKING INSTRUCTION** **P520**

This instruction applies to organic peroxides of Division 5.2 and self-reactive substances of Division 4.1

The packagings listed below are authorized provided that the general provisions of **4.1.1** and **4.1.3** and special provisions of **4.1.7** are met.

The packing methods are designated OP1 to OP8. The packing methods appropriate for the individual currently assigned organic peroxides and self-reactive substances are listed in 2.4.2.3.2.3 and 2.5.3.2.4.

The quantities specified for each packing method are the maximum quantities authorized per package. The following packagings are authorized:

(1) Combination packagings with outer packagings comprising boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1 and 4H2), drums (1A1, 1A2, 1B1, 1B2, 1G, 1H1, 1H2 and 1D), jerricans (3A1, 3A2, 3B1, 3B2, 3H1 and 3H2);

(2) Single packagings consisting of drums (1A1, 1A2, 1B1, 1B2, 1G, 1H1, 1H2 and 1D) and jerricans (3A1, 3A2, 3B1, 3B2, 3H1 and 3H2);

(3) Composite packagings with plastics inner receptacles (6HA1, 6HA2, 6HB1, 6HB2, 6HC, 6HD1, 6HD2, 6HG1, 6HG2, 6HH1 and 6HH2).

Maximum quantity per packaging/package[a] for packing methods OP1 to OP8

Packing Method / Maximum Quantity	OP1	OP2[a]	OP3	OP4[a]	OP5	OP6	OP7	OP8
Maximum mass (kg) for solids and for combination packagings (liquid and solid)	0.5	0.5/10	5	5/25	25	50	50	400[b]
Maximum contents in litres for liquids[c]	0.5	-	5	-	30	60	60	225[d]

[a] *If two values are given, the first applies to the maximum net mass per inner packaging and the second to the maximum net mass of the complete package.*

[b] *60 kg for jerricans/200 kg for boxes and, for solids, 400 kg in combination packagings with outer packagings comprising boxes (4C1, 4C2, 4D, 4F, 4G, 4H1 and 4H2) and with inner packagings of plastics or fibre with a maximum net mass of 25 kg.*

[c] *Viscous liquids shall be treated as solids when they do not meet the criteria provided in the definition for "liquids" presented in 1.2.1.*

[d] *60 litres for jerricans.*

Additional requirements:

1. Metal packagings, including inner packagings of combination packagings and outer packagings of combination or composite packagings may only be used for packing methods OP7 and OP8;
2. In combination packagings, glass receptacles may only be used as inner packagings with a maximum content of 0.5 kg for solids or 0.5 litre for liquids.
3. In combination packagings, cushioning materials shall not be readily combustible.
4. The packaging of an organic peroxide or self-reactive substance required to bear an "EXPLOSIVE" subsidiary hazard label (Model No.1, see 5.2.2.2.2) shall also comply with the provisions given in 4.1.5.10 and 4.1.5.11.

Special packing provisions:

PP21 For certain self-reactive substances of types B or C, UN 3221, UN 3222, UN 3223, UN 3224, UN 3231, UN 3232, UN 3233 and UN 3234 a smaller packaging than that allowed by packing methods OP5 or OP6 respectively shall be used (see 4.1.7 and 2.4.2.3.2.3).

PP22 UN 3241, 2-Bromo-2-nitropropane-1,3-diol, shall be packed in accordance with packing method OP6.

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P520	PACKING INSTRUCTION *(cont'd)*	P520

Special packing provisions: ***(Cont'd)***

PP94 Very small amounts of energetic samples of section 2.0.4.3 may be carried under UN 3223 or UN 3224, as appropriate, provided that:

1. Only combination packaging with outer packaging comprising boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1 and 4H2) are used;
2. The samples are carried in microtiter plates or multi-titer plates made of plastics, glass, porcelain or stoneware as inner packaging;
3. The maximum amount per individual inner cavity does not exceed 0.01 g for solids or 0.01 ml for liquids;
4. The maximum net quantity per outer packaging is 20 g for solids or 20 ml for liquids, or in the case of mixed packing the sum of grams and millilitres does not exceed 20; and
5. When dry ice or liquid nitrogen is optionally used as a coolant for quality control measures, the requirements of 5.5.3 are complied with. Interior supports shall be provided to secure the inner packagings in their original position. The inner and outer packagings shall maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.

PP95 Small amounts of energetic samples of section 2.0.4.3 may be carried under UN 3223 or UN 3224, as appropriate, provided that:

1. The outer packaging consist only of corrugated fibreboard of type 4G having minimum dimensions of 60 cm (length) by 40.5 cm (width) by 30 cm (height) and minimum wall thickness of 1.3 cm;
2. The individual substance is contained in an inner packaging of glass or plastics of maximum capacity 30 ml placed in an expandable polyethylene foam matrix of at least 130 mm thickness having a density of 18 ± 1 g/l;
3. Within the foam carrier, inner packagings are segregated from each other by a minimum distance of 40 mm and from the wall of the outer packaging by a minimum distance of 70 mm. The package may contain up to two layers of such foam matrices, each carrying up to 28 inner packagings;
4. The maximum content of each inner packaging does not exceed 1 g for solids or 1 ml for liquids;
5. The maximum net quantity per outer packaging is 56 g for solids or 56 ml for liquids, or in the case of mixed packing the sum of grams and millilitres does not exceed 56; and
6. When dry ice or liquid nitrogen is optionally used as a coolant for quality control measures, the requirements of 5.5.3 are complied with. Interior supports shall be provided to secure the inner packagings in their original position. The inner and outer packagings shall maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.

P600	PACKING INSTRUCTION	P600

This instruction applies to UN Nos. 1700, 2016 and 2017.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Outer packagings: (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H2) meeting the packing group II performance level. The articles shall be individually packaged and separated from each other using partitions, dividers, inner packagings or cushioning material to prevent inadvertent discharge during normal conditions of transport.

Maximum net mass: 75 kg

P601	PACKING INSTRUCTION	P601

The following packagings are authorized provided that the general provisions of **4.1.1** and **4.1.3** are met and the packagings are hermetically sealed:

(1) Combination packagings with a maximum gross mass of 15 kg, consisting of

- one or more glass inner packaging(s) with a maximum net quantity of 1 litre each and filled to not more than 90 % of their capacity; the closure(s) of which shall be physically held in place by any means capable of preventing back-off or loosening by impact or vibration during transport, individually placed in
- metal receptacles together with cushioning and absorbent material sufficient to absorb the entire contents of the glass inner packaging(s), further packed in
- 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings.

(2) Combination packagings consisting of metal or plastics inner packagings not exceeding 5 litres in capacity individually packed with absorbent material sufficient to absorb the contents and inert cushioning material in 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings with a maximum gross mass of 75 kg. Inner packagings shall not be filled to more than 90 % of their capacity. The closure of each inner packaging shall be physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport.

(3) Packagings consisting of:

Outer packagings:

Steel or plastics drums (1A1, 1A2, 1H1 or 1H2), tested in accordance with the test requirements in 6.1.5 at a mass corresponding to the mass of the assembled package either as a packaging intended to contain inner packagings, or as a single packaging intended to contain solids or liquids, and marked accordingly.

Inner packagings:

Drums and composite packagings (1A1, 1B1, 1N1, 1H1 or 6HA1), meeting the requirements of Chapter 6.1 for single packagings), subject to the following conditions:

(a) The hydraulic pressure test shall be conducted at a pressure of at least 3 bar (gauge pressure);

(b) The design and production leakproofness tests shall be conducted at a test pressure of 0.30 bar;

(c) They shall be isolated from the outer drum by the use of inert shock-mitigating cushioning material which surrounds the inner packaging on all sides;

(d) Their capacity shall not exceed 125 litres; and

(e) Closures shall be of a screw cap type that are:

(i) physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport; and

(ii) provided with a cap seal.

(f) The outer and inner packagings shall be subjected periodically to a leakproofness test according to (b) at intervals of not more than two and a half years; and

(g) The outer and inner packagings shall bear in clearly legible and durable characters:

(i) the date (month, year) of the initial testing and the latest periodical test;

(ii) the name or authorized symbol of the party performing the tests and inspections.

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P601	PACKING INSTRUCTION *(cont'd)*	P601

(4) Pressure receptacles, provided that the general provisions of **4.1.3.6** are met. They shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 1 MPa (10 bar) (gauge pressure). Pressure receptacles may not be equipped with any pressure relief device. Each pressure receptacle containing a toxic by inhalation liquid with an LC_{50} less than or equal to 200 ml/m^3 (ppm) shall be closed with a plug or valve conforming to the following:

(a) Each plug or valve shall have a taper-threaded connection directly to the pressure receptacle and be capable of withstanding the test pressure of the pressure receptacle without damage or leakage;

(b) Each valve shall be of the packless type with non-perforated diaphragm, except that, for corrosive substances, a valve may be of the packed type with an assembly made gas-tight by means of a seal cap with gasket joint attached to the valve body or the pressure receptacle to prevent loss of substance through or past the packing;

(c) Each valve outlet shall be sealed by a threaded cap or threaded solid plug and inert gasket material;

(d) The materials of construction for the pressure receptacle, valves, plugs, outlet caps, luting and gaskets shall be compatible with each other and with the contents.

Each pressure receptacle with a wall thickness at any point of less than 2.0 mm and each pressure receptacle which does not have fitted valve protection shall be transported in an outer packaging. Pressure receptacles shall not be manifolded or interconnected.

P602	PACKING INSTRUCTION	P602

The following packagings are authorised provided that the general provisions of **4.1.1** and **4.1.3** are met and the packagings are hermetically sealed:

(1) Combination packagings with a maximum gross mass of 15 kg, consisting of

- one or more glass inner packaging(s) with a maximum net quantity of 1 litre each and filled to not more than 90 % of their capacity; the closure(s) of which shall be physically held in place by any means capable of preventing back-off or loosening by impact or vibration during transport, individually placed in
- metal receptacles together with cushioning and absorbent material sufficient to absorb the entire contents of the glass inner packaging(s), further packed in
- 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings.

(2) Combination packagings consisting of metal or plastics inner packagings individually packed with absorbent material sufficient to absorb the contents and inert cushioning material in 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings with a maximum gross mass of 75 kg. Inner packagings shall not be filled to more than 90 % of their capacity. The closure of each inner packaging shall be physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport. Inner packagings shall not exceed 5 litres in capacity.

(3) Drums and composite packagings (1A1, 1B1, 1N1, 1H1, 6HA1 or 6HH1), subject to the following conditions:

(a) The hydraulic pressure test shall be conducted at a pressure of at least 3 bar (gauge pressure);

(b) The design and production leakproofness tests shall be conducted at a test pressure of 0.30 bar; and

(c) Closures shall be of a screw cap type that are:

(i) physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport; and

(ii) provided with a cap seal.

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P602	PACKING INSTRUCTION *(cont'd)*	P602

(4) Pressure receptacles, provided that the general provisions of 4.1.3.6 are met. They shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 1 MPa (10 bar) (gauge pressure). Pressure receptacles may not be equipped with any pressure relief device. Each pressure receptacle containing a toxic by inhalation liquid with an LC_{50} less than or equal to 200 ml/m^3 (ppm) shall be closed with a plug or valve conforming to the following:

(a) Each plug or valve shall have a taper-threaded connection directly to the pressure receptacle and be capable of withstanding the test pressure of the pressure receptacle without damage or leakage;

(b) Each valve shall be of the packless type with non-perforated diaphragm, except that, for corrosive substances, a valve may be of the packed type with an assembly made gas-tight by means of a seal cap with gasket joint attached to the valve body or the pressure receptacle to prevent loss of substance through or past the packing;

(c) Each valve outlet shall be sealed by a threaded cap or threaded solid plug and inert gasket material;

(d) The materials of construction for the pressure receptacle, valves, plugs, outlet caps, luting and gaskets shall be compatible with each other and with the contents.

Each pressure receptacle with a wall thickness at any point of less than 2.0 mm and each pressure receptacle which does not have fitted valve protection shall be transported in an outer packaging. Pressure receptacles shall not be manifolded or interconnected.

P603	PACKING INSTRUCTION	P603

This instruction applies to UN 3507.

The following packagings are authorized provided that the general provisions of **4.1.1** and **4.1.3** and the special packing provisions of **4.1.9.1.2, 4.1.9.1.4** and **4.1.9.1.7** are met:

Packagings consisting of:

(a) Metal or plastics primary receptacle(s); in

(b) Leakproof rigid secondary packaging(s); in

(c) A rigid outer packaging:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

Additional requirements:

1. Primary inner receptacles shall be packed in secondary packagings in a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packagings shall be secured in outer packagings with suitable cushioning material to prevent movement. If multiple primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them;

2. The contents shall comply with the provisions of 2.7.2.4.5.2;

3. The provisions of 6.4.4 shall be met.

Special packing provision:

In the case of fissile-excepted material, limits specified in 2.7.2.3.5 shall be met.

P620	PACKING INSTRUCTION	P620

This instruction applies to UN Nos. 2814 and 2900.

The following packagings are authorized provided that the special packing provisions of **4.1.8** are met:

Packagings meeting the requirements of Chapter 6.3 and approved accordingly consisting of:

(a) Inner packagings comprising:

(i) leakproof primary receptacle(s);

(ii) a leakproof secondary packaging;

(iii) other than for solid infectious substances, an absorbent material in sufficient quantity to absorb the entire contents placed between the primary receptacle(s) and the secondary packaging; if multiple primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them;

(b) A rigid outer packaging:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2).

The smallest external dimension shall be not less than 100 mm.

Additional requirements:

1. Inner packagings containing infectious substances shall not be consolidated with inner packagings containing unrelated types of goods. Complete packages may be overpacked in accordance with the provisions of 1.2.1 and 5.1.2: such an overpack may contain dry ice.
2. Other than for exceptional consignments, e.g. whole organs which require special packaging, the following additional requirements shall apply:

   (a) Substances consigned at ambient temperatures or at a higher temperature. Primary receptacles shall be of glass, metal or plastics. Positive means of ensuring a leakproof seal shall be provided, e.g. a heat seal, a skirted stopper or a metal crimp seal. If screw caps are used, they shall be secured by positive means, e.g., tape, paraffin sealing tape or manufactured locking closure;

   (b) Substances consigned refrigerated or frozen. Ice, dry ice or other refrigerant shall be placed around the secondary packaging(s) or alternatively in an overpack with one or more complete packages marked in accordance with 6.3.3. Interior supports shall be provided to secure secondary packaging(s) or packages in position after the ice or dry ice has dissipated. If ice is used, the outer packaging or overpack shall be leakproof. If dry ice is used, the outer packaging or overpack shall permit the release of carbon dioxide gas. The primary receptacle and the secondary packaging shall maintain their integrity at the temperature of the refrigerant used;

   (c) Substances consigned in liquid nitrogen. Plastics primary receptacles capable of withstanding very low temperature shall be used. The secondary packaging shall also be capable of withstanding very low temperatures, and in most cases will need to be fitted over the primary receptacle individually. Provisions for the consignment of liquid nitrogen shall also be fulfilled. The primary receptacle and the secondary packaging shall maintain their integrity at the temperature of the liquid nitrogen;

   (d) Lyophilized substances may also be transported in primary receptacles that are flame-sealed glass ampoules or rubber-stoppered glass vials fitted with metal seals.

3. Whatever the intended temperature of the consignment, the primary receptacle or the secondary packaging shall be capable of withstanding without leakage an internal pressure producing a pressure differential of not less than 95 kPa. This primary receptacle or secondary packaging shall also be capable of withstanding temperatures in the range -40 °C to +55 °C.
4. Other dangerous goods shall not be packed in the same packaging as Division 6.2 infectious substances unless they are necessary for maintaining the viability, stabilizing or preventing degradation or neutralizing the hazards of the infectious substances. A quantity of 30 ml or less of dangerous goods included in Classes 3, 8 or 9 may be packed in each primary receptacle containing infectious substances. These small quantities of dangerous goods of Classes 3, 8 or 9 are not subject to any additional requirements of these Regulations when packed in accordance with this packing instruction.
5. Alternative packagings for the transport of animal material may be authorized by the competent authority in accordance with the provisions of 4.1.3.7.

P621	PACKING INSTRUCTION	P621

This instruction applies to UN No. 3291.

The following packagings are authorized provided that the general provisions of **4.1.1** except 4.1.1.15 and **4.1.3** are met:

(1) Provided that there is sufficient absorbent material to absorb the entire amount of liquid present and the packaging is capable of retaining liquids:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2).

Packagings shall conform to the packing group II performance level for solids.

(2) For packages containing larger quantities of liquid:

Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G);

Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2);

Composites (6HA1, 6HB1, 6HG1, 6HH1, 6HD1, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6PA1, 6PB1, 6PG1, 6PD1, 6PH1, 6PH2, 6PA2, 6PB2, 6PC, 6PG2 or 6PD2).

Packagings shall conform to the packing group II performance level for liquids.

Additional requirement:

Packagings intended to contain sharp objects such as broken glass and needles shall be resistant to puncture and retain liquids under the performance test conditions in Chapter 6.1.

P622	PACKING INSTRUCTION	P622
This instruction applies to waste of UN 3549 transported for disposal.		
The following packagings are authorized provided the general provisions of **4.1.1** and **4.1.3** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
metal plastics	metal plastics	**Boxes** steel (4A) aluminium (4B) other metal (4N) plywood (4D) fibreboard (4G) plastics, solid (4H2) **Drums** steel (1A2) aluminium (1B2) other metal (1N2) plywood (1D) fibre (1G) plastics (1H2) **Jerricans** steel (3A2) aluminium (3B2) plastics (3H2)
The outer packaging shall conform to the packing group I performance level for solids.		
Additional requirements:		

1. Fragile articles shall be contained in either a rigid inner packaging or a rigid intermediate packaging.
2. Inner packagings containing sharp objects such as broken glass and needles shall be rigid and resistant to puncture.
3. The inner packaging, the intermediate packaging, and the outer packaging shall be capable of retaining liquids. Outer packagings that are not capable of retaining liquids by design shall be fitted with a liner or suitable measure of retaining liquids.
4. The inner packaging and/or the intermediate packaging may be flexible. When flexible packagings are used, they shall be capable of passing the impact resistance test of at least 165 g according to ISO 7765-1:1988 “Plastics film and sheeting – Determination of impact resistance by the free-falling dart method – Part 1: Staircase methods” and the tear resistance test of at least 480 g in both parallel and perpendicular planes with respect to the length of the bag in accordance with ISO 6383-2:1983 “Plastics – Film and sheeting – Determination of tear resistance – Part 2: Elmendorf method”. The maximum net mass of each flexible inner packaging shall be 30kg.
5. Each flexible intermediate packaging shall contain only one inner packaging.
6. Inner packagings containing a small amount of free liquid may be included in intermediate packaging provided that there is sufficient absorbent or solidifying material in the inner or intermediate packaging to absorb or solidify all the liquid content present. Suitable absorbent material which withstands the temperatures and vibrations liable to occur under normal conditions of transport shall be used.
7. Intermediate packagings shall be secured in outer packagings with suitable cushioning and/or absorbent material.

P650	PACKING INSTRUCTION	P650

This packing instruction applies to UN 3373.

(1) The packaging shall be of good quality, strong enough to withstand the shocks and loadings normally encountered during transport, including transhipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings shall be constructed and closed to prevent any loss of contents that might be caused under normal conditions of transport by vibration or by changes in temperature, humidity or pressure.

(2) The packaging shall consist of at least three components:

(a) a primary receptacle;

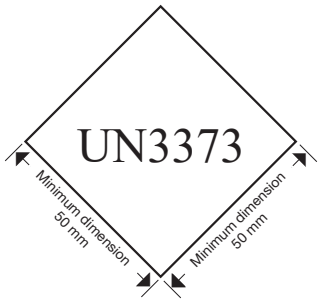
(b) a secondary packaging; and

(c) an outer packaging

of which either the secondary or the outer packaging shall be rigid.

(3) Primary receptacles shall be packed in secondary packagings in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packagings shall be secured in outer packagings with suitable cushioning material. Any leakage of the contents shall not compromise the integrity of the cushioning material or of the outer packaging.

(4) For transport, the mark illustrated below shall be displayed on the external surface of the outer packaging on a background of a contrasting colour and shall be clearly visible and legible. The mark shall be in the form of a square set at an angle of 45° (diamond-shaped) with each side having a length of at least 50 mm; the width of the line shall be at least 2 mm and the letters and numbers shall be at least 6 mm high. The proper shipping name "BIOLOGICAL SUBSTANCE, CATEGORY B" in letters at least 6 mm high shall be marked on the outer packaging adjacent to the diamond-shaped mark.



NOTE: *The mark shown in paragraph (4) of Packing Instruction P650 of the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016.*

(5) At least one surface of the outer packaging shall have a minimum dimension of 100 mm × 100 mm.

(6) The completed package shall be capable of successfully passing the drop test in 6.3.5.3 as specified in 6.3.5.2 of these Regulations at a height of 1.2 m. Following the appropriate drop sequence, there shall be no leakage from the primary receptacle(s) which shall remain protected by absorbent material, when required, in the secondary packaging.

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P650	PACKING INSTRUCTION *(cont'd)*	P650

(7) For liquid substances

(a) The primary receptacle(s) shall be leakproof;

(b) The secondary packaging shall be leakproof;

(c) If multiple fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated to prevent contact between them;

(d) Absorbent material shall be placed between the primary receptacle(s) and the secondary packaging. The absorbent material shall be in quantity sufficient to absorb the entire contents of the primary receptacle(s) so that any release of the liquid substance will not compromise the integrity of the cushioning material or of the outer packaging;

(e) The primary receptacle or the secondary packaging shall be capable of withstanding, without leakage, an internal pressure of 95 kPa (0.95 bar).

(8) For solid substances

(a) The primary receptacle(s) shall be siftproof;

(b) The secondary packaging shall be siftproof;

(c) If multiple fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated to prevent contact between them;

(d) If there is any doubt as to whether or not residual liquid may be present in the primary receptacle during transport then a packaging suitable for liquids, including absorbent materials, shall be used.

(9) Refrigerated or frozen specimens: Ice, dry ice and liquid nitrogen

(a) When dry ice or liquid nitrogen is used as a coolant, the requirements of 5.5.3 shall apply. When used, ice shall be placed outside the secondary packagings or in the outer packaging or an overpack. Interior supports shall be provided to secure the secondary packagings in the original position. If ice is used, the outside packaging or overpack shall be leakproof;

(b) The primary receptacle and the secondary packaging shall maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.

(10) When packages are placed in an overpack, the package marks required by this packing instruction shall either be clearly visible or be reproduced on the outside of the overpack.

(11) Infectious substances assigned to UN 3373 which are packed and marked in accordance with this packing instruction are not subject to any other requirement in these Regulations.

(12) Clear instructions on filling and closing such packages shall be provided by packaging manufacturers and subsequent distributors to the consignor or to the person who prepares the package (e.g. patient) to enable the package to be correctly prepared for transport.

(13) Other dangerous goods shall not be packed in the same packaging as Division 6.2 infectious substances unless they are necessary for maintaining the viability, stabilizing or preventing degradation or neutralizing the hazards of the infectious substances. A quantity of 30 ml or less of dangerous goods included in Classes 3, 8 or 9 may be packed in each primary receptacle containing infectious substances. When these small quantities of dangerous goods are packed with infectious substances in accordance with this packing instruction no other requirements in these Regulations need be met.

Additional requirement:

Alternative packagings for the transport of animal material may be authorized by the competent authority in accordance with the provisions of 4.1.3.7.

P800 **PACKING INSTRUCTION** **P800**

This instruction applies to UN Nos. 2803 and 2809.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.

(2) Steel flasks or bottles with threaded closures with a capacity not exceeding 3 *l*; or

(3) Combination packagings which conform to the following requirements:

(a) Inner packagings shall comprise glass, metal or rigid plastics intended to contain liquids with a maximum net mass of 15 kg each;

(b) The inner packagings shall be packed with sufficient cushioning material to prevent breakage;

(c) Either the inner packagings or the outer packagings shall have inner liners or bags of strong leakproof and puncture-resistant material impervious to the contents and completely surrounding the contents to prevent it from escaping from the package irrespective of its position or orientation;

(d) The following outer packagings and maximum net masses are authorized:

Outer packaging:	**Maximum net mass**
Drums	
steel (1A1, 1A2)	400 kg
metal, other than steel or aluminium (1N1, 1N2)	400 kg
plastics (1H1, 1H2)	400 kg
plywood (1D)	400 kg
fibre (1G)	400 kg
Boxes	
steel (4A)	400 kg
metal, other than steel or aluminium (4N)	400 kg
natural wood (4C1)	250 kg
natural wood with sift proof walls (4C2)	250 kg
plywood (4D)	250 kg
reconstituted wood (4F)	125 kg
fibreboard (4G)	125 kg
expanded plastics (4H1)	60 kg
solid plastics (4H2)	125 kg

Special packing provision:

PP41 For UN 2803, when it is necessary to transport Gallium at low temperatures in order to maintain it in a completely solid state, the above packagings may be overpacked in a strong, water-resistant outer packaging which contains dry ice or other means of refrigeration. If a refrigerant is used, all of the above materials used in the packaging of gallium shall be chemically and physically resistant to the refrigerant and shall have impact resistance at the low temperatures of the refrigerant employed. If dry ice is used, the outer packaging shall permit the release of carbon dioxide gas.

P801	PACKING INSTRUCTION	P801

This instruction applies to UN Nos. 2794, 2795 and 3028.

The following packagings are authorized, provided that the provisions of **4.1.1.1, 4.1.1.2, 4.1.1.6**, and **4.1.3** are met:

(1) Rigid outer packagings, wooden slatted crates or pallets.

Additionally, the following conditions shall be met:

(a) Battery stacks shall be in tiers separated by a layer of electrically non-conductive material;

(b) Battery terminals shall not support the weight of other superimposed elements;

(c) Batteries shall be packaged or secured to prevent inadvertent movement;

(d) Batteries shall not leak under normal conditions of transport or appropriate measures shall be taken to prevent the release of electrolyte from the package (e.g. individually packaging batteries or other equally effective methods); and

(e) Batteries shall be protected against short circuits.

(2) Stainless steel or plastics bins may also be used to transport used batteries.

Additionally, the following conditions shall be met:

(a) The bins shall be resistant to the electrolyte that was contained in the batteries;

(b) The bins shall not be filled to a height greater than the height of their sides;

(c) The outside of the bins shall be free of residues of electrolyte contained in the batteries;

(d) Under normal conditions of transport, no electrolyte shall leak from the bins;

(e) Measures shall be taken to ensure that filled bins cannot lose their content; and

(f) Measures shall be taken to prevent short circuits (e.g. batteries are discharged, individual protection of the battery terminals, etc.).

NOTE: *The packagings authorized in (1) and (2) may exceed a net mass of 400 kg (see 4.1.3.3).*

P802	PACKING INSTRUCTION	P802

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Combination packagings

Outer packagings: 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2; maximum net mass: 75 kg.

Inner packagings: glass or plastics; maximum capacity: 10 litres.

(2) Combination packagings

Outer packagings: 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2; maximum net mass: 125 kg.

Inner packagings: metal; maximum capacity: 40 litres

(3) Composite packagings: Glass receptacle in steel, aluminium or plywood drum (6PA1, 6PB1 or 6PD1) or in a steel, aluminium or wood box or in wickerwork hamper (6PA2, 6PB2, 6PC or 6PD2) or in solid plastics packaging (6PH2); maximum capacity: 60 litres.

(4) Steel drums (1A1) with a maximum capacity of 250 litres.

(5) Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.

Special packing provision:

PP79 For UN 1790 with more than 60 % but not more than 85 % hydrogen fluoride, see P001.

P803	PACKING INSTRUCTION	P803

This instruction applies to UN No. 2028.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

(2) Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H2);

Maximum net mass: 75 kg.

The articles shall be individually packaged and separated from each other using partitions, dividers, inner packagings or cushioning material to prevent inadvertent discharge during normal conditions of transport.

P804	PACKING INSTRUCTION	P804

This instruction applies to UN No. 1744.

The following packagings are authorized provided that the general provisions of 4.1.1 and 4.1.3 are met and the packagings are hermetically sealed:

(1) **Combination packagings** with a maximum gross mass of 25 kg, consisting of

- one or more glass inner packaging(s) with a maximum capacity of 1.3 litres each and filled to not more than 90 % of their capacity; the closure(s) of which shall be physically held in place by any means capable of preventing back-off or loosening by impact or vibration during transport, individually placed in
- metal or rigid plastics receptacles together with cushioning and absorbent material sufficient to absorb the entire contents of the glass inner packaging(s), further packed in
- 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings.

(2) **Combination packagings** consisting of metal or polyvinylidene fluoride (PVDF) inner packagings, not exceeding 5 litres in capacity individually packed with absorbent material sufficient to absorb the contents and inert cushioning material in 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G or 4H2outer packagings with a maximum gross mass of 75 kg. Inner packagings shall not be filled to more than 90 % of their capacity. The closure of each inner packaging shall be physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport;

(3) **Packagings** consisting of:

Outer packagings:

Steel or plastics drums (1A1, 1A2, 1H1 or 1H2) tested in accordance with the test requirements in 6.1.5 at a mass corresponding to the mass of the assembled package either as a packaging intended to contain inner packagings, or as a single packaging intended to contain solids or liquids, and marked accordingly;

Inner packagings:

Drums and composite packagings (1A1, 1B1, 1N1, 1H1 or 6HA1) meeting the requirements of Chapter 6.1 for single packagings, subject to the following conditions:

(a) The hydraulic pressure test shall be conducted at a pressure of at least 300 kPa (3 bar) (gauge pressure);

(b) The design and production leakproofness tests shall be conducted at a test pressure of 30 kPa (0,3 bar);

(c) They shall be isolated from the outer drum by the use of inert shock-mitigating cushioning material which surrounds the inner packaging on all sides;

(d) Their capacity shall not exceed 125 litres;

(e) Closures shall be of a screw type that are:

(i) Physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport;

(ii) Provided with a cap seal;

(f) The outer and inner packagings shall be subjected periodically to an internal inspection and leakproofness test according to (b) at intervals of not more than two and a half years; and

(g) The outer and inner packagings shall bear in clearly legible and durable characters:

(i) the date (month, year) of the initial test and the latest periodic test and inspection of the inner packaging; and

(ii) the name or authorized symbol of the expert performing the tests and inspections;

(4) **Pressure receptacles**, provided that the general provisions of 4.1.3.6 are met.

(a) They shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 1 MPa (10 bar) (gauge pressure);

(b) They shall be subjected periodically to an internal inspection and leakproofness test at intervals of not more than two and a half years;

(c) They may not be equipped with any pressure relief device;

(d) Each pressure receptacle shall be closed with a plug or valve(s) fitted with a secondary closure device; and

(e) The materials of construction for the pressure receptacle, valves, plugs, outlet caps, luting and gaskets shall be compatible with each other and with the contents.

P900	PACKING INSTRUCTION	P900
This instruction applies to UN No. 2216.		
The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met: (1) Packagings according to P002; or (2) Bags (5H1, 5H2, 5H3, 5H4, 5L1, 5L2, 5L3, 5M1 or 5M2) with a maximum net mass of 50 kg. Fish meal may also be transported unpackaged when it is packed in closed cargo transport units and the free air space has been restricted to a minimum.		

P901	PACKING INSTRUCTION	P901
This instruction applies to UN No. 3316.		
The following combination packagings are authorized provided the general provisions of **4.1.1** and **4.1.3** are met: Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2); Jerricans (3A1, 3A2, 3B1, 3B2, 3H1, 3H2). Packagings shall conform to the performance level consistent with the packing group assigned to the kit as a whole (see 3.3.1, special provision 251). Where the kit contains only dangerous goods to which no packing group is assigned, packagings shall meet packing group II performance level. Maximum quantity of dangerous goods per outer packaging: 10 kg excluding the mass of any carbon dioxide, solid (dry ice) used as a refrigerant.		
Additional requirement: Dangerous goods in kits shall be packed in inner packagings which shall be protected from other materials in the kit.		

P902	PACKING INSTRUCTION	P902
This instruction applies to UN No. 3268.		
Packaged articles: The following packagings are authorized provided the general provisions of 4.1.1 and 4.1.3 are met: Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G); Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2); Jerricans (3A2, 3B2, 3H2). Packagings shall conform to the packing group III performance level. The packagings shall be designed and constructed so as to prevent movement of the articles and inadvertent operation during normal conditions of transport. **Unpackaged articles:** The articles may also be transported unpackaged in dedicated handling devices, vehicles or containers when moved to, from, or between where they are manufactured and an assembly plant including intermediate handling locations.		
Additional requirement: Any pressure receptacle shall be in accordance with the requirements of the competent authority for the substance(s) contained therein.		

P903	PACKING INSTRUCTION	P903

This instruction applies to UN Nos. 3090, 3091, 3480 and 3481.

For the purpose of this packing instruction, "equipment" means apparatus for which the lithium cells or batteries will provide electrical power for its operation. The following packagings are authorized provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) For cells and batteries:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

Cells or batteries shall be packed in packagings so that the cells or batteries are protected against damage that may be caused by the movement or placement of the cells or batteries within the packaging.

Packagings shall conform to the packing group II performance level.

(2) In addition, for a cell or a battery with a gross mass of 12 kg or more employing a strong, impact resistant outer casing:

(a) Strong outer packagings;

(b) Protective enclosures (e.g., fully enclosed or wooden slatted crates); or

(c) Pallets or other handling devices.

Cells or batteries shall be secured to prevent inadvertent movement, and the terminals shall not support the weight of other superimposed elements.

Packagings need not meet the requirements of 4.1.1.3.

(3) For cells or batteries packed with equipment:

Packagings conforming to the requirements in paragraph (1) of this packing instruction, then placed with the equipment in an outer packaging; or

Packagings that completely enclose the cells or batteries, then placed with equipment in a packaging conforming to the requirements in paragraph (1) of this packing instruction.

The equipment shall be secured against movement within the outer packaging.

(4) For cells or batteries contained in equipment:

Strong outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use. They shall be constructed in such a manner as to prevent accidental operation during transport. Packagings need not meet the requirements of 4.1.1.3.

Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

When intentionally active, devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported in strong outer packagings. When active, these devices shall meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

(5) For packagings containing both cells or batteries packed with equipment and contained in equipment:

(a) For cells and batteries, packagings that completely enclose the cells or batteries, then placed with equipment in a packaging conforming to the requirements in paragraph (1) of this packing instruction; or

(b) Packagings conforming to the requirements in paragraph (1) of this packing instruction, then placed with the equipment in a strong outer packaging constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use. The outer packaging shall be constructed in such a manner as to prevent accidental operation during transport and need not meet the requirements of 4.1.1.3.

The equipment shall be secured against movement within the outer packaging.

When intentionally active, devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported in strong outer packagings. When active, these devices shall meet defined standards for electromagnetic radiation to ensure that the operation of the devices does not interfere with aircraft systems.

NOTE: *The packagings authorized in (2), (4) and (5) may exceed a net mass of 400 kg (see 4.1.3.3).*

Additional requirement:

Cells or batteries shall be protected against short circuit.

P904	PACKING INSTRUCTION	P904

This instruction applies to UN No. 3245.

The following packagings are authorized:

(1) Packagings meeting the provisions of 4.1.1.1, 4.1.1.2, 4.1.1.4, 4.1.1.8 and 4.1.3 and so designed that they meet the construction requirements of 6.1.4. Outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, shall be used. Where this packing instruction is used for the transport of inner packagings of combination packagings the packaging shall be designed and constructed to prevent inadvertent discharge during normal conditions of transport.

(2) Packagings, which need not conform to the packaging test requirements of Part 6, but conforming to the following:

(a) An inner packaging comprising:

(i) primary receptacle(s) and a secondary packaging, the primary receptacle(s) or the secondary packaging shall be leakproof for liquids or siftproof for solids;

(ii) for liquids, absorbent material placed between the primary receptacle(s) and the secondary packaging. The absorbent material shall be in a quantity sufficient to absorb the entire contents of the primary receptacle(s) so that any release of the liquid substance will not compromise the integrity of the cushioning material or of the outer packaging;

(iii) if multiple fragile primary receptacles are placed in a single secondary packaging they shall be individually wrapped or separated to prevent contact between them;

(b) An outer packaging shall be strong enough for its capacity, mass and intended use, and with a smallest external dimension of at least 100 mm.

For transport, the mark illustrated below shall be displayed on the external surface of the outer packaging on a background of a contrasting colour and shall be clearly visible and legible. The mark shall be in the form of a square set at an angle of 45° (diamond-shaped) with each side having a length of at least 50 mm; the width of the line shall be at least 2 mm and the letters and numbers shall be at least 6 mm high.

NOTE: *The mark shown in paragraph (2) of Packing Instruction P904 of the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016.*

Additional requirement:

Ice, dry ice and liquid nitrogen

When dry ice or liquid nitrogen is used as a coolant, the requirements of 5.5.3 shall apply. When used, ice shall be placed outside the secondary packagings or in the outer packaging or an overpack. Interior supports shall be provided to secure the secondary packaging in the original position. If ice is used, the outside packaging or overpack shall be leakproof.

P905	PACKING INSTRUCTION	P905

This instruction applies to UN Nos. 3072 and 2990.

Any suitable packaging is authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met, except that packagings need not conform to the requirements of Part 6.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

When the life saving appliances are constructed to incorporate or are contained in rigid outer weatherproof casings (such as for lifeboats), they may be transported unpackaged.

Additional requirements:

1. All dangerous substances and articles contained as equipment within the appliances shall be secured to prevent inadvertent movement and in addition:
   (a) Signal devices of Class 1 shall be packed in plastics or fibreboard inner packagings;
   (b) Gases (Division 2.2) shall be contained in cylinders as specified by the competent authority, which may be connected to the appliance;
   (c) Electric storage batteries (Class 8) and lithium batteries (Class 9) shall be disconnected or electrically isolated and secured to prevent any spillage of liquid; and
   (d) Small quantities of other dangerous substances (for example in Class 3 or Divisions 4.1 and 5.2) shall be packed in strong inner packagings.
2. Preparation for transport and packaging shall include provisions to prevent any accidental inflation of the appliance.

P906	PACKING INSTRUCTION	P906

This instruction applies to UN Nos. 2315, 3151, 3152 and 3432.

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) For liquids and solids containing or contaminated with PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes: Packagings in accordance with P001 or P002, as appropriate.

(2) For transformers and condensers and other articles:

   (a) Packagings in accordance with packing instructions P001 or P002. The articles shall be secured with suitable cushioning material to prevent inadvertent movement during normal conditions of transport; or

   (b) Leakproof packagings which are capable of containing, in addition to the articles, at least 1.25 times the volume of the liquid PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes present in them. There shall be sufficient absorbent material in the packagings to absorb at least 1.1 times the volume of liquid which is contained in the articles. In general, transformers and condensers shall be carried in leakproof metal packagings which are capable of holding, in addition to the transformers and condensers, at least 1.25 times the volume of the liquid present in them.

   NOTE 1: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

Notwithstanding the above, liquids and solids not packaged in accordance with P001 and P002 and unpackaged transformers and condensers may be transported in cargo transport units fitted with a leakproof metal tray to a height of at least 800 mm, containing sufficient inert absorbent material to absorb at least 1.1 times the volume of any free liquid.

NOTE 2: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

Additional requirement:

Adequate provisions shall be taken to seal the transformers and condensers to prevent leakage during normal conditions of transport.

P907	PACKING INSTRUCTION	P907

This packing instruction applies to articles such as machinery, apparatus or devices of UN 3363.

If the article is constructed and designed so that the receptacles containing the dangerous goods are afforded adequate protection, an outer packaging is not required. Dangerous goods in an article shall otherwise be packed in outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, and meeting the applicable requirements of **4.1.1.1.**

Receptacles containing dangerous goods shall conform to the general provisions in 4.1.1, except that 4.1.1.3, 4.1.1.4, 4.1.1.12 and 4.1.1.14 do not apply. For Division 2.2 gases, the inner cylinder or receptacle, its contents and filling ratio shall be to the satisfaction of the competent authority of the country in which the cylinder or receptacle is filled.

In addition, the manner in which receptacles are contained within the article, shall be such that under normal conditions of transport, damage to receptacles containing the dangerous goods is unlikely; and in the event of damage to receptacles containing solid or liquid dangerous goods, no leakage of the dangerous goods from the article is possible (a leakproof liner may be used to satisfy this requirement). Receptacles containing dangerous goods shall be so installed, secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the article during normal conditions of transport. Cushioning material shall not react dangerously with the content of the receptacles. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

P908	PACKING INSTRUCTION	P908

This instruction applies to damaged or defective lithium ion cells and batteries and damaged or defective lithium metal cells and batteries, including those contained in equipment, of UN Nos. 3090, 3091, 3480 and 3481.

The following packagings are authorized provided the general provisions of 4.1.1 and 4.1.3 are met:

For cells and batteries and equipment containing cells and batteries:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G)

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2)

Jerricans (3A2, 3B2, 3H2)

Packagings shall conform to the packing group II performance level.

1. Each damaged or defective cell or battery or equipment containing such cells or batteries shall be individually packed in inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging shall be leak-proof to prevent the potential release of electrolyte.
2. Each inner packaging shall be surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat.
3. Sealed packagings shall be fitted with a venting device when appropriate.
4. Appropriate measures shall be taken to minimize the effects of vibrations and shocks, prevent movement of the cells or batteries within the package that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may also be used to meet this requirement.
5. Non combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured.

For leaking cells or batteries, sufficient inert absorbent material shall be added to the inner or outer packaging to absorb any release of electrolyte.

A cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging.

Additional requirements:

Cells or batteries shall be protected against short circuit.

P909	PACKING INSTRUCTION	P909

This packing instruction applies to UN Nos. 3090, 3091, 3480 and 3481 transported for disposal or recycling, either packed together with or packed without non-lithium batteries:

(1) Cells and batteries shall be packed in accordance with the following:

(a) The following packagings are authorized, provided that the general provisions of 4.1.1 and 4.1.3, are met:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H2); and

Jerricans (3A2, 3B2, 3H2).

(b) Packagings shall conform to the packing group II performance level.

(c) Metal packagings shall be fitted with an electrically non-conductive lining material (e.g., plastics) of adequate strength for the intended use.

(2) However, lithium ion cells with a Watt-hour rating of not more than 20 Wh, lithium ion batteries with a Watt-hour rating of not more than 100 Wh, lithium metal cells with a lithium content of not more than 1 g and lithium metal batteries with an aggregate lithium content of not more than 2 g may be packed in accordance with the following:

(a) In strong outer packaging up to 30 kg gross mass meeting the general provisions of 4.1.1, except 4.1.1.3, and 4.1.3.

(b) Metal packagings shall be fitted with a electrically non-conductive lining material (e.g., plastics) of adequate strength for the intended use.

(3) For cells or batteries contained in equipment, strong outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, may be used. Packagings need not meet the requirements of 4.1.1.3. Equipment may also be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

(4) In addition, for cells or batteries with a gross mass of 12 kg or more employing a strong, impact resistant outer casing, strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packagings capacity and its intended use, may be used. Packagings need not meet the requirements of 4.1.1.3.

NOTE: *The packagings authorized in (3) and (4) may exceed a net mass of 400 kg (see 4.1.3.3).*

Additional requirements:

1. Cells and batteries shall be designed or packed to prevent short circuits and the dangerous evolution of heat.
2. Protection against short circuits and the dangerous evolution of heat includes, but is not limited to,
   - individual protection of the battery terminals,
   - inner packaging to prevent contact between cells and batteries,
   - batteries with recessed terminals designed to protect against short circuits, or
   - the use of an electrically non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.
3. Cells and batteries shall be secured within the outer packaging to prevent excessive movement during transport (e.g. by using a non-combustible and electrically non-conductive cushioning material or through the use of a tightly closed plastics bag).

P910	PACKING INSTRUCTION	P910

This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.

The following packagings are authorized provided that the general provisions of 4.1.1 and 4.1.3 are met:

(1) For cells and batteries, including when packed with equipment:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

Packagings shall conform to the packing group II performance level and shall meet the following requirements:

(a) Batteries and cells, including equipment, of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;

(b) Each cell or battery shall be individually packed in an inner packaging and placed inside an outer packaging;

(c) Each inner packaging shall be completely surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat;

(d) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may be used to meet this requirement;

(e) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured;

(f) A cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging.

(2) For cells and batteries contained in equipment:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2).

Packagings shall conform to the packing group II performance level and shall meet the following requirements:

(a) Equipment of different sizes, shapes or masses shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;

(b) The equipment shall be constructed or packaged in such a manner as to prevent accidental operation during transport;

(c) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and electrically non-conductive; and

(d) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured.

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P910	PACKING INSTRUCTION *(cont'd)*	P910

(3) The equipment or the batteries may be transported unpackaged under conditions specified by the competent authority. Additional conditions that may be considered in the approval process include, but are not limited to:

(a) The equipment or the battery shall be strong enough to withstand the shocks and loadings normally encountered during transport, including transshipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet for subsequent manual or mechanical handling; and

(b) The equipment or the battery shall be fixed in cradles or crates or other handling devices in such a way that it will not become loose during normal conditions of transport.

NOTE: *The packagings authorized may exceed a net mass of 400 kg (see 4.1.3.3).*

Additional requirements:

The cells and batteries shall be protected against short circuit;

Protection against short circuits includes, but is not limited to:

- individual protection of the battery terminals,
- inner packaging to prevent contact between cells and batteries,
- batteries with recessed terminals designed to protect against short circuits, or
- the use of a electrically non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.

P911	PACKING INSTRUCTION	P911

This instruction applies to damaged or defective cells and batteries of UN Nos. 3090, 3091, 3480 and 3481 liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours under normal conditions of transport.

The following packagings are authorized, provided that the general provisions of 4.1.1 and 4.1.3 are met:

For cells and batteries and equipment containing cells and batteries:

Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);

Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);

Jerricans (3A2, 3B2, 3H2)

The packagings shall conform to the packing group I performance level.

(1) The packaging shall be capable of meeting the following additional performance requirements in case of rapid disassembly, dangerous reaction, production of a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours of the cells or batteries:

(a) The outside surface temperature of the completed package shall not have a temperature of more than 100°C. A momentary spike in temperature up to 200 °C is acceptable;

(b) No flame shall occur outside the package;

(c) No projectiles shall exit the package;

(d) The structural integrity of the package shall be maintained

(e) The packagings shall have a gas management system (e.g. filter system, air circulation, containment for gas, gas tight packaging etc.), as appropriate.

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P911	PACKING INSTRUCTION *(cont'd)*	P911

(2) The additional packaging performance requirements shall be verified by a test as specified by the competent authority[a].

A verification report shall be available on request. As a minimum requirement, the cell or battery name, the cell or battery number, the mass, type, energy content of the cells or batteries, the packaging identification and the test data according to the verification method as specified by the competent authority shall be listed in the verification report

(3) When dry ice or liquid nitrogen is used as a coolant, the requirements of section 5.5.3 shall apply. The inner packaging and outer packaging shall maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.

Additional requirement:

Cells or batteries shall be protected against short circuit.

[a] *The following criteria, as relevant, may be considered to assess the performance of the packaging:*

(a) The assessment shall be done under a quality management system (as described e.g. in section 2.9.4 (e)) allowing for the traceability of tests results, reference data and characterization models used;

(b) The list of hazards expected in case of thermal runaway for the cell or battery type, in the condition it is transported (e.g. usage of an inner packaging, state of charge (SOC), use of sufficient non-combustible, electrically non-conductive and absorbent cushioning material etc.), shall be clearly identified and quantified; the reference list of possible hazards for lithium cells or batteries (rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours) can be used for this purpose. The quantification of these hazards shall rely on available scientific literature;

(c) The mitigating effects of the packaging shall be identified and characterized, based on the nature of the protections provided and the construction material properties. A list of technical characteristics and drawings shall be used to support this assessment (Density [$kg \cdot m^{-3}$], specific heat capacity [$J \cdot kg^{-1} \cdot K^{-1}$], heating value [$kJ \cdot kg^{-1}$], thermal conductivity [$W \cdot m^{-1} \cdot K^{-1}$], melting temperature and flammability temperature [K], heat transfer coefficient of the outer packaging [$W \cdot m^{-2} \cdot K^{-1}$], ...);

(d) The test and any supporting calculations shall assess the result of a thermal run-away of the cell or battery inside the packaging in the normal conditions of transport;

(e) In case the SOC of the cell or battery is not known, the assessment used, shall be done with the highest possible SOC corresponding to the cell or battery use conditions;

(f) The surrounding conditions in which the packaging may be used and transported shall be described (including for possible consequences of gas or smoke emissions on the environment, such as ventilation or other methods) according to the gas management system of the packaging;

(g) The tests or the model calculation shall consider the worst case scenario for the thermal runaway triggering and propagation inside the cell or battery: this scenario includes the worst possible failure in the normal transport condition, the maximum heat and flame emissions for the possible propagation of the reaction;

(h) These scenarios shall be assessed over a period of time long enough to allow all the possible consequences to occur (e.g. 24 hours).

(i) In the case of multiple batteries and multiple items of equipment containing batteries, additional requirements such as the maximum number of batteries and items of equipment, the total maximum energy content of the batteries, and the configuration inside the package, including separations and protections of the parts, shall be considered.

4.1.4.2 *Packing instructions concerning the use of IBCs*

IBC01	PACKING INSTRUCTION	IBC01
The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: Metal (31A, 31B and 31N).		

IBC02	PACKING INSTRUCTION	IBC02
The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: (1) Metal (31A, 31B and 31N); (2) Rigid plastics (31H1 and 31H2); (3) Composite (31HZ1).		
Special packing provisions: **B5** For UN Nos. 1791, 2014, 2984 and 3149, IBCs shall be provided with a device to allow venting during transport. The inlet to the venting device shall be sited in the vapour space of the IBC under maximum filling conditions during transport. **B7** For UN Nos. 1222 and 1865, IBCs with a capacity greater than 450 litres are not permitted due to the substance's potential for explosion when transported in large volumes. **B8** The pure form of this substance shall not be transported in IBCs since it is known to have a vapour pressure of more than 110 kPa at 50 °C or 130 kPa at 55 °C. **B15** For UN 2031 with more than 55 % nitric acid, the permitted use of rigid plastics IBCs and of rigid plastics inner receptacles of composite IBCs shall be two years from their date of manufacture. **B16** For UN 3375, IBCs of type 31A and 31N are not allowed without competent authority approval.		

IBC03	PACKING INSTRUCTION	IBC03
The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: (1) Metal (31A, 31B and 31N); (2) Rigid plastics (31H1 and 31H2); (3) Composite (31HZ1 and 31HA2, 31HB2, 31HN2, 31HD2 and 31HH2).		
Special packing provisions: **B8** The pure form of this substance shall not be transported in IBCs since it is known to have a vapour pressure of more than 110 kPa at 50 °C or 130 kPa at 55 °C. **B11** Notwithstanding the provisions of 4.1.1.10, UN 2672 ammonia solution in concentrations not exceeding 25 % may be transported in rigid or composite plastics IBCs (31H1, 31H2 and 31HZ1). **B19** For UN Nos. 3532 and 3534, IBCs shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization.		

IBC04	PACKING INSTRUCTION	IBC04
The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N).		
Special packing provision: **B1** For packing group I substances, IBCs shall be transported in closed cargo transport units.		

IBC05	PACKING INSTRUCTION	IBC05
The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: (1) Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); (2) Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); (3) Composite (11HZ1, 21HZ1 and 31HZ1).		
Special packing provisions: **B1** For packing group I substances, IBCs shall be transported in closed cargo transport units. **B2** For solid substances in IBCs other than metal or rigid plastics IBCs, the IBCs shall be transported in closed cargo transport units.		

IBC06	PACKING INSTRUCTION	IBC06
The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: (1) Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); (2) Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); (3) Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2 and 31HZ1).		
Additional requirement: Where the solid may become liquid during transport see 4.1.3.4.		
Special packing provisions: **B1** For packing group I substances, IBCs shall be transported in closed cargo transport units. **B2** For solid substances in IBCs other than metal or rigid plastics IBCs, the IBCs shall be transported in closed cargo transport units. **B12** For UN 2907, IBCs shall meet the packing group II performance level. IBCs meeting the test criteria of packing group I shall not be used.		

IBC07	PACKING INSTRUCTION	IBC07
The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: (1) Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); (2) Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); (3) Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2 and 31HZ1); (4) Wooden (11C, 11D and 11F).		
Additional requirements: 1. Where the solid may become liquid during transport see 4.1.3.4. 2. Liners of wooden IBCs shall be siftproof.		
Special packing provisions: **B1** For packing group I substances, IBCs shall be transported in closed cargo transport units. **B2** For solid substances in IBCs other than metal or rigid plastics IBCs, the IBCs shall be transported in closed cargo transport units. **B18** For UN Nos. 3531 and 3533, IBCs shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization. **B20** UN 3550 may be transported in flexible IBCs (13H3 or 13H4) with siftproof liners to prevent any egress of dust during transport.		

IBC08	PACKING INSTRUCTION	IBC08

The following IBCs are authorized, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met:

(1) Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N);
(2) Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2);
(3) Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2 and 31HZ1);
(4) Fibreboard (11G);
(5) Wooden (11C, 11D and 11F);
(6) Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).

Additional requirement:

Where the solid may become liquid during transport see 4.1.3.4.

Special packing provisions:

B2 For solid substances in IBCs other than metal or rigid plastics IBCs, the IBCs shall be transported in closed cargo transport units.

B3 Flexible IBCs shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.

B4 Flexible, fibreboard or wooden IBCs shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.

B6 For UN Nos. 1327, 1363, 1364, 1365, 1386, 1408, 1841, 2211, 2217, 2793 and 3314, IBCs are not required to meet the IBC testing requirements of Chapter 6.5.

B13 For UN Nos. 1748, 2208, 2880, 3485, 3486 and 3487, transport by sea in IBCs is prohibited.

IBC99	PACKING INSTRUCTION	IBC99

Only IBCs which are approved by the competent authority for these goods may be used (see 4.1.3.7). A copy of the competent authority approval shall accompany each consignment or the transport document shall include an indication that the packaging was approved by the competent authority.

IBC100	PACKING INSTRUCTION	IBC100

This instruction applies to UN Nos. 0082, 0222, 0241, 0331 and 0332.

The following IBCs are authorized, provided that the general provisions of 4.1.1, 4.1.2 and 4.1.3 and special provisions of 4.1.5 are met:

(1) Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N);
(2) Flexible (13H2, 13H3, 13H4, 13L2, 13L3, 13L4 and 13M2);
(3) Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1,and 31H2);
(4) Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2).

Additional requirements:

1. IBCs shall only be used for free flowing substances.
2. Flexible IBCs shall only be used for solids.

Special packing provisions:

B2 For UN No. 0222 in IBCs other than metal or rigid plastics IBCs, the IBCs shall be transported in closed cargo transport units.

B3 For UN No. 0222, flexible IBCs shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.

B9 For UN 0082, this packing instruction may only be used when the substances are mixtures of ammonium nitrate or other inorganic nitrates with other combustible substances which are not explosive ingredients. Such explosives shall not contain nitroglycerin, similar liquid organic nitrates, or chlorates. Metal IBCs are not authorized.

B10 For UN 0241, this packing instruction may only be used for substances which consist of water as an essential ingredient and high proportions of ammonium nitrate or other oxidizing substances some or all of which are in solution. The other constituents may include hydrocarbons or aluminium powder, but shall not include nitro-derivatives such as trinitrotoluene. Metal IBCs are not authorized.

B17 For UN No. 0222, metal IBCs are not authorized.

IBC520	PACKING INSTRUCTION				IBC520
This instruction applies to organic peroxides and self-reactive substances of type F.					
The IBCs listed below are authorized for the formulations listed, provided that the general provisions of **4.1.1**, **4.1.2** and **4.1.3** and special provisions of **4.1.7.2** are met. The formulations not listed in 2.4.2.3.2.3 and 2.5.3.2.4 but listed below may also be transported packed in accordance with packing method OP8 of packing instruction P520 of 4.1.4.1, with the same control and emergency temperatures, if applicable. For formulations not listed below, only IBCs which are approved by the competent authority may be used (see 4.1.7.2.2).					
UN No.	**Organic peroxide**	**Type of IBC**	**Maximum quantity (litres)**	**Control temperature**	**Emergency temperature**
3109	**ORGANIC PEROXIDE, TYPE F, LIQUID**				
	tert-Butyl cumyl peroxide	31HA1	1000		
	tert-Butyl hydroperoxide, not more than 72 % with water	31A	1 250		
		31HA1	1 000		
	tert-Butyl peroxyacetate, not more than 32 % in diluent type A	31A 31HA1	1 250 1 000		
	tert-Butyl peroxybenzoate, not more than 32 % in diluent type A	31A	1 250		
	tert-Butyl peroxy-3,5,5-trimethylhexanoate, not more than 37 % in diluent type A	31A 31HA1	1 250 1 000		
	Cumyl hydroperoxide, not more than 90 % in diluent type A	31HA1	1 250		
	Dibenzoyl peroxide, not more than 42 % as a stable dispersion	31H1	1 000		
	2,5-Dimethyl-2,5-di(tert-butylperoxy)hexane, not more than 52 % in diluent type A	31HA1	1 000		
	Di-tert-butyl peroxide, not more than 52 % in diluent type A	31A 31HA1	1 250 1 000		
	1,1-Di-(tert-butylperoxy)cyclohexane, not more than 37 % in diluent type A	31A	1 250		
	1,1-Di-(tert-butylperoxy)cyclohexane, not more than 42 % in diluent type A	31H1	1 000		
	Dilauroyl peroxide, not more than 42 %, stable dispersion, in water	31HA1	1 000		
	Isopropylcumyl hydroperoxide, not more than 72 % in diluent type A	31HA1	1 250		
	p-Menthyl hydroperoxide, not more than 72 % in diluent type A	31HA1	1 250		
	Peroxyacetic acid, stabilized, not more than 17 %	31H1 31H2 31HA1 31A	1 500 1 500 1 500 1 500		
	3,6,9-Triethyl-3,6,9-trimethyl-1,4,7-triperoxonane, not more than 27 % in diluent type A	31HA1	1 000		
3110	**ORGANIC PEROXIDE, TYPE F, SOLID**				
	Dicumyl peroxide	31A 31H 31HA1	2 000		

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IBC520	PACKING INSTRUCTION *(cont'd)*				IBC520
UN No.	**Organic peroxide**	**Type of IBC**	**Maximum quantity (litres)**	**Control temperature**	**Emergency temperature**
3119	ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED				
	tert-Amyl peroxy-2-ethylhexanoate, not more than 62 % in diluent type A	31HA1	1 000	+15 °C	+20 °C
	tert-Amyl peroxypivalate, not more than 32 % in diluent type A	31A	1 250	+10 °C	+15 °C
	tert-Amyl peroxypivalate, not more than 42 % as a stable dispersion in water	31HA1	1 050	0 °C	+10 °C
	tert-Butyl peroxy-2-ethylhexanoate, not more than 32 % in diluent type B	31HA1 31A	1 000 1 250	+30 °C +30 °C	+35 °C +35 °C
	tert-Butyl peroxyneodecanoate, not more than 32 % in diluent type A	31A	1 250	0 °C	+10 °C
	tert-Butyl peroxyneodecanoate, not more than 42 % stable dispersion, in water	31A	1 250	- 5 °C	+5 °C
	tert-Butyl peroxyneodecanoate, not more than 52 %, stable dispersion, in water	31A	1 250	-5 °C	+5 °C
	tert-Butyl peroxypivalate, not more than 27 % in diluent type B	31HA1 31A	1 000 1 250	+10 °C +10 °C	+15 °C +15 °C
	tert-Butyl peroxypivalate, not more than 42 % in diluent type A	31HA1 31A	1 000 1 250	+10 °C +10 °C	+15 °C +15 °C
	Cumyl peroxyneodecanoate, not more than 52 %, stable dispersion, in water	31A	1 250	- 15 °C	- 5 °C
	Di-(4-tert-butylcyclohexyl) peroxydicarbonate, not more than 42 %, stable dispersion, in water	31HA1	1 000	+30 °C	+35 °C
	Dicetyl peroxydicarbonate, not more than 42 %, stable dispersion, in water	31HA1	1 000	+30 °C	+35 °C
	Dicyclohexylperoxydicarbonate, not more than 42 % as a stable dispersion, in water	31A	1 250	+10 °C	+15 °C
	Di-(2-ethylhexyl) peroxydicarbonate, not more than 62 %, stable dispersion, in water	31A 31HA1	1 250 1000	-20 °C -20 ºC	-10 °C -10 ºC
	Diisobutyryl peroxide, not more than 28 % as a stable dispersion in water	31HA1 31A	1 000 1 250	-20 ºC -20 ºC	-10 ºC -10 ºC
	Diisobutyryl peroxide, not more than 42 % as a stable dispersion in water	31HA1 31A	1 000 1 250	-25 ºC -25 ºC	-15 ºC -15 ºC
	Dimyristyl peroxydicarbonate, not more than 42 %, stable dispersion, in water	31HA1	1 000	+15 °C	+20 °C
	Di-(2-neodecanoylperoxyisopropyl) benzene, not more than 42 %, stable dispersion, in water	31A	1 250	-15 °C	-5 °C
	Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 52 % in diluent type A	31HA1 31A	1 000 1 250	+10 °C +10 °C	+15 °C +15 °C
	Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 52 %, stable dispersion, in water	31A	1 250	+10 °C	+15 °C
	3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate, not more than 52 %, stable dispersion, in water	31A	1 250	-15 °C	-5 °C
	1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate, not more than 67 %, in diluent type A	31HA1	1000	+15 ºC	+20 ºC
	1,1,3,3-Tetramethylbutyl peroxyneodecanoate, not more than 52 %, stable dispersion, in water	31A 31HA1	1 250 1 000	-5 °C -5 °C	+5 °C +5 °C
3120	**ORGANIC PEROXIDE, TYPE F, SOLID, TEMPERATURE CONTROLLED**				

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IBC520	PACKING INSTRUCTION *(cont'd)*	IBC520

Additional requirements:

1. IBCs shall be provided with a device to allow venting during transport. The inlet to the pressure-relief device shall be sited in the vapour space of the IBC under maximum filling conditions during transport.
2. To prevent explosive rupture of metal IBCs or composite IBCs with complete metal casing, the emergency-relief devices shall be designed to vent all the decomposition products and vapours evolved during self-accelerating decomposition or during a period of not less than one hour of complete fire-engulfment as calculated by the formula in 4.2.1.13.8. The control and emergency temperatures specified in this packing instruction are based on a non-insulated IBC. When consigning an organic peroxide in an IBC in accordance with this instruction, it is the responsibility of the consignor to ensure that:
   (a) the pressure and emergency relief devices installed on the IBC are designed to take appropriate account of the self-accelerating decomposition of the organic peroxide and of fire-engulfment; and
   (b) when applicable, the control and emergency temperatures indicated are appropriate, taking into account the design (e.g. insulation) of the IBC to be used.

IBC620	PACKING INSTRUCTION	IBC620

This instruction applies to UN No. 3291.

The following IBCs are authorized, provided that the general provisions of **4.1.1**, except 4.1.1.15, **4.1.2** and **4.1.3** are met:
Rigid, leakproof IBCs conforming to the packing group II performance level.

Additional requirements:

1. There shall be sufficient absorbent material to absorb the entire amount of liquid present in the IBC.
2. IBCs shall be capable of retaining liquids.
3. IBCs intended to contain sharp objects such as broken glass and needles shall be resistant to puncture.

4.1.4.3 *Packing instructions concerning the use of large packagings*

LP01	**PACKING INSTRUCTION (LIQUIDS)**			**LP01**
The following large packagings are authorized provided that the general provision of **4.1.1** and **4.1.3** are met:				
Inner packagings	**Large outer packagings**	**Packing group I**	**Packing group II**	**Packing group III**
Glass 10 litre Plastics 30 litre Metal 40 litre	steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) natural wood (50C) plywood (50D) reconstituted wood (50F) rigid fibreboard (50G)	Not allowed	Not allowed	Maximum capacity: 3 m^3

LP02	**PACKING INSTRUCTION (SOLIDS)**			**LP02**
The following large packagings are authorized provided that the general provision of **4.1.1** and **4.1.3** are met:				
Inner packagings	**Large outer packagings**	**Packing group I**	**Packing group II**	**Packing group III**
Glass 10 kg Plastics[b] 50 kg Metal 50 kg Paper[a, b] 50 kg Fibre[a, b] 50 kg	steel (50A) aluminium (50B) metal other than steel or aluminium (50N) flexible plastics (51H) [c] rigid plastics (50H) natural wood (50C) plywood (50D) reconstituted wood (50F) rigid fibreboard (50G)	Not allowed	Not allowed	Maximum capacity: 3 m^3
[a] *These packagings shall not be used when the substances being transported may become liquid during transport.* [b] *Packagings shall be siftproof.* [c] *To be used with flexible inner packagings only.*				
Special packing provisions: **L2** *Deleted* **L3** For UN Nos. 2208 and 3486, transport by sea in large packagings is prohibited.				

LP03	PACKING INSTRUCTION	LP03

This instruction applies to UN Nos. 3537, 3538, 3540, 3541, 3546, 3547 and 3548.

(1) The following large packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Rigid large packagings conforming to the packing group II performance level made of:

steel (50A);
aluminium (50B);
metal other than steel or aluminium (50N);
rigid plastics (50H);
natural wood (50C);
plywood (50D);
reconstituted wood (50F);
rigid fibreboard (50G).

(2) Additionally, the following conditions shall be met:

(a) Receptacles within articles containing liquids or solids shall be constructed of suitable materials and secured in the article in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the article itself or the outer packaging;

(b) Receptacles containing liquids with closures shall be packed with their closures correctly oriented. The receptacles shall in addition conform to the internal pressure test provisions of 6.1.5.5;

(c) Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials shall be properly secured. Any leakage of the contents shall not substantially impair the protective properties of the article or of the outer packaging;

(d) Receptacles within articles containing gases shall meet the requirements of Section 4.1.6 and Chapter 6.2 as appropriate or be capable of providing an equivalent level of protection as packing instructions P200 or P208; and

(e) Where there is no receptacle within the article, the article shall fully enclose the dangerous substances and prevent their release under normal conditions of transport.

(3) Articles shall be packed to prevent movement and inadvertent operation during normal conditions of transport.

LP99	PACKING INSTRUCTION	LP99

Only large packagings which are approved by the Competent Authority for these goods may be used (see 4.1.3.7). A copy of the competent authority approval shall accompany each consignment or the transport document shall include an indication that the packaging was approved by the competent authority.

LP101	PACKING INSTRUCTION	LP101
The following large packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** and special provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Large packagings**
Not necessary	Not necessary	steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) natural wood (50C) plywood (50D) reconstituted wood (50F) rigid fibreboard (50G)
Special packing provision: **L1** For UN Nos. 0006, 0009, 0010, 0015, 0016, 0018, 0019, 0034, 0035, 0038, 0039, 0048, 0056, 0137, 0138, 0168, 0169, 0171, 0181, 0182, 0183, 0186, 0221, 0243, 0244, 0245, 0246, 0254, 0280, 0281, 0286, 0287, 0297, 0299, 0300, 0301, 0303, 0321, 0328, 0329, 0344, 0345, 0346, 0347, 0362, 0363, 0370, 0412, 0424, 0425, 0434, 0435, 0436, 0437, 0438, 0451, 0488, 0502 and 0510: Large and robust explosives articles, normally intended for military use, without their means of initiation or with their means of initiation containing at least two effective protective features, may be carried unpackaged. When such articles have propelling charges or are self-propelled, their ignition systems shall be protected against stimuli encountered during normal conditions of transport. A negative result in test series 4 on an unpackaged article indicates that the article can be considered for transport unpackaged. Such unpackaged articles may be fixed to cradles or contained in crates or other suitable handling devices.		

LP102	PACKING INSTRUCTION	LP102
The following large packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** and special provisions of **4.1.5** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
Bags water-resistant **Receptacles** fibreboard metal plastics wood **Sheets** fibreboard, corrugated **Tubes** fibreboard	Not necessary	steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) natural wood (50C) plywood (50D) reconstituted wood (50F) rigid fibreboard (50G)

LP200	PACKING INSTRUCTION	LP200

This instruction applies to UN 1950 and UN 2037.

The following large packagings are authorized for aerosols and gas cartridges, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Rigid large packagings conforming to the packing group II performance level, made of:

steel (50A);
aluminium (50B);
metal other than steel or aluminium (50N);
rigid plastics (50H);
natural wood (50C);
plywood (50D);
reconstituted wood (50F);
rigid fibreboard (50G).

Special packing provision

L2 The large packagings shall be designed and constructed to prevent dangerous movement and inadvertent discharge during normal conditions of transport. For waste aerosols transported in accordance with special provision 327, the large packagings shall have a means of retaining any free liquid that might escape during transport, e.g. absorbent material. For waste aerosols and waste gas cartridges carried in accordance with special provision 327, the large packagings shall be adequately ventilated to prevent the creation of dangerous atmospheres and the build-up of pressure.

LP621	PACKING INSTRUCTION	LP621

This instruction applies to UN 3291.

The following large packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) For clinical waste placed in inner packagings: Rigid, leakproof large packagings conforming to the requirements of Chapter 6.6 for solids, at the packing group II performance level, provided that there is sufficient absorbent material to absorb the entire amount of liquid present and the large packaging is capable of retaining liquids.

(2) For packages containing larger quantities of liquid: Large rigid packagings conforming to the requirements of Chapter 6.6, at the packing group II performance level, for liquids.

Additional requirement:

Large packagings intended to contain sharp objects such as broken glass and needles shall be resistant to puncture and retain liquids under the performance test conditions in Chapter 6.6.

LP622	PACKING INSTRUCTION	LP622
This instruction applies to waste of UN 3549 transported for disposal.		
The following large packagings are authorized provided the general provisions of **4.1.1** and **4.1.3** are met:		
Inner packagings	**Intermediate packagings**	**Outer packagings**
metal plastics	metal plastics	steel (50A) aluminium (50B) metal other than steel or aluminium (50N) plywood (50D) rigid fibreboard (50G) rigid plastics (50H)
The outer packaging shall conform to the packing group I performance level for solids.		

Additional requirement:

1. Fragile articles shall be contained in either a rigid inner packaging or a rigid intermediate packaging.
2. Inner packagings containing sharp objects such as broken glass and needles shall be rigid and resistant to puncture.
3. The inner packaging, the intermediate packaging and the outer packaging shall be capable of retaining liquids. Outer packagings that are not capable of retaining liquids by design shall be fitted with a liner or suitable measure of retaining liquids.
4. The inner packaging and/or the intermediate packaging may be flexible. When flexible packagings are used, they shall be capable of passing the impact resistance test of at least 165g according to ISO 7765-1:1988 “Plastics film and sheeting – Determination of impact resistance by the free-falling dart method – Part 1: Staircase methods” and the tear resistance test of at least 480g in both parallel and perpendicular planes with respect to the length of the bag in accordance with ISO 6383-2:1983 “Plastics – Film and sheeting – Determination of tear resistance – Part 2: Elmendorf method”. The maximum net mass of each flexible inner packaging shall be 30kg.
5. Each flexible intermediate packaging shall contain only one inner packaging.
6. Inner packagings containing a small amount of free liquid may be included in intermediate packaging provided that there is sufficient absorbent or solidifying material in the inner or intermediate packaging to absorb or solidify all the liquid content present. Suitable absorbent material which withstands the temperatures and vibrations liable to occur under normal conditions of transport shall be used.
7. Intermediate packagings shall be secured in outer packagings with suitable cushioning and/or absorbent material.

LP902	PACKING INSTRUCTION	LP902

This instruction applies to UN 3268.

Packaged articles:

The following large packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Rigid large packagings conforming to the packing group III performance level, made of:

steel (50A);
aluminium (50B);
metal other than steel or aluminium (50N);
rigid plastics (50H);
natural wood (50C);
plywood (50D);
reconstituted wood (50F);
rigid fibreboard (50G).

The packagings shall be designed and constructed to prevent movement of the articles and inadvertent operation during normal conditions of transport.

Unpackaged articles:

The articles may also be transported unpackaged in dedicated handling devices, vehicles, containers or wagons when moved to, from, or between where they are manufactured and an assembly plant including intermediate handling locations.

Additional requirement:

Any pressure receptacle shall be in accordance with the requirements of the competent authority for the substance(s) contained in the pressure receptacle(s).

LP903	PACKING INSTRUCTION	LP903

This instruction applies to UN Nos. 3090, 3091, 3480 and 3481

The following large packagings are authorized for a single battery and for a single item of equipment containing batteries, provided that the general provisions of **4.1.1** and **4.1.3** are met:

Rigid large packagings conforming to the packing group II performance level, made of:

steel (50A);
aluminium (50B);
metal other than steel or aluminium (50N);
rigid plastics (50H);
natural wood (50C);
plywood (50D);
reconstituted wood (50F);
rigid fibreboard (50G).

The battery or the equipment shall be packed so that the battery or the equipment is protected against damage that may be caused by its movement or placement within the large packaging.

Additional requirement:

Batteries shall be protected against short circuit.

LP904	PACKING INSTRUCTION	LP904

This instruction applies to single damaged or defective batteries and to single items of equipment containing damaged or defective cells and batteries of UN Nos. 3090, 3091, 3480 and 3481.

The following large packagings are authorized for a single damaged or defective battery and for a single item of equipment containing damaged or defective cells and batteries, provided the general provisions of **4.1.1** and **4.1.3** are met.

For batteries and equipment containing cells and batteries:

Rigid large packagings conforming to the packing group II performance level, made of:

steel (50A);

aluminium (50B);

metal other than steel or aluminium (50N);

rigid plastics (50H);

plywood (50D).

1. The damaged or defective battery or equipment containing such cells or batteries shall be individually packed in an inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging shall be leak-proof to prevent the potential release of electrolyte.
2. The inner packaging shall be surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat.
3. Sealed packagings shall be fitted with a venting device when appropriate.
4. Appropriate measures shall be taken to minimize the effects of vibrations and shocks, prevent movement of the battery or the equipment within the package that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may also be used to meet this requirement.
5. Non combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured.

For leaking batteries and cells, sufficient inert absorbent material shall be added to the inner or outer packaging to absorb any release of electrolyte.

Additional requirements:

Batteries and cells shall be protected against short circuit**.**

LP905	PACKING INSTRUCTION	LP905

This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.

The following large packagings are authorized for a single battery and for a single item of equipment containing cells and batteries, provided that the general provisions of **4.1.1** and **4.1.3** are met:

(1) For a single battery:

Rigid large packagings conforming to the packing group II performance level, made of:

steel (50A);

aluminium (50B);

metal other than steel or aluminium (50N);

rigid plastics (50H);

natural wood (50C);

plywood (50D);

reconstituted wood (50F);

rigid fibreboard (50G).

Large packagings shall also meet the following requirements:

(a) A battery of different size, shape or mass may be packed in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;

(b) The battery shall be packed in an inner packaging and placed inside the outer packaging;

(c) The inner packaging shall be completely surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat;

(d) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the battery within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and electrically non-conductive; and

(e) Non-combustibility shall be assessed according to a standard recognized in the country where the large packaging is designed or manufactured.

(2) For a single item of equipment containing cells or batteries:

Rigid large packagings conforming to the packing group II performance level, made of:

Steel (50A);

Aluminium (50B);

Metal other than steel or aluminium (50N);

Rigid plastics (50H);

Natural wood (50C);

Plywood (50D);

Reconstituted wood (50F);

Rigid fibreboard (50G).

Large packagings shall also meet the following requirements:

(a) A single item of equipment of different size, shape or mass may be packed in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;

(b) The equipment shall be constructed or packed in such a manner as to prevent accidental operation during transport;

(c) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement, it shall be non-combustible and electrically non-conductive; and

(d) Non-combustibility shall be assessed according to a standard recognized in the country where the large packaging is designed or manufactured.

Additional requirement:

Cells and batteries shall be protected against short circuit.

LP906	PACKING INSTRUCTION	LP906

This instruction applies to damaged or defective batteries of UN Nos. 3090, 3091, 3480 and 3481 liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours under normal conditions of transport.

The following large packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met:

For a batteries and items of equipment containing batteries:

Rigid large packagings conforming to the packing group I performance level, made of:

steel (50A);

aluminium (50B);

metal other than steel or aluminium (50N);

rigid plastics (50H);

plywood (50D);

rigid fibreboard (50G)

(1) The large packaging shall be capable of meeting the following additional performance requirements in case of rapid disassembly, dangerous reaction, production of a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours of the battery:

(a) The outside surface temperature of the completed package shall not have a temperature of more than 100 °C. A momentary spike in temperature up to 200 °C is acceptable;

(b) No flame shall occur outside the package;

(c) No projectiles shall exit the package;

(d) The structural integrity of the package shall be maintained; and

(e) The large packagings shall have a gas management system (e.g. filter system, air circulation, containment for gas, gas tight packaging etc.), as appropriate.

(2) The additional large packaging performance requirements shall be verified by a test as specified by the competent authority [a].

A verification report shall be available on request. As a minimum requirement, the name of the batteries, their type as defined in Section 38.3.2.3 of the Manual of Tests and Criteria, the maximum number of batteries, the total mass of batteries, the total energy content of the batteries, the large packaging identification and the test data according to the verification method as specified by the competent authority shall be listed in the verification report. A set of specific instructions describing the way to use the package shall also be part of the verification report.

(3) When dry ice or liquid nitrogen is used as a coolant, the requirements of section 5.5.3 shall apply. The inner packaging and outer packaging shall maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.

(4) The specific instructions for use of the package shall be made available by the packaging manufacturers and subsequent distributors to the consignor. They shall include at least the identification of the batteries and items of equipment that may be contained inside the packaging, the maximum number of batteries contained in the package and the maximum total of the batteries energy content, as well as the configuration inside the package, including the separations and protections used during the performance verification test.

Additional requirement:

Batteries shall be protected against short circuit.

[a] *The following criteria, as relevant, may be considered to assess the performance of the large packaging*:

(a) The assessment shall be done under a quality management system (as described e.g. in section 2.9.4 (e)) allowing for the traceability of tests results, reference data and characterization models used;

(b) The list of hazards expected in case of thermal runaway for the battery type, in the condition it is transported (e.g. usage of an inner packaging, state of charge (SOC), use of sufficient non-combustible, electrically non-conductive and absorbent cushioning material etc.), shall be clearly identified and quantified; the reference list of possible hazards for lithium batteries (rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours) can be used for this purpose. The quantification of these hazards shall rely on available scientific literature;

(c) The mitigating effects of the large packaging shall be identified and characterized, based on the nature of the protections provided and the construction material properties. A list of technical characteristics and drawings shall be used to support this assessment (Density [kg·m^{-3}], specific heat capacity [J·kg^{-1}·K^{-1}], heating value [kJ·kg^{-1}], thermal conductivity [W·m^{-1}·K^{-1}], melting temperature and flammability temperature [K], heat transfer coefficient of the outer packaging [W·m^{-2}·K^{-1}], ...);

(d) The test and any supporting calculations shall assess the result of a thermal run-away of the battery inside the large packaging in the normal conditions of transport;

(e) In case the SOC of the battery is not known, the assessment used, shall be done with the highest possible SOC corresponding to the battery use conditions;

(f) The surrounding conditions in which the large packaging may be used and transported shall be described (including for possible consequences of gas or smoke emissions on the environment, such as ventilation or other methods) according to the gas management system of the large packaging;

(g) The tests or the model calculation shall consider the worst case scenario for the thermal runaway triggering and propagation inside the battery: this scenario includes the worst possible failure in the normal transport condition, the maximum heat and flame emissions for the possible propagation of the reaction;

(h) These scenarios shall be assessed over a period long enough to allow all the possible consequences to occur (e.g. 24 hours).

(i) In the case of multiple batteries and multiple items of equipment containing batteries, additional requirements such as the maximum number of batteries and items of equipment, the total maximum energy content of the batteries, and the configuration inside the package, including separations and protections of the parts, shall be considered.

4.1.5 Special packing provisions for goods of Class 1

4.1.5.1 The general provisions of section 4.1.1 shall be met.

4.1.5.2 All packagings for Class 1 goods shall be so designed and constructed that:

(a) They will protect the explosives, prevent them escaping and cause no increase in the risk of unintended ignition or initiation when subjected to normal conditions of transport including foreseeable changes in temperature, humidity and pressure;

(b) The complete package can be handled safely in normal conditions of transport; and

(c) The packages will withstand any loading imposed on them by foreseeable stacking to which they will be subject during transport so that they do not add to the risk presented by the explosives, the containment function of the packagings is not harmed, and they are not distorted in a way or to an extent which will reduce their strength or cause instability of a stack.

4.1.5.3 All explosive substances and articles, as prepared for transport, shall have been classified in accordance with the procedures detailed in 2.1.3.

4.1.5.4 Class 1 goods shall be packed in accordance with the appropriate packing instruction shown in Column 8 of the Dangerous Goods List, as detailed in 4.1.4.

4.1.5.5 Unless otherwise specified in these Regulations, packagings, including IBCs and large packagings, shall conform to the requirements of chapters 6.1, 6.5 or 6.6, as appropriate, and shall meet their test requirements for packing group II.

4.1.5.6 The closure device of packagings containing liquid explosives shall ensure a double protection against leakage.

4.1.5.7 The closure device of metal drums shall include a suitable gasket; if a closure device includes a screw-thread, the ingress of explosive substances into the screw-thread shall be prevented.

4.1.5.8 Packagings for water soluble substances shall be water-resistant. Packagings for desensitized or phlegmatized substances shall be closed to prevent changes in concentration during transport.

4.1.5.9 When the packaging includes a double envelope filled with water which may freeze during transport, a sufficient quantity of an anti-freeze agent shall be added to the water to prevent freezing. Anti-freeze that could create a fire hazard because of its inherent flammability shall not be used.

4.1.5.10 Nails, staples and other closure devices made of metal without protective covering shall not penetrate to the inside of the outer packaging unless the inner packaging adequately protects the explosives against contact with the metal.

4.1.5.11 Inner packagings, fittings and cushioning materials and the placing of explosive substances or articles in packages shall be accomplished in a manner which prevents the explosive substances or articles from becoming loose in the outer packaging under normal conditions of transport. Metallic components of articles shall be prevented from making contact with metal packagings. Articles containing explosive substances not enclosed in an outer casing shall be separated from each other in order to prevent friction and impact. Padding, trays, partitioning in the inner or outer packaging, mouldings or receptacles may be used for this purpose.

4.1.5.12 Packagings shall be made of materials compatible with, and impermeable to, the explosives contained in the package, so that neither interaction between the explosives and the packaging materials, nor leakage, causes the explosive to become unsafe to transport, or the hazard division or compatibility group to change.

4.1.5.13 The ingress of explosive substances into the recesses of seamed metal packagings shall be prevented.

4.1.5.14 Plastics packagings shall not be liable to generate or accumulate sufficient static electricity so that a discharge could cause the packaged explosive substances or articles to initiate, ignite or function.

4.1.5.15 Large and robust explosives articles, normally intended for military use, without their means of initiation or with their means of initiation containing at least two effective protective features, may be carried unpackaged. When such articles have propelling charges or are self-propelled, their ignition systems shall be protected against stimuli encountered during normal conditions of transport. A negative result in test series 4 on an unpackaged article indicates that the article can be considered for transport unpackaged. Such unpackaged articles may be fixed to cradles or contained in crates or other suitable handling, storage or launching devices in such a way that they will not become loose during normal conditions of transport.

Where such large explosive articles are as part of their operational safety and suitability tests subjected to test regimes that meet the intentions of these Regulations and such tests have been successfully undertaken, the competent authority may approve such articles to be transported under these Regulations.

4.1.5.16 Explosive substances shall not be packed in inner or outer packagings where the differences in internal and external pressures, due to thermal or other effects, could cause an explosion or rupture of the package.

4.1.5.17 Whenever loose explosive substances or the explosive substance of an uncased or partly cased article may come into contact with the inner surface of metal packagings (1A1, 1A2, 1B1, 1B2, 4A, 4B and metal receptacles), the metal packaging shall be provided with an inner liner or coating (see 4.1.1.2).

4.1.5.18 Packing instruction P101 may be used for any explosive provided the package has been approved by a competent authority regardless of whether the packaging complies with the packing instruction assignment in the Dangerous Goods List.

4.1.6 Special packing provisions for goods of Class 2

4.1.6.1 *General requirements*

4.1.6.1.1 This section provides general requirements applicable to the use of pressure receptacles for the transport of Class 2 gases and other dangerous goods in pressure receptacles (e.g. UN 1051 hydrogen cyanide, stabilized). Pressure receptacles shall be constructed and closed so as to prevent any loss of contents which might be caused under normal conditions of transport, including by vibration, or by changes in temperature, humidity or pressure (resulting from change in altitude, for example).

4.1.6.1.2 Parts of pressure receptacles which are in direct contact with dangerous goods shall not be affected or weakened by those dangerous goods and shall not cause a dangerous effect (e.g. catalysing a reaction or reacting with the dangerous goods). The provisions of ISO 11114-1:2012 + A1:2017 and ISO 11114-2:2013 shall be met as applicable.

4.1.6.1.3 Pressure receptacles, including their closures, shall be selected to contain a gas or a mixture of gases according to the requirements of 6.2.1.2 and the requirements of the specific packing instructions of 4.1.4.1. This section also applies to pressure receptacles which are elements of MEGCs.

4.1.6.1.4 Refillable pressure receptacles shall not be filled with a gas or gas mixture different from that previously contained unless the necessary operations for change of gas service have been performed. The change of service for compressed and liquefied gases shall be in accordance with ISO 11621:1997, as applicable. In addition, a pressure receptacle that previously contained a Class 8 corrosive substance or a substance of another class with a corrosive subsidiary hazard shall not be authorized for the transport of a Class 2 substance unless the necessary inspection and testing as specified in 6.2.1.6 have been performed.

4.1.6.1.5 Prior to filling, the filler shall perform an inspection of the pressure receptacle and ensure that the pressure receptacle is authorized for the gas and, in case of a chemical under pressure, for the propellant to be transported and that the provisions of these Regulations have been met. Shut-off valves shall be closed after filling and remain closed during transport. The consignor shall verify that the closures and equipment are not leaking.

4.1.6.1.6 Pressure receptacles shall be filled according to the working pressures, filling ratios and provisions specified in the appropriate packing instruction for the specific substance being filled and taking into account the lowest pressure rating of any component. Service equipment having a pressure rating lower than other components shall nevertheless comply with 6.2.1.3.1. Reactive gases and gas mixtures shall be filled to a pressure such that if complete decomposition of the gas occurs, the working pressure of the pressure receptacle shall not be exceeded.

4.1.6.1.7 Pressure receptacles, including their closures, shall conform to the design, construction, inspection and testing requirements detailed in Chapter 6.2. When outer packagings are prescribed, the pressure receptacles shall be firmly secured therein. Unless otherwise specified in the detailed packing instructions, one or more inner packagings may be enclosed in an outer packaging.

4.1.6.1.8 Valves shall be designed and constructed in such a way that they are inherently able to withstand damage without release of the contents or shall be protected from damage which could cause inadvertent release of the contents of the pressure receptacle, by one of the following methods:

(a) Valves are placed inside the neck of the pressure receptacle and protected by a threaded plug or cap;

(b) Valves are protected by caps. Caps shall possess vent-holes of sufficient cross-sectional area to evacuate the gas if leakage occurs at the valves;

(c) Valves are protected by shrouds or guards;

(d) Pressure receptacles are transported in frames, (e.g. bundles); or

(e) Pressure receptacles are transported in an outer packaging. The packaging as prepared for transport shall be capable of meeting the drop test specified in 6.1.5.3 at the packing group I performance level.

For pressure receptacles with valves as described in (b) and (c), the requirements of ISO 11117:1998, ISO 11117:2008 + Cor 1:2009 or ISO 11117:2019 shall be met; for valves with inherent protection, the requirements of annex A of ISO 10297:2006, annex A of ISO 10297:2014 or annex A of ISO 10297 + A1:2017 shall be met. For pressure receptacles with self-closing valves with inherent protection, the requirements of annex A of ISO 17879:2017 shall be met.

For metal hydride storage systems, the valve protection requirements specified in ISO 16111:2008 or ISO 16111:2018 shall be met.

4.1.6.1.9 Non-refillable pressure receptacles shall:

(a) Be transported in an outer packaging, such as a box, or crate, or in shrink-wrapped trays or stretch- wrapped trays;

(b) Be of a water capacity less than or equal to 1.25 litres when filled with flammable or toxic gas;

(c) Not be used for toxic gases with an LC50 less than or equal to 200 ml/m3; and

(d) Not be repaired after being put into service.

4.1.6.1.10 Refillable pressure receptacles, other than closed cryogenic receptacles, shall be periodically inspected according to the provisions of 6.2.1.6 and packing instruction P200, P205, P206 or P208, as applicable. Pressure relief valves for closed cryogenic receptacles shall be subject to periodic inspections and tests according to the provisions of 6.2.1.6.3 and packing instruction P203. Pressure receptacles shall not be filled after they become due for periodic inspection but may be transported after the expiry of the time limit.

4.1.6.1.11 Repairs shall be consistent with the fabrication and testing requirements of the applicable design and construction standards and are only permitted as indicated in the relevant periodic inspection standards specified in 6.2.2.4. Pressure receptacles, other than the jacket of closed cryogenic receptacles, shall not be subjected to repairs of any of the following:

(a) Weld cracks or other weld defects;

(b) Cracks in walls;

(c) Leaks or defects in the material of the wall, head or bottom.

4.1.6.1.12 Pressure receptacles shall not be offered for filling:

(a) When damaged to such an extent that the integrity of the pressure receptacle or its service equipment may be affected;

(b) Unless the pressure receptacle and its service equipment has been examined and found to be in good working order; or

(c) Unless the required certification, retest, and filling marks are legible.

4.1.6.1.13 Filled pressure receptacles shall not be offered for transport;

(a) When leaking;

(b) When damaged to such an extent that the integrity of the pressure receptacle or its service equipment may be affected;

(c) Unless the pressure receptacle and its service equipment has been examined and found to be in good working order; or

(d) Unless the required certification, retest, and filling marks are legible.

4.1.7 Special packing provisions for organic peroxides (Division 5.2) and self-reactive substances of Division 4.1

4.1.7.0.1 For organic peroxides, all receptacles shall be "effectively closed". Where significant internal pressure may develop in a package by the evolution of a gas, a vent may be fitted, provided the gas emitted will not cause danger, otherwise the degree of filling shall be limited. Any venting device shall be so constructed that liquid will not escape when the package is in an upright position and it shall be able to prevent ingress of impurities. The outer packaging, if any, shall be so designed as not to interfere with the operation of the venting device.

4.1.7.1 ***Use of packagings (except IBCs)***

4.1.7.1.1 Packagings for organic peroxides and self-reactive substances shall conform to the requirements of Chapter 6.1 and shall meet its test requirements for packing group II.

4.1.7.1.2 The packing methods for organic peroxides and self-reactive substances are listed in packing instruction P520 and are designated OP1 to OP8. The quantities specified for each packing method are the maximum quantities authorized per package.

4.1.7.1.3 The packing methods appropriate for the individual currently assigned organic peroxides and self-reactive substances are listed in 2.4.2.3.2.3 and 2.5.3.2.4.

4.1.7.1.4 For new organic peroxides, new self-reactive substances or new formulations of currently assigned organic peroxides or self-reactive substances, the following procedure shall be used to assign the appropriate packing method:

(a) ORGANIC PEROXIDE, TYPE B or SELF-REACTIVE SUBSTANCE, TYPE B:

Packing method OP5 shall be assigned, provided that the organic peroxide (or self-reactive substance) satisfies the criteria of 2.5.3.3.2 (b) (resp. 2.4.2.3.3.2 (b)) in a packaging authorized by the packing method. If the organic peroxide (or self-reactive substance) can only satisfy these criteria in a smaller packaging than those authorized by packing method OP5 (viz. one of the packagings listed for OP1 to OP4), then the corresponding packing method with the lower OP number is assigned;

(b) ORGANIC PEROXIDE, TYPE C or SELF-REACTIVE SUBSTANCE, TYPE C:

Packing method OP6 shall be assigned, provided that the organic peroxide (or self-reactive substance) satisfies the criteria of 2.5.3.3.2 (c) (resp. 2.4.2.3.3.2 (c)) in packaging authorized by the packing method. If the organic peroxide (or self-reactive substance) can only satisfy these criteria in a smaller packaging than those authorized by packing method OP6 then the corresponding packing method with the lower OP number is assigned;

(c) ORGANIC PEROXIDE, TYPE D or SELF-REACTIVE SUBSTANCE, TYPE D:

Packing method OP7 shall be assigned to this type of organic peroxide or self-reactive substance;

(d) ORGANIC PEROXIDE, TYPE E or SELF-REACTIVE SUBSTANCE, TYPE E:

Packing method OP8 shall be assigned to this type of organic peroxide or self-reactive substance;

(e) ORGANIC PEROXIDE, TYPE F or SELF-REACTIVE SUBSTANCE, TYPE F:

Packing method OP8 shall be assigned to this type of organic peroxide or self-reactive substance.

4.1.7.2 ***Use of intermediate bulk containers***

4.1.7.2.1 The currently assigned organic peroxides specifically listed in packing instruction IBC520 may be transported in IBCs in accordance with this packing instruction. IBCs shall conform to the requirements of Chapter 6.5 and shall meet its test requirements for packing group II.

4.1.7.2.2 Other organic peroxides and self-reactive substances of type F may be transported in IBCs under conditions established by the competent authority of the country of origin when, on the basis of the appropriate tests, that competent authority is satisfied that such transport may be safely conducted. The tests undertaken shall include those necessary:

(a) To prove that the organic peroxide (or self-reactive substance) complies with the principles for classification given in 2.5.3.3.2 (f), exit box F of Figure 2.5.1; (resp. 2.4.2.3.3.2 (f), exit box F of Figure 2.4.1);

(b) To prove the compatibility of all materials normally in contact with the substance during the transport;

(c) To determine, when applicable, the control and emergency temperatures associated with the transport of the product in the IBC concerned as derived from the SADT;

(d) To design, when applicable, pressure and emergency relief devices; and

(e) To determine if any special provisions are necessary for safe transport of the substance.

4.1.7.2.3 For self-reactive substances temperature control is required according to 2.4.2.3.4. For organic peroxides temperature control is required according to 2.5.3.4.1. Temperature control provisions are given in 7.1.5.3.

4.1.7.2.4 Emergencies to be taken into account are self-accelerating decomposition and fire engulfment. To prevent explosive rupture of metal IBCs with a complete metal casing, the emergency-relief devices shall be designed to vent all the decomposition products and vapours evolved during self-accelerating decomposition or during a period of not less than one hour of complete fire engulfment calculated by the equations given in 4.2.1.13.8.

4.1.8 Special packing provisions for infectious substances of Category A (Division 6.2, UN 2814 and UN 2900)

4.1.8.1 Consignors of infectious substances shall ensure that packages are prepared in such a manner that they arrive at their destination in good condition and present no hazard to persons or animals during transport.

4.1.8.2 The definitions in 1.2.1 and the general packing provisions of 4.1.1.1 to 4.1.1.14, except 4.1.1.10 to 4.1.1.12, apply to infectious substances packages. However, liquids shall only be filled into packagings which have an appropriate resistance to the internal pressure that may develop under normal conditions of transport.

4.1.8.3 An itemized list of contents shall be enclosed between the secondary packaging and the outer packaging. When the infectious substances to be transported are unknown, but suspected of meeting the criteria for inclusion in category A, the words “suspected category A infectious substance” shall be shown, in parentheses, following the proper shipping name on the document inside the outer packaging.

4.1.8.4 Before an empty packaging is returned to the consignor, or sent elsewhere, it shall be disinfected or sterilized to nullify any hazard and any label or mark indicating that it had contained an infectious substance shall be removed or obliterated.

4.1.8.5 Provided an equivalent level of performance is maintained, the following variations in the primary receptacles placed within a secondary packaging are allowed without further testing of the completed package:

(a) Primary receptacles of equivalent or smaller size as compared to the tested primary receptacles may be used provided:

(i) The primary receptacles are of similar design to the tested primary receptacle (e.g. shape: round, rectangular, etc.);

(ii) The material of construction of the primary receptacle (glass, plastics, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested primary receptacle;

(iii) The primary receptacles have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc.);

(iv) Sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the primary receptacles; and

(v) Primary receptacles are oriented within the secondary packaging in the same manner as in the tested package;

(b) A lesser number of the tested primary receptacles, or of the alternative types of primary receptacles identified in (a) above, may be used provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the primary receptacles.

4.1.9 Special packing provisions for radioactive material

4.1.9.1 *General*

4.1.9.1.1 Radioactive material, packagings and packages shall meet the requirements of Chapter 6.4. The quantity of radioactive material in a package shall not exceed the limits specified in 2.7.2.2, 2.7.2.4.1, 2.7.2.4.4, 2.7.2.4.5, 2.7.2.4.6, SP336 of Chapter 3.3 and 4.1.9.3.

The types of packages for radioactive materials covered by these Regulations, are:

(a) Excepted package (see 1.5.1.5);

(b) Industrial package Type 1 (Type IP-1 package);

(c) Industrial package Type 2 (Type IP-2 package);

(d) Industrial package Type 3 (Type IP-3 package);

(e) Type A package;

(f) Type B(U) package;

(g) Type B(M) package;

(h) Type C package.

Packages containing fissile material or uranium hexafluoride are subject to additional requirements.

4.1.9.1.2 The non-fixed contamination on the external surfaces of any package shall be kept as low as practicable and, under routine conditions of transport, shall not exceed the following limits:

(a) 4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters; and

(b) 0.4 Bq/cm^2 for all other alpha emitters.

These limits are applicable when averaged over any area of 300 cm^2 of any part of the surface.

4.1.9.1.3 A package shall not contain any items other than those that are necessary for the use of the radioactive material. The interaction between these items and the package under the conditions of transport applicable to the design, shall not reduce the safety of the package.

4.1.9.1.4 Except as provided in 7.1.8.5.5, the level of non-fixed contamination on the external and internal surfaces of overpacks, freight containers and conveyances shall not exceed the limits specified in 4.1.9.1.2. This requirement does not apply to the internal surfaces of freight containers being used as packagings, either loaded or empty.

4.1.9.1.5 For radioactive material having other dangerous properties the package design shall take into account those properties. Radioactive material with a subsidiary hazard, packaged in packages that do not require competent authority approval, shall be transported in packagings, IBCs, tanks or bulk containers fully complying with the requirements of the relevant chapters of Part 6 as appropriate, as well as applicable requirements of chapters 4.1, 4.2 or 4.3 for that subsidiary hazard.

4.1.9.1.6 Before a packaging is first used to transport radioactive material, it shall be confirmed that it has been manufactured in conformity with the design specifications to ensure compliance with the relevant provisions of these Regulations and any applicable certificate of approval. The following requirements shall also be fulfilled, if applicable:

(a) If the design pressure of the containment system exceeds 35 kPa (gauge), it shall be ensured that the containment system of each packaging conforms to the approved design requirements relating to the capability of that system to maintain its integrity under that pressure;

(b) For each packaging intended for use as a Type B(U), Type B(M) or Type C package and for each packaging intended to contain fissile material, it shall be ensured that the effectiveness of its shielding and containment and, where necessary, the heat transfer characteristics and the effectiveness of the confinement system, are within the limits applicable to or specified for the approved design;

(c) For each packaging intended to contain fissile material, it shall be ensured that the effectiveness of the criticality safety features is within the limits applicable to or specified for the design and in particular where, in order to comply with the requirements of 6.4.11.1 neutron poisons are specifically included, checks shall be performed to confirm the presence and distribution of those neutron poisons.

4.1.9.1.7 Before each shipment of any package, it shall be ensured that the package contains neither:

(a) Radionuclides different from those specified for the package design; nor

(b) Contents in a form, or physical or chemical state different from those specified for the package design.

4.1.9.1.8 Before each shipment of any package, it shall be ensured that all the requirements specified in the relevant provisions of these Regulations and in the applicable certificates of approval have been fulfilled. The following requirements shall also be fulfilled, if applicable:

(a) It shall be ensured that lifting attachments which do not meet the requirements of 6.4.2.2 have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with 6.4.2.3;

(b) Each Type B(U), Type B(M) and Type C package shall be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure unless an exemption from these requirements has received unilateral approval;

(c) For each Type B(U), Type B(M) and Type C package, it shall be ensured by inspection and/or appropriate tests that all closures, valves and other openings of the containment system through which the radioactive contents might escape are properly closed and, where appropriate, sealed in the manner for which the demonstrations of compliance with the requirements of 6.4.8.8 and 6.4.10.3 were made;

(d) For packages containing fissile material the measurement specified in 6.4.11.5 (b) and the tests to demonstrate closure of each package as specified in 6.4.11.8 shall be performed;

(e) For packages intended to be used for shipment after storage, it shall be ensured that all packaging components and radioactive contents have been maintained during storage in a manner such that all the requirements specified in the relevant provisions of these Regulations and in the applicable certificates of approval have been fulfilled.

4.1.9.1.9 The consignor shall also have a copy of any instructions with regard to the proper closing of the package and any preparation for shipment before making any shipment under the terms of the certificates.

4.1.9.1.10 Except for consignments under exclusive use, the transport index of any package or overpack shall not exceed 10, nor shall the criticality safety index of any package or overpack exceed 50.

4.1.9.1.11 Except for packages or overpacks transported under exclusive use by rail or by road under the conditions specified in 7.2.3.1.2 (a), or under exclusive use and special arrangement by vessel or by air under the conditions specified in 7.2.3.2.1 or 7.2.3.3.3 respectively, the maximum dose rate at any point on any external surface of a package or overpack shall not exceed 2 mSv/h.

4.1.9.1.12 The maximum dose rate at any point on any external surface of a package or overpack under exclusive use shall not exceed 10 mSv/h.

4.1.9.2 *Requirements and controls for transport of LSA material and SCO*

4.1.9.2.1 The quantity of LSA material or SCO in a single Type IP-1 package, Type IP-2 package, Type IP-3 package, or object or collection of objects, whichever is appropriate, shall be so restricted that the external dose rate at 3 m from the unshielded material or object or collection of objects does not exceed 10 mSv/h.

4.1.9.2.2 For LSA material and SCO which are or contain fissile material, which is not excepted under 2.7.2.3.5, the applicable requirements of 7.1.8.4.1 and 7.1.8.4.2 shall be met.

4.1.9.2.3 For LSA material and SCO which are or contain fissile material, the applicable requirements of 6.4.11.1 shall be met.

4.1.9.2.4 LSA material and SCO in groups LSA-I, SCO-I and SCO-III may be transported unpackaged under the following conditions:

(a) All unpackaged material other than ores containing only naturally occurring radionuclides shall be transported in such a manner that under routine conditions of transport there will be no escape of the radioactive contents from the conveyance nor will there be any loss of shielding;

(b) Each conveyance shall be under exclusive use, except when only transporting SCO-I on which the contamination on the accessible and the inaccessible surfaces is not greater than ten times the applicable level specified in 2.7.1.2;

(c) For SCO-I where it is suspected that non-fixed contamination exists on inaccessible surfaces in excess of the values specified in 2.7.2.3.2 (a)(i), measures shall be taken to ensure that the radioactive material is not released into the conveyance;

(d) Unpackaged fissile material shall meet the requirements of 2.7.2.3.5 (e);

(e) For SCO-III:

(i) Transport shall be under exclusive use by road, rail, inland waterway or sea.

(ii) Stacking shall not be permitted.

(iii) All activities associated with the shipment, including radiation protection, emergency response and any special precautions or special administrative or operational controls that are to be employed during transport shall be described in a transport plan. The transport plan shall demonstrate that the overall level of safety in transport is at least equivalent to that which would be provided if the requirements of 6.4.7.14 (only for the test specified in 6.4.15.6, preceded by the tests specified in 6.4.15.2 and 6.4.15.3 had been met.

(iv) The requirements of 6.4.5.1 and 6.4.5.2 for a Type IP-2 package shall be satisfied, except that the maximum damage referred to in 6.4.15.4 may be determined based on provisions in the transport plan, and the requirements of 6.4.15.5 are not applicable.

(v) The object and any shielding are secured to the conveyance in accordance with 6.4.2.1.

(vi) The shipment shall be subject to multilateral approval.

4.1.9.2.5 LSA material and SCO, except as otherwise specified in 4.1.9.2.4, shall be packaged in accordance with Table 4.1.9.2.5.

Table 4.1.9.2.5: Industrial package requirements for LSA material and SCO

Radioactive contents	Industrial package type	
	Exclusive use	**Not under exclusive use**
LSA-I		
Solid[a]	Type IP-1	Type IP-1
Liquid	Type IP-1	Type IP-2
LSA-II		
Solid	Type IP-2	Type IP-2
Liquid and gas	Type IP-2	Type IP-3
LSA-III	Type IP-2	Type IP-3
SCO-I[a]	Type IP-1	Type IP-1
SCO-II	Type IP-2	Type IP-2

[a] *Under the conditions specified in 4.1.9.2.4, LSA-I material and SCO-I may be transported unpackaged.*

4.1.9.3 *Packages containing fissile material*

4.1.9.3.1 The contents of packages containing fissile material shall be as specified for the package design either directly in these Regulations or in the certificate of approval.

CHAPTER 4.2

USE OF PORTABLE TANKS AND MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs)

4.2.1 General provisions for the use of portable tanks for the transport of substances of Class 1 and Classes 3 to 9

4.2.1.1 This section provides general requirements applicable to the use of portable tanks for the transport of substances of Classes 1, 3, 4, 5, 6, 7, 8 and 9. In addition to these general requirements, portable tanks shall conform to the design, construction, inspection and testing requirements detailed in 6.7.2. Substances shall be transported in portable tanks conforming to the applicable portable tank instruction identified in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6 (T1 to T23) and the portable tank special provisions assigned to each substance in Column 11 of the Dangerous Goods List and described in 4.2.5.3.

4.2.1.2 During transport, portable tanks shall be adequately protected against damage to the shell and service equipment resulting from lateral and longitudinal impact and overturning. If the shell and service equipment are so constructed as to withstand impact or overturning it need not be protected in this way. Examples of such protection are given in 6.7.2.17.5.

4.2.1.3 Certain substances are chemically unstable. They are accepted for transport only when the necessary steps have been taken to prevent their dangerous decomposition, transformation or polymerization during transport. To this end, care shall in particular be taken to ensure that shells do not contain any substances liable to promote these reactions.

4.2.1.4 The temperature of the outer surface of the shell excluding openings and their closures or of the thermal insulation shall not exceed 70 °C during transport. When necessary, the shell shall be thermally insulated.

4.2.1.5 Empty portable tanks not cleaned and not gas-free shall comply with the same requirements as portable tanks filled with the previous substance.

4.2.1.6 Substances shall not be transported in the same or adjoining compartments of shells when they may react dangerously with each other and cause:

(a) Combustion and/or evolution of considerable heat;

(b) Evolution of flammable, toxic or asphyxiant gases;

(c) The formation of corrosive substances;

(d) The formation of unstable substances;

(e) Dangerous rise in pressure.

4.2.1.7 The design approval certificate, the test report and the certificate showing the results of the initial inspection and test for each portable tank issued by the competent authority or its authorized body shall be retained by the authority or body and the owner. Owners shall be able to provide this documentation upon the request of any competent authority.

4.2.1.8 Unless the name of the substance(s) being transported appears on the metal plate described in 6.7.2.20.2, a copy of the certificate specified in 6.7.2.18.1 shall be made available upon the request of a competent authority or its authorized body and readily provided by the consignor, consignee or agent, as appropriate.

4.2.1.9 ***Degree of Filling***

4.2.1.9.1 Prior to filling, the consignor shall ensure that the appropriate portable tank is used and that the portable tank is not loaded with substances which in contact with the materials of the shell, gaskets, service equipment and any protective linings, are likely to react dangerously with them to form dangerous products or appreciably weaken these materials. The consignor may need to consult the manufacturer of the substance in conjunction with the competent authority for guidance on the compatibility of the substance with the portable tank materials.

4.2.1.9.1.1 Portable tanks shall not be filled above the extent provided in 4.2.1.9.2 to 4.2.1.9.6. The applicability of 4.2.1.9.2, 4.2.1.9.3 or 4.2.1.9.5.1 to individual substances is specified in the applicable portable tank instructions or special provisions in 4.2.5.2.6 or 4.2.5.3 and Columns 10 or 11 of the Dangerous Goods List.

4.2.1.9.2 The maximum degree of filling (in %) for general use is determined by the formula:

$$\text{Degree of filling} = \frac{97}{1 + \alpha\,(t_r - t_f)}$$

4.2.1.9.3 The maximum degree of filling (in %) for liquids of Division 6.1 and Class 8, in packing groups I and II, and liquids with an absolute vapour pressure of more than 175 kPa (1.75 bar) at 65 °C, is determined by the formula:

$$\text{Degree of filling} = \frac{95}{1 + \alpha\,(t_r - t_f)}$$

4.2.1.9.4 In these formulae, α is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (t_f) and the maximum mean bulk temperature during transport (t_r) (both in °C). For liquids transported under ambient conditions α could be calculated by the formula:

$$\alpha = \frac{d_{15} - d_{50}}{35 d_{50}}$$

in which d_{15} and d_{50} are the densities of the liquid at 15 °C and 50 °C, respectively.

4.2.1.9.4.1 The maximum mean bulk temperature (t_r) shall be taken as 50 °C except that, for journeys under temperate or extreme climatic conditions, the competent authorities concerned may agree to a lower or require a higher temperature, as appropriate.

4.2.1.9.5 The requirements of 4.2.1.9.2 to 4.2.1.9.4.1 do not apply to portable tanks which contain substances maintained at a temperature above 50 °C during transport (e.g. by means of a heating device). For portable tanks equipped with a heating device, a temperature regulator shall be used to ensure the maximum degree of filling is not more than 95 % full at any time during transport.

4.2.1.9.5.1 The maximum degree of filling (in %) for solids transported above their melting points and for elevated temperature liquids shall be determined by the following formula:

$$\text{Degree of filling} = 95\,\frac{d_r}{d_f}$$

in which d_f and d_r are the densities of the liquid at the mean temperature of the liquid during filling and the maximum mean bulk temperature during transport respectively.

4.2.1.9.6 Portable tanks shall not be offered for transport:

(a) With a degree of filling, for liquids having a viscosity less than 2 680 mm^2/s at 20 °C or maximum temperature of the substance during transport in the case of the heated substance, of more than 20 % but less than 80 % unless the shells of portable tanks are

divided, by partitions or surge plates, into sections of not more than 7 500 litres capacity;

(b) With residue of substances previously transported adhering to the outside of the shell or service equipment;

(c) When leaking or damaged to such an extent that the integrity of the portable tank or its lifting or securing arrangements may be affected; and

(d) Unless the service equipment has been examined and found to be in good working order.

4.2.1.9.7 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.7.2.17.4 need not be provided with a means of closing off the forklift pockets.

4.2.1.10 ***Additional provisions applicable to the transport of Class 3 substances in portable tanks***

4.2.1.10.1 All portable tanks intended for the transport of flammable liquids shall be closed and be fitted with relief devices in accordance with 6.7.2.8 to 6.7.2.15.

4.2.1.10.1.1 For portable tanks intended for use only on land, the pertinent regulations governing transport by land may allow open venting systems.

4.2.1.11 ***Additional provisions applicable to the transport of Class 4 substances (other than Division 4.1 self-reactive substances) in portable tanks***

Reserved.

NOTE: *For Division 4.1 self-reactive substances, see 4.2.1.13.1.*

4.2.1.12 ***Additional provisions applicable to the transport of Division 5.1 substances in portable tanks***

Reserved.

4.2.1.13 ***Additional provisions applicable to the transport of Division 5.2 substances and Division 4.1 self-reactive substances in portable tanks***

4.2.1.13.1 Each substance shall have been tested and a report submitted to the competent authority of the country of origin for approval. Notification thereof shall be sent to the competent authority of the country of destination. The notification shall contain relevant transport information and the report with test results. The tests undertaken shall include those necessary:

(a) To prove the compatibility of all materials normally in contact with the substance during transport;

(b) To provide data for the design of the pressure and emergency relief devices taking into account the design characteristics of the portable tank.

Any additional provision necessary for safe transport of the substance shall be clearly described in the report.

4.2.1.13.2 The following provisions apply to portable tanks intended for the transport of Type F organic peroxides or Type F self-reactive substances with a Self-Accelerating Decomposition Temperature (SADT) of 55 °C or more. In case of conflict these provisions prevail over those specified in section 6.7.2. Emergencies to be taken into account are self-accelerating decomposition of the substance and fire-engulfment as described in 4.2.1.13.8.

4.2.1.13.3 The additional provisions for transport of organic peroxides or self-reactive substances with an SADT less than 55 °C in portable tanks shall be specified by the competent authority of the country of origin. Notification thereof shall be sent to the competent authority of the country of destination.

4.2.1.13.4 The portable tank shall be designed for a test pressure of at least 0.4 MPa (4 bar).

4.2.1.13.5 Portable tanks shall be fitted with temperature sensing devices.

4.2.1.13.6 Portable tanks shall be fitted with pressure-relief devices and emergency-relief devices. Vacuum-relief devices may also be used. Pressure-relief devices shall operate at pressures determined according to both the properties of the substance and the construction characteristics of the portable tank. Fusible elements are not allowed in the shell.

4.2.1.13.7 The pressure-relief devices shall consist of spring-loaded valves fitted to prevent significant build-up within the portable tank of the decomposition products and vapours released at a temperature of 50 °C. The capacity and start-to-discharge pressure of the relief valves shall be based on the results of the tests specified in 4.2.1.13.1. The start-to-discharge pressure shall, however, in no case be such that liquid would escape from the valve(s) if the portable tank were overturned.

4.2.1.13.8 The emergency-relief devices may be of the spring-loaded or frangible types, or a combination of the two, designed to vent all the decomposition products and vapours evolved during a period of not less than one hour of complete fire-engulfment as calculated by the following formula:

$$q = 70961 \times F \times A^{0.82}$$

where:

q	=	heat absorption [W]
A	=	wetted area [m^2]
F	=	insulation factor
F	=	1 for non-insulated shells, or

$$F = \frac{U(923 - T)}{47032} \text{ for insulated shells}$$

where:

K	=	heat conductivity of insulation layer [$W \cdot m^{-1} \cdot K^{-1}$]
L	=	thickness of insulation layer [m]
U	=	K/L = heat transfer coefficient of the insulation [$W \cdot m^{-2} \cdot K^{-1}$]
T	=	temperature of substance at relieving conditions [K]

The start-to-discharge pressure of the emergency-relief device(s) shall be higher than that specified in 4.2.1.13.7 and based on the results of the tests referred to in 4.2.1.13.1. The emergency-relief devices shall be dimensioned in such a way that the maximum pressure in the portable tank never exceeds the test pressure of the tank.

NOTE: *An example of a method to determine the size of emergency-relief devices is given in Appendix 5 of the Manual of Tests and Criteria.*

4.2.1.13.9 For insulated portable tanks the capacity and setting of emergency-relief device(s) shall be determined assuming a loss of insulation from 1 % of the surface area.

4.2.1.13.10 Vacuum-relief devices and spring-loaded valves shall be provided with flame arresters. Due attention shall be paid to the reduction of the relief capacity caused by the flame arrester.

4.2.1.13.11 Service equipment such as valves and external piping shall be so arranged that no substance remains in them after filling the portable tank.

4.2.1.13.12 Portable tanks may be either insulated or protected by a sun-shield. If the SADT of the substance in the portable tank is 55 °C or less, or the portable tank is constructed of aluminium, the portable tank shall be completely insulated. The outer surface shall be finished in white or bright metal.

4.2.1.13.13 The degree of filling shall not exceed 90 % at 15 oC.

4.2.1.13.14 The mark as required in 6.7.2.20.2 shall include the UN number and the technical name with the approved concentration of the substance concerned.

4.2.1.13.15 Organic peroxides and self-reactive substances specifically listed in portable tank instruction T23 in 4.2.5.2.6 may be transported in portable tanks.

4.2.1.14 ***Additional provisions applicable to the transport of Division 6.1 substances in portable tanks***

Reserved.

4.2.1.15 ***Additional provisions applicable to the transport of Division 6.2 substances in portable tanks***

Reserved.

4.2.1.16 ***Additional provisions applicable to the transport of Class 7 substances in portable tanks***

4.2.1.16.1 Portable tanks used for the transport of radioactive material shall not be used for the transport of other goods.

4.2.1.16.2 The degree of filling for portable tanks shall not exceed 90 % or, alternatively, any other value approved by the competent authority.

4.2.1.17 ***Additional provisions applicable to the transport of Class 8 substances in portable tanks***

4.2.1.17.1 Pressure-relief devices of portable tanks used for the transport of Class 8 substances shall be inspected at intervals not exceeding one year.

4.2.1.18 ***Additional provisions applicable to the transport of Class 9 substances in portable tanks***

Reserved.

4.2.1.19 ***Additional provisions applicable to the transport of solid substances transported above their melting point***

4.2.1.19.1 Solid substances transported or offered for transport above their melting point which are not assigned a portable tank instruction in Column 10 of the Dangerous Goods List or when the assigned portable tank instruction does not apply to transport at temperatures above their melting point may be transported in portable tanks provided that the solid substances are classified in Divisions 4.1, 4.2, 4.3, 5.1 or 6.1 or Classes 8 or 9 and have no subsidiary hazard other than that of Division 6.1 or Class 8 and are in packing group II or III.

4.2.1.19.2 Unless otherwise indicated in the Dangerous Goods List of Chapter 3.2, portable tanks used for the transport of these solid substances above their melting point shall conform to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II. A portable tank that affords an equivalent or greater level of safety may be selected according to 4.2.5.2.5. The maximum degree of filling (in %) shall be determined according to 4.2.1.9.5 (TP3) .

4.2.2 General provisions for the use of portable tanks for the transport of non-refrigerated liquefied gases and chemicals under pressure

4.2.2.1 This section provides general requirements applicable to the use of portable tanks for the transport of non-refrigerated liquefied gases and chemicals under pressure.

4.2.2.2 Portable tanks shall conform to the design, construction, inspection and testing requirements detailed in 6.7.3. Non-refrigerated liquefied gases and chemicals under pressure shall be transported in portable tanks conforming to portable tank instruction T50 as described in 4.2.5.2.6 and any portable tank special provisions assigned to specific non-refrigerated liquefied gases in Column 11 of the Dangerous Goods List and described in 4.2.5.3.

4.2.2.3 During transport, portable tanks shall be adequately protected against damage to the shell and service equipment resulting from lateral and longitudinal impact and overturning. If the shell and service equipment are so constructed as to withstand impact or overturning it need not be protected in this way. Examples of such protection are given in 6.7.3.13.5.

4.2.2.4 Certain non-refrigerated liquefied gases are chemically unstable. They are accepted for transport only when the necessary steps have been taken to prevent their dangerous decomposition, transformation or polymerization during transport. To this end, care shall in particular be taken to ensure that portable tanks do not contain any non-refrigerated liquefied gases liable to promote these reactions.

4.2.2.5 Unless the name of the gas(es) being transported appears on the metal plate described in 6.7.3.16.2, a copy of the certificate specified in 6.7.3.14.1 shall be made available upon a competent authority request and readily provided by the consignor, consignee or agent, as appropriate.

4.2.2.6 Empty portable tanks not cleaned and not gas-free shall comply with the same requirements as portable tanks filled with the previous non-refrigerated liquefied gas.

4.2.2.7 ***Filling***

4.2.2.7.1 Prior to filling the consignor shall ensure that the portable tank is approved for the non-refrigerated liquefied gas or the propellant of the chemical under pressure to be transported and that the portable tank is not loaded with non-refrigerated liquefied gases, or with chemicals under pressure which in contact with the materials of the shell, gaskets and service equipment, are likely to react dangerously with them to form dangerous products or appreciably weaken these materials. During filling, the temperature of the non-refrigerated liquefied gas or propellant of chemicals under pressure shall fall within the limits of the design temperature range.

4.2.2.7.2 The maximum mass of non-refrigerated liquefied gas per litre of shell capacity (kg/l) shall not exceed the density of the non-refrigerated liquefied gas at 50 °C multiplied by 0.95. Furthermore, the shell shall not be liquid-full at 60 °C.

4.2.2.7.3 Portable tanks shall not be filled above their maximum permissible gross mass and the maximum permissible load mass specified for each gas to be transported.

4.2.2.8 Portable tanks shall not be offered for transport:

(a) In an ullage condition liable to produce an unacceptable hydraulic force due to surge within the portable tank;

(b) When leaking;

(c) When damaged to such an extent that the integrity of the tank or its lifting or securing arrangements may be affected; and

(d) Unless the service equipment has been examined and found to be in good working order.

4.2.2.9 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.7.3.13.4 need not be provided with a means of closing off the forklift pockets.

4.2.3 General provisions for the use of portable tanks for the transport of refrigerated liquefied gases

4.2.3.1 This section provides general requirements applicable to the use of portable tanks for the transport of refrigerated liquefied gases.

4.2.3.2 Portable tanks shall conform to the design, construction, inspection and testing requirements detailed in 6.7.4. Refrigerated liquefied gases shall be transported in portable tanks conforming to portable tank instruction T75 as described in 4.2.5.2.6 and the portable tank special provisions assigned to each substance in Column 11 of the Dangerous Goods List and described in 4.2.5.3.

4.2.3.3 During transport, portable tanks shall be adequately protected against damage to the shell and service equipment resulting from lateral and longitudinal impact and overturning. If the shell and service equipment are so constructed as to withstand impact or overturning it need not be protected in this way. Examples of such protection are provided in 6.7.4.12.5.

4.2.3.4 Unless the name of the gas(es) being transported appears on the metal plate described in 6.7.4.15.2, a copy of the certificate specified in 6.7.4.13.1 shall be made available upon a competent authority request and readily provided by the consignor, consignee or agent, as appropriate.

4.2.3.5 Empty portable tanks not cleaned and not gas-free shall comply with the same requirements as portable tanks filled with the previous substance.

4.2.3.6 *Filling*

4.2.3.6.1 Prior to filling the consignor shall ensure that the portable tank is approved for the refrigerated liquefied gas to be transported and that the portable tank is not loaded with refrigerated liquefied gases which in contact with the materials of the shell, gaskets and service equipment, are likely to react dangerously with them to form dangerous products or appreciably weaken these materials. During filling, the temperature of the refrigerated liquefied gas shall be within the limits of the design temperature range.

4.2.3.6.2 In estimating the initial degree of filling the necessary holding time for the intended journey including any delays which might be encountered shall be taken into consideration. The initial degree of filling of the shell, except as provided for in 4.2.3.6.3 and 4.2.3.6.4, shall be such that if the contents, except helium, were to be raised to a temperature at which the vapour pressure is equal to the maximum allowable working pressure (MAWP) the volume occupied by liquid would not exceed 98 %.

4.2.3.6.3 Shells intended for the transport of helium can be filled up to but not above the inlet of the pressure-relief device.

4.2.3.6.4 A higher initial degree of filling may be allowed, subject to approval by the competent authority, when the intended duration of transport is considerably shorter than the holding time.

4.2.3.7 *Actual holding time*

4.2.3.7.1 The actual holding time shall be calculated for each journey in accordance with a procedure recognized by the competent authority, on the basis of the following:

(a) The reference holding time for the refrigerated liquefied gas to be transported (see 6.7.4.2.8.1) (as indicated on the plate referred to in 6.7.4.15.1);

(b) The actual filling density;

(c) The actual filling pressure;

(d) The lowest set pressure of the pressure limiting device(s).

4.2.3.7.2 The actual holding time shall be marked either on the portable tank itself or on a metal plate firmly secured to the portable tank, in accordance with 6.7.4.15.2.

4.2.3.7.3 The date at which the actual holding time ends shall be entered in the transport document (see 5.4.1.5.13).

4.2.3.8 Portable tanks shall not be offered for transport:

(a) In an ullage condition liable to produce an unacceptable hydraulic force due to surge within the shell;

(b) When leaking;

(c) When damaged to such an extent that the integrity of the portable tank or its lifting or securing arrangements may be affected;

(d) Unless the service equipment has been examined and found to be in good working order;

(e) Unless the actual holding time for the refrigerated liquefied gas being transported has been determined in accordance with 4.2.3.7 and the portable tank is marked in accordance with 6.7.4.15.2; and

(f) Unless the duration of transport, after taking into consideration any delays which might be encountered, does not exceed the actual holding time.

4.2.3.9 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.7.4.12.4 need not be provided with a means of closing off the forklift pockets.

4.2.4 General provisions for the use of multiple-element gas containers (MEGCs)

4.2.4.1 This section provides general requirements applicable to the use of multiple-element gas containers (MEGCs) for the transport of non-refrigerated gases.

4.2.4.2 MEGCs shall conform to the design, construction, inspection and testing requirements detailed in 6.7.5. The elements of MEGCs shall be periodically inspected according to the provisions set out in P200 and in 6.2.1.6.

4.2.4.3 During transport, MEGCs shall be protected against damage to the elements and service equipment resulting from lateral and longitudinal impact and overturning. If the elements and service equipment are so constructed as to withstand impact or overturning, they need not be protected in this way. Examples of such protection are given in 6.7.5.10.4.

4.2.4.4 The periodic testing and inspection requirements for MEGCs are specified in 6.7.5.12. MEGCs or their elements shall not be charged or filled after they become due for periodic inspection but may be transported after the expiry of the time limit.

4.2.4.5 *Filling*

4.2.4.5.1 Prior to filling, the MEGC shall be inspected to ensure that it is authorized for the gas to be transported and that the applicable provisions of these Regulations have been met.

4.2.4.5.2 Elements of MEGCs shall be filled according to the working pressures, filling ratios and filling provisions specified in packing instruction P200 for the specific gas being filled into each element. In no case shall a MEGC or group of elements be filled as a unit in excess of the lowest working pressure of any given element.

4.2.4.5.3 MEGCs shall not be filled above their maximum permissible gross mass.

4.2.4.5.4 Isolation valves shall be closed after filling and remain closed during transport. Toxic gases of division 2.3 shall only be transported in MEGCs where each element is equipped with an isolation valve.

4.2.4.5.5 The opening(s) for filling shall be closed by caps or plugs. The leakproofness of the closures and equipment shall be verified by the consignor after filling.

4.2.4.5.6 MEGCs shall not be offered for filling:

(a) when damaged to such an extent that the integrity of the pressure receptacles or its structural or service equipment may be affected;

(b) unless the pressure receptacles and its structural and service equipment has been examined and found to be in good working order; and

(c) unless the required certification, retest, and filling marks are legible.

4.2.4.6 Charged MEGCs shall not be offered for transport:

(a) when leaking;

(b) when damaged to such an extent that the integrity of the pressure receptacles or its structural or service equipment may be affected;

(c) unless the pressure receptacles and its structural and service equipment have been examined and found to be in good working order; and

(d) unless the required certification, retest, and filling marks are legible.

4.2.4.7 Empty MEGCs that have not been cleaned and purged shall comply with the same requirements as MEGCs filled with the previous substance.

4.2.5 Portable tank instructions and special provisions

4.2.5.1 *General*

4.2.5.1.1 This section includes the portable tank instructions and special provisions applicable to dangerous goods authorized to be transported in portable tanks. Each portable tank instruction is identified by an alpha-numeric designation (e.g. T1). Column 10 of the Dangerous Goods List in Chapter 3.2 indicates the portable tank instruction that shall be used for each substance permitted for transport in a portable tank. When no portable tank instruction appears in Column 10 for a specific dangerous goods entry then transport of the substance in portable tanks is not permitted unless a competent authority approval is granted as detailed in 6.7.1.3. Portable tank special provisions are assigned to specific dangerous goods in Column 11 of the Dangerous Goods List in Chapter 3.2. Each portable tank special provision is identified by an alpha-numeric designation (e.g. TP1). A listing of the portable tank special provisions is provided in 4.2.5.3.

***NOTE**: The gases authorized for transport in MEGCs are indicated in the column "MEGC" in tables 1 and 2 of packing instruction P200 in 4.1.4.1.*

4.2.5.2 *Portable tank instructions*

4.2.5.2.1 Portable tank instructions apply to dangerous goods of Classes 1 to 9. Portable tank instructions provide specific information relevant to portable tanks provisions applicable to specific substances. These provisions shall be met in addition to the general provisions of this Chapter and the general requirements of Chapter 6.7 or Chapter 6.9.

4.2.5.2.2 For substances of Class 1 and Classes 3 to 9, the portable tank instructions indicate the applicable minimum test pressure, the minimum shell thickness (in reference steel or the minimum shell thickness of fibre-reinforced plastics), bottom opening requirements and pressure relief requirements. In T23, self-reactive substances of Division 4.1 and Division 5.2 organic peroxides permitted to be transported in portable tanks are listed along with the applicable control and emergency temperatures.

4.2.5.2.3 Non-refrigerated liquefied gases are assigned to portable tank instruction T50. T50 provides the maximum allowable working pressures, bottom opening requirements, pressure relief requirements and degree of filling requirements for non-refrigerated liquefied gases permitted for transport in portable tanks.

4.2.5.2.4 Refrigerated liquefied gases are assigned to portable tank instruction T75.

4.2.5.2.5 *Determination of the appropriate portable tank instructions*

When a specific portable tank instruction is specified in Column 10 for a specific dangerous goods entry additional portable tanks which possess higher test pressures, greater shell thicknesses, more stringent bottom opening and pressure-relief device arrangements may be used. The following guidelines apply to determining the appropriate portable tanks which may be used for transport of particular substances:

Portable tank instruction specified	**Portable tank instructions also permitted**
T1	T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T2	T4, T5, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T3	T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T4	T5, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T5	T10, T14, T19, T20, T22
T6	T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T7	T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T8	T9, T10, T13, T14, T19, T20, T21, T22
T9	T10, T13, T14, T19, T20, T21, T22
T10	T14, T19, T20, T22
T11	T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22
T12	T14, T16, T18, T19, T20, T22
T13	T14, T19, T20, T21, T22
T14	T19, T20, T22
T15	T16, T17, T18, T19, T20, T21, T22
T16	T18, T19, T20, T22
T17	T18, T19, T20, T21, T22
T18	T19, T20, T22
T19	T20, T22
T20	T22
T21	T22
T22	None
T23	None

4.2.5.2.6 *Portable tank instructions*

Portable tank instructions specify the requirements applicable to a portable tank when used for the transport of specific substances. Portable tank instructions T1 to T22 specify the applicable minimum test pressure, the minimum shell thickness (in mm reference steel or the minimum shell thickness for fibre reinforced plastics (FRP) portable tanks), and the pressure-relief and bottom-opening requirements.

T1 - T22	**PORTABLE TANK INSTRUCTIONS**			**T1 - T22**
These portable tank instructions apply to liquid and solid substances of Class 1 and Classes 3 to 9. The general provisions of section 4.2.1 and the requirements of section 6.7.2 shall be met. The instructions for portable tanks with FRP shells apply to substances of Classes or Divisions 1, 3, 5.1, 6.1, 6.2, 8 and 9. Additionally, the requirements of Chapter 6.9 apply to the portable tanks with FRP shells.				
Portable tank instruction	**Minimum test pressure (bar)**	**Minimum shell thickness (in mm-reference steel) (see 6.7.2.4)**	**Pressure-relief requirements[a] (see 6.7.2.8)**	**Bottom opening requirements[b] (see 6.7.2.6)**
T1	1.5	See 6.7.2.4.2	Normal	See 6.7.2.6.2
T2	1.5	See 6.7.2.4.2	Normal	See 6.7.2.6.3
T3	2.65	See 6.7.2.4.2	Normal	See 6.7.2.6.2
T4	2.65	See 6.7.2.4.2	Normal	See 6.7.2.6.3
T5	2.65	See 6.7.2.4.2	See 6.7.2.8.3	Not Allowed
T6	4	See 6.7.2.4.2	Normal	See 6.7.2.6.2
T7	4	See 6.7.2.4.2	Normal	See 6.7.2.6.3
T8	4	See 6.7.2.4.2	Normal	Not allowed
T9	4	6 mm	Normal	Not allowed
T10	4	6 mm	See 6.7.2.8.3	Not allowed
T11	6	See 6.7.2.4.2	Normal	See 6.7.2.6.3
T12	6	See 6.7.2.4.2	See 6.7.2.8.3	See 6.7.2.6.3
T13	6	6 mm	Normal	Not allowed
T14	6	6 mm	See 6.7.2.8.3	Not allowed
T15	10	See 6.7.2.4.2	Normal	See 6.7.2.6.3
T16	10	See 6.7.2.4.2	See 6.7.2.8.3	See 6.7.2.6.3
T17	10	6 mm	Normal	See 6.7.2.6.3
T18	10	6 mm	See 6.7.2.8.3	See 6.7.2.6.3
T19	10	6 mm	See 6.7.2.8.3	Not allowed
T20	10	8 mm	See 6.7.2.8.3	Not allowed
T21	10	10 mm	Normal	Not allowed
T22	10	10 mm	See 6.7.2.8.3	Not allowed

[a] *When the word "Normal" is indicated, all the requirements of 6.7.2.8 apply except for 6.7.2.8.3.*

[b] *When this column indicates "not allowed", bottom openings are not permitted when the substance to be transported is a liquid (see 6.7.2.6.1). When the substance to be transported is a solid at all temperatures encountered under normal conditions of transport, bottom openings conforming to the requirements of 6.7.2.6.2 are authorized.*

T23	PORTABLE TANK INSTRUCTION	T23

This portable tank instruction applies to self-reactive substances of Division 4.1 and organic peroxides of Division 5.2. The general provisions of section 4.2.1 and the requirements of section 6.7.2 shall be met. The provisions specific to self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 in 4.2.1.13 shall also be met. The formulations not listed in 2.4.2.3.2.3 and 2.5.3.2.4 but listed below may also be transported packed in accordance with packing method OP8 of packing instruction P520 of 4.1.4.1, with the same control and emergency temperatures, if applicable.

UN No	Substance	Min. test pressure (bar)	Min. shell thickness (mm-reference steel)	Bottom opening requirements	Pressure-relief requirements	Degree of filling	Control temp.	Emergency temp.
3109	ORGANIC PEROXIDE, TYPE F, LIQUID	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13		
	tert-Butyl hydroperoxide[a], not more than 72 % with water							
	tert-Butyl hydroperoxide, not more than 56 % in diluent type B[b]							
	Cumyl hydroperoxide, not more than 90 % in diluent type A							
	Di-tert-butyl peroxide, not more than 32 % in diluent type A							
	Isopropyl cumyl hydroperoxide, not more than 72 % in diluent type A							
	p-Menthyl hydroperoxide, not more than 72 % in diluent type A							
	Pinanyl hydroperoxide, not more than 56 % in diluent type A							
3110	ORGANIC PEROXIDE TYPE F, SOLID Dicumyl peroxide[c]	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13		
3119	ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13	[d]	[d]
	tert-Amyl peroxyneodecanoate, not more than 47 % in diluent type A						-10 °C	-5 °C

[a] *Provided that steps have been taken to achieve the safety equivalence of 65 % tert-Butyl hydroperoxide and 35 % water.*

[b] *Diluent type B is tert-Butyl alcohol*

[c] *Maximum quantity per portable tank 2 000 kg.*

[d] *As approved by the competent authority.*

Cont'd on next page

T23	PORTABLE TANK INSTRUCTION *(cont'd)*							T23
UN No	**Substance**	**Min. test pressure (bar)**	**Min. shell thickness (mm-reference steel)**	**Bottom opening require-ments**	**Pressure-relief require-ments**	**Degree of filling**	**Control temp.**	**Emer-gency temp.**
3119 *(cont'd)*	tert-Butyl peroxyacetate, not more than 32 % in diluent type B						+30 °C	+35 °C
	tert-Butyl peroxy-2-ethylhexanoate, not more than 32 % in diluent type B						+15 °C	+20 °C
	tert-Butyl peroxypivalate, not more than 27 % in diluent type B						+5 °C	+10 °C
	tert-Butyl peroxy-3,5,5-trimethyl-hexanoate, not more than 32 % in diluent type B						+35 °C	+40 °C
	Di-(3,5,5-trimethyl-hexanoyl) peroxide, not more than 38 % in diluent type A or type B						0 °C	+5 °C
	Peroxyacetic acid, distilled, type F, stabilized[e]						+30 °C	+35 °C
3120	ORGANIC PEROXIDE, TYPE F, SOLID, TEMPERATURE CONTROLLED	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13	[d]	[d]
3229	SELF-REACTIVE LIQUID TYPE F	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13		
3230	SELF-REACTIVE SOLID TYPE F	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13		
3239	SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13	[d]	[d]
3240	SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED	4	See 6.7.2.4.2	See 6.7.2.6.3	See 6.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13	[d]	[d]

[d] *As approved by the competent authority.*

[e] *Formulation derived from distillation of peroxyacetic acid originating from peroxyacetic acid in concentration of not more than 41 % with water, total active oxygen (peroxyacetic acid+H_2O_2) ≤ 9.5 %, which fulfils the criteria of 2.5.3.3.2 (f). "CORROSIVE" subsidiary hazard placard required (Model No 8, see 5.2.2.2.2).*

T50 PORTABLE TANK INSTRUCTION T50

This portable tank instruction applies to non-refrigerated liquefied gases and chemicals under pressure (UN Nos. 3500, 3501, 3502, 3503, 3504 and 3505). The general provisions of section 4.2.2 and the requirements of section 6.7.3 shall be met.

UN No	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated; respectively[a]	Openings below liquid level	Pressure-relief requirements[b] (see 6.7.3.7)	Maximum filling ratio
1005	Ammonia, anhydrous	29.0 25.7 22.0 19.7	Allowed	See 6.7.3.7.3	0.53
1009	Bromotrifluoromethane (Refrigerant gas R 13B1)	38.0 34.0 30.0 27.5	Allowed	Normal	1.13
1010	Butadienes, stabilized	7.5 7.0 7.0 7.0	Allowed	Normal	0.55
1010	Butadienes and hydrocarbon mixture, stabilized	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7
1011	Butane	7.0 7.0 7.0 7.0	Allowed	Normal	0.51
1012	Butylene	8.0 7.0 7.0 7.0	Allowed	Normal	0.53
1017	Chlorine	19.0 17.0 15.0 13.5	Not allowed	See 6.7.3.7.3	1.25
1018	Chlorodifluoromethane (Refrigerant gas R 22)	26.0 24.0 21.0 19.0	Allowed	Normal	1.03
1020	Chloropentafluoroethane (Refrigerant gas R 115)	23.0 20.0 18.0 16.0	Allowed	Normal	1.06
1021	1-Chloro-1,2,2,2-tetrafluoroethane (Refrigerant gas R 124)	10.3 9.8 7.9 7.0	Allowed	Normal	1.20

[a] *"Small" means tanks having a shell with a diameter of 1.5 metres or less; "Bare" means tanks having a shell with a diameter of more than 1.5 metres without insulation or sun shield (see 6.7.3.2.12); "Sunshield" means tanks having a shell with a diameter of more than 1.5 metres with sun shield (see 6.7.3.2.12); "Insulated" means tanks having a shell with a diameter of more than 1.5 metres with insulation (see 6.7.3.2.12); (see definition of "Design reference temperature" in 6.7.3.1).*

[b] *The word "Normal" in the pressure relief requirements column indicates that a frangible disc as specified in 6.7.3.7.3 is not required.*

T50	PORTABLE TANK INSTRUCTION *(cont'd)*				T50
UN No	**Non-refrigerated liquefied gases**	**Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated; respectively[a]**	**Openings below liquid level**	**Pressure-relief requirements[b] (see 6.7.3.7)**	**Maximum filling ratio**
1027	Cyclopropane	18.0 16.0 14.5 13.0	Allowed	Normal	0.53
1028	Dichlorodifluoromethane (Refrigerant gas R 12)	16.0 15.0 13.0 11.5	Allowed	Normal	1.15
1029	Dichlorofluoromethane (Refrigerant gas R 21)	7.0 7.0 7.0 7.0	Allowed	Normal	1.23
1030	1,1-Difluoroethane (Refrigerant gas R 152a)	16.0 14.0 12.4 11.0	Allowed	Normal	0.79
1032	Dimethylamine, anhydrous	7.0 7.0 7.0 7.0	Allowed	Normal	0.59
1033	Dimethyl ether	15.5 13.8 12.0 10.6	Allowed	Normal	0.58
1036	Ethylamine	7.0 7.0 7.0 7.0	Allowed	Normal	0.61
1037	Ethyl chloride	7.0 7.0 7.0 7.0	Allowed	Normal	0.80
1040	Ethylene oxide with nitrogen up to a total pressure of 1MPa (10 bar) at 50 °C	- - - 10.0	Not allowed	See 6.7.3.7.3	0.78
1041	Ethylene oxide and carbon dioxide mixture with more than 9 % but not more than 87 % ethylene oxide	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7
1055	Isobutylene	8.1 7.0 7.0 7.0	Allowed	Normal	0.52

[a] *"Small" means tanks having a shell with a diameter of 1.5 metres or less; "Bare" means tanks having a shell with a diameter of more than 1.5 metres without insulation or sun shield (see 6.7.3.2.12); "Sunshield" means tanks having a shell with a diameter of more than 1.5 metres with sun shield (see 6.7.3.2.12); "Insulated" means tanks having a shell with a diameter of more than 1.5 metres with insulation (see 6.7.3.2.12); (see definition of "Design reference temperature" in 6.7.3.1).*

[b] *The word "Normal" in the pressure relief requirements column indicates that a frangible disc as specified in 6.7.3.7.3 is not required.*

T50	PORTABLE TANK INSTRUCTION *(cont'd)*				T50
UN No	**Non-refrigerated liquefied gases**	**Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated; respectively[a]**	**Openings below liquid level**	**Pressure-relief requirements[b] (see 6.7.3.7)**	**Maximum filling ratio**
1060	Methyllacetylene and propadiene mixture, stabilized	28.0 24.5 22.0 20.0	Allowed	Normal	0.43
1061	Methylamine, anhydrous	10.8 9.6 7.8 7.0	Allowed	Normal	0.58
1062	Methyl bromide with not more than 2 % chloropicrin	7.0 7.0 7.0 7.0	Not allowed	See 6.7.3.7.3	1.51
1063	Methyl chloride (Refrigerant gas R 40)	14.5 12.7 11.3 10.0	Allowed	Normal	0.81
1064	Methyl mercaptan	7.0 7.0 7.0 7.0	Not allowed	See 6.7.3.7.3	0.78
1067	Dinitrogen tetroxide	7.0 7.0 7.0 7.0	Not allowed	See 6.7.3.7.3	1.30
1075	Petroleum gas, liquefied	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7
1077	Propylene	28.0 24.5 22.0 20.0	Allowed	Normal	0.43
1078	Refrigerant gas, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7
1079	Sulphur dioxide	11.6 10.3 8.5 7.6	Not allowed	See 6.7.3.7.3	1.23
1082	Trifluorochloroethylene, stabilized (Refrigerant gas R 1113)	17.0 15.0 13.1 11.6	Not allowed	See 6.7.3.7.3	1.13

[a] *"Small" means tanks having a shell with a diameter of 1.5 metres or less; "Bare" means tanks having a shell with a diameter of more than 1.5 metres without insulation or sun shield (see 6.7.3.2.12); "Sunshield" means tanks having a shell with a diameter of more than 1.5 metres with sun shield (see 6.7.3.2.12); "Insulated" means tanks having a shell with a diameter of more than 1.5 metres with insulation (see 6.7.3.2.12); (see definition of "Design reference temperature" in 6.7.3.1).*

[b] *The word "Normal" in the pressure relief requirements column indicates that a frangible disc as specified in 6.7.3.7.3 is not required.*

T50	PORTABLE TANK INSTRUCTION *(cont'd)*				T50
UN No	**Non-refrigerated liquefied gases**	**Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated; respectively[a]**	**Openings below liquid level**	**Pressure-relief requirements[b] (see 6.7.3.7)**	**Maximum filling ratio**
1083	Trimethylamine, anhydrous	7.0 7.0 7.0 7.0	Allowed	Normal	0.56
1085	Vinyl bromide, stabilized	7.0 7.0 7.0 7.0	Allowed	Normal	1.37
1086	Vinyl chloride, stabilized	10.6 9.3 8.0 7.0	Allowed	Normal	0.81
1087	Vinyl methyl ether, stabilized	7.0 7.0 7.0 7.0	Allowed	Normal	0.67
1581	Chloropicrin and methyl bromide mixture with more than 2 % chloropicrin	7.0 7.0 7.0 7.0	Not allowed	See 6.7.3.7.3	1.51
1582	Chloropicrin and methyl chloride mixture	19.2 16.9 15.1 13.1	Not allowed	See 6.7.3.7.3	0.81
1858	Hexafluoropropylene (Refrigerant gas R 1216)	19.2 16.9 15.1 13.1	Allowed	Normal	1.11
1912	Methyl chloride and methylene chloride mixture	15.2 13.0 11.6 10.1	Allowed	Normal	0.81
1958	1,2-Dichloro-1,1,2,2-tetrafluoroethane (Refrigerant gas R 114)	7.0 7.0 7.0 7.0	Allowed	Normal	1.30
1965	Hydrocarbon gas, mixture liquefied, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7
1969	Isobutane	8.5 7.5 7.0 7.0	Allowed	Normal	0.49

[a] *"Small" means tanks having a shell with a diameter of 1.5 metres or less; "Bare" means tanks having a shell with a diameter of more than 1.5 metres without insulation or sun shield (see 6.7.3.2.12); "Sunshield" means tanks having a shell with a diameter of more than 1.5 metres with sun shield (see 6.7.3.2.12); "Insulated" means tanks having a shell with a diameter of more than 1.5 metres with insulation (see 6.7.3.2.12); (see definition of "Design reference temperature" in 6.7.3.1).*

[b] *The word "Normal" in the pressure relief requirements column indicates that a frangible disc as specified in 6.7.3.7.3 is not required.*

T50	PORTABLE TANK INSTRUCTION *(cont'd)*				T50
UN No	**Non-refrigerated liquefied gases**	**Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated; respectively[a]**	**Openings below liquid level**	**Pressure-relief requirements[b] (see 6.7.3.7)**	**Maximum filling ratio**
1973	Chlorodifluoromethane and chloropentafluoroethane mixture with fixed boiling point, with approximately 49 % chlorodifluoromethane (Refrigerant gas R 502)	28.3 25.3 22.8 20.3	Allowed	Normal	1.05
1974	Chlorodifluorobromomethane (Refrigerant gas R 12B1)	7.4 7.0 7.0 7.0	Allowed	Normal	1.61
1976	Octafluorocyclobutane (Refrigerant gas RC 318)	8.8 7.8 7.0 7.0	Allowed	Normal	1.34
1978	Propane	22.5 20.4 18.0 16.5	Allowed	Normal	0.42
1983	1-Chloro-2,2,2-trifluoroethane (Refrigerant gas R 133a)	7.0 7.0 7.0 7.0	Allowed	Normal	1.18
2035	1,1,1-Trifluoroethane (Refrigerant gas R 143a)	31.0 27.5 24.2 21.8	Allowed	Normal	0.76
2424	Octafluoropropane (Refrigerant gas R 218)	23.1 20.8 18.6 16.6	Allowed	Normal	1.07
2517	1-Chloro-1,1-difluoroethane (Refrigerant gas R 142b)	8.9 7.8 7.0 7.0	Allowed	Normal	0.99
2602	Dichlorodifluoromethane and difluoroethane azeotropic mixture with approximately 74 % dichlorodifluoromethane (Refrigerant gas R 500)	20.0 18.0 16.0 14.5	Allowed	Normal	1.01
3057	Trifluoroacetyl chloride	14.6 12.9 11.3 9.9	Not allowed	6.7.3.7.3	1.17

[a] *"Small" means tanks having a shell with a diameter of 1.5 metres or less; "Bare" means tanks having a shell with a diameter of more than 1.5 metres without insulation or sun shield (see 6.7.3.2.12); "Sunshield" means tanks having a shell with a diameter of more than 1.5 metres with sun shield (see 6.7.3.2.12); "Insulated" means tanks having a shell with a diameter of more than 1.5 metres with insulation (see 6.7.3.2.12); (see definition of "Design reference temperature" in 6.7.3.1).*

[b] *The word "Normal" in the pressure relief requirements column indicates that a frangible disc as specified in 6.7.3.7.3 is not required.*

T50	PORTABLE TANK INSTRUCTION *(cont'd)*				T50
UN No	**Non-refrigerated liquefied gases**	**Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated; respectively[a]**	**Openings below liquid level**	**Pressure-relief requirements[b] (see 6.7.3.7)**	**Maximum filling ratio**
3070	Ethylene oxide and dichlorodifluoromethane mixture with not more than 12.5 % ethylene oxide	14.0 12.0 11.0 9.0	Allowed	6.7.3.7.3	1.09
3153	Perfluoro (methyl vinyl ether)	14.3 13.4 11.2 10.2	Allowed	Normal	1.14
3159	1,1,1,2-Tetrafluoroethane (Refrigerant gas R 134a)	17.7 15.7 13.8 12.1	Allowed	Normal	1.04
3161	Liquefied gas, flammable, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7
3163	Liquefied gas, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	Normal	See 4.2.2.7
3220	Pentafluoroethane (Refrigerant gas R 125)	34.4 30.8 27.5 24.5	Allowed	Normal	0.87
3252	Difluoromethane (Refrigerant gas R 32)	43.0 39.0 34.4 30.5	Allowed	Normal	0.78
3296	Heptafluoropropane (Refrigerant gas R 227)	16.0 14.0 12.5 11.0	Allowed	Normal	1.20
3297	Ethylene oxide and chlorotetrafluoroethane mixture, with not more than 8.8 % ethylene oxide	8.1 7.0 7.0 7.0	Allowed	Normal	1.16
3298	Ethylene oxide and pentafluoroethane mixture, with not more than 7.9 % ethylene oxide	25.9 23.4 20.9 18.6	Allowed	Normal	1.02
3299	Ethylene oxide and tetrafluoroethane mixture, with not more than 5.6 % ethylene oxide	16.7 14.7 12.9 11.2	Allowed	Normal	1.03

[a] *"Small" means tanks having a shell with a diameter of 1.5 metres or less; "Bare" means tanks having a shell with a diameter of more than 1.5 metres without insulation or sun shield (see 6.7.3.2.12); "Sunshield" means tanks having a shell with a diameter of more than 1.5 metres with sun shield (see 6.7.3.2.12); "Insulated" means tanks having a shell with a diameter of more than 1.5 metres with insulation (see 6.7.3.2.12); (see definition of "Design reference temperature" in 6.7.3.1).*

[b] *The word "Normal" in the pressure relief requirements column indicates that a frangible disc as specified in 6.7.3.7.3 is not required.*

T50	PORTABLE TANK INSTRUCTION *(cont'd)*				T50
UN No	**Non-refrigerated liquefied gases**	**Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated; respectively[a]**	**Openings below liquid level**	**Pressure-relief requirements[b] (see 6.7.3.7)**	**Maximum filling ratio**
3318	Ammonia solution, relative density less than 0.880 at 15 °C in water, with more than 50 % ammonia	See MAWP definition in 6.7.3.1	Allowed	See 6.7.3.7.3	See 4.2.2.7
3337	Refrigerant gas R 404A	31.6 28.3 25.3 22.5	Allowed	Normal	0.82
3338	Refrigerant gas R 407A	31.3 28.1 25.1 22.4	Allowed	Normal	0.94
3339	Refrigerant gas R 407B	33.0 29.6 26.5 23.6	Allowed	Normal	0.93
3340	Refrigerant gas R 407C	29.9 26.8 23.9 21.3	Allowed	Normal	0.95
3500	Chemical under pressure, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	See 6.7.3.7.3	TP4[c]
3501	Chemical under pressure, flammable, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	See 6.7.3.7.3	TP4[c]
3502	Chemical under pressure, toxic, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	See 6.7.3.7.3	TP4[c]
3503	Chemical under pressure, corrosive, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	See 6.7.3.7.3	TP4[c]
3504	Chemical under pressure, flammable, toxic, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	See 6.7.3.7.3	TP4[c]
3505	Chemical under pressure, flammable, corrosive, n.o.s.	See MAWP definition in 6.7.3.1	Allowed	See 6.7.3.7.3	TP4[c]

[a] *"Small" means tanks having a shell with a diameter of 1.5 metres or less; "Bare" means tanks having a shell with a diameter of more than 1.5 metres without insulation or sun shield (see 6.7.3.2.12); "Sunshield" means tanks having a shell with a diameter of more than 1.5 metres with sun shield (see 6.7.3.2.12); "Insulated" means tanks having a shell with a diameter of more than 1.5 metres with insulation (see 6.7.3.2.12); (see definition of "Design reference temperature" in 6.7.3.1).*

[b] *The word "Normal" in the pressure relief requirements column indicates that a frangible disc as specified in 6.7.3.7.3 is not required.*

[c] *For UN Nos. 3500, 3501, 3502, 3503, 3504 and 3505, the degree of filling shall be considered instead of the maximum filling ratio.*

T75	PORTABLE TANK INSTRUCTION	T75
This portable tank instruction applies to refrigerated liquefied gases. The general provisions of section 4.2.3 and the requirements of section 6.7.4 shall be met.		

4.2.5.3 ***Portable tank special provisions***

Portable tank special provisions are assigned to certain substances to indicate provisions which are in addition to or in lieu of those provided by the portable tank instructions or the requirements in Chapter 6.7. Portable tank special provisions are identified by an alphanumeric designation beginning with the letters "TP" (tank provision) and are assigned to specific substances in Column 11 of the Dangerous Goods List in Chapter 3.2. The following is a list of the portable tank special provisions:

TP1 The degree of filling prescribed in 4.2.1.9.2 shall not be exceeded

$$\text{Degree of filling} = \frac{97}{1 + \alpha(t_r - t_f)}$$

TP2 The degree of filling prescribed in 4.2.1.9.3 shall not be exceeded

$$\text{Degree of filling} = \frac{95}{1 + \alpha(t_r - t_f)}$$

TP3 The maximum degree of filling (in %) for solids transported above their melting points and for elevated temperature liquids shall be determined in accordance with 4.2.1.9.5.

$$\text{Degree of filling} = 95\frac{d_r}{d_f}$$

TP4 The degree of filling shall not exceed 90 % or, alternatively, any other value approved by the competent authority (see 4.2.1.16.2).

TP5 The degree of filling prescribed in 4.2.3.6 shall be met.

TP6 To prevent the tank bursting in any event, including fire engulfment, it shall be provided with pressure-relief devices which are adequate in relation to the capacity of the tank and to the nature of the substance transported. The device shall also be compatible with the substance.

TP7 Air shall be eliminated from the vapour space by nitrogen or other means.

TP8 The test pressure for the portable tank may be reduced to 1.5 bar when the flash point of the substances transported is greater than 0 °C.

TP9 A substance under this description shall only be transported in a portable tank under an approval granted by the competent authority.

TP10 A lead lining, not less than 5 mm thick, which shall be tested annually, or another suitable lining material approved by the competent authority is required. A portable tank may be offered for transport after the date of expiry of the last lining inspection for a period not to exceed three months beyond that date, after emptying but before cleaning, for purposes of performing the next required test or inspection prior to refilling.

TP12 *Deleted.*

TP13 Self-contained breathing apparatus shall be provided when this substance is transported.

TP16 The tank shall be fitted with a special device to prevent under-pressure and excess pressure during normal transport conditions. This device shall be approved by the competent authority. Pressure-relief requirements are as indicated in 6.7.2.8.3 to prevent crystallization of the product in the pressure-relief valve.

TP17 Only inorganic non-combustible materials shall be used for thermal insulation of the tank.

TP18 Temperature shall be maintained between 18 °C and 40 °C. Portable tanks containing solidified methacrylic acid shall not be reheated during transport.

TP19 At the time of construction, the minimum shell thickness determined according to 6.7.3.4 shall be increased by 3 mm as a corrosion allowance. Shell thickness shall be verified ultrasonically at intervals midway between periodic hydraulic tests and shall never be lower than the minimum shell thickness determined according to 6.7.3.4.

TP20 This substance shall only be transported in insulated tanks under a nitrogen blanket.

TP21 The shell thickness shall be not less than 8 mm. Tanks shall be hydraulically tested and internally inspected at intervals not exceeding 2.5 years.

TP22 Lubricant for joints or other devices shall be oxygen compatible.

TP23 *Deleted.*

TP24 The portable tank may be fitted with a device located under maximum filling conditions in the vapour space of the shell to prevent the build up of excess pressure due to the slow decomposition of the substance transported. This device shall also prevent an unacceptable amount of leakage of liquid in the case of overturning or entry of foreign matter into the tank. This device shall be approved by the competent authority or its authorized body.

TP25 Sulphur trioxide 99.95 % pure and above may be transported in tanks without an inhibitor provided that it is maintained at a temperature equal to or above 32.5 °C.

TP26 When transported under heated conditions, the heating device shall be fitted outside the shell. For UN 3176 this requirement only applies when the substance reacts dangerously with water.

TP27 A portable tank having a minimum test pressure of 4 bar may be used if it is shown that a test pressure of 4 bar or less is acceptable according to the test pressure definition in 6.7.2.1.

TP28 A portable tank having a minimum test pressure of 2.65 bar may be used if it is shown that a test pressure of 2.65 bar or less is acceptable according to the test pressure definition in 6.7.2.1.

TP29 A portable tank having a minimum test pressure of 1.5 bar may be used if it is shown that a test pressure of 1.5 bar or less is acceptable according to the test pressure definition in 6.7.2.1.

TP30 This substance shall be transported in insulated tanks.

TP31 This substance may only be transported in tanks in the solid state.

TP32 For UN Nos. 0331, 0332 and 3375, portable tanks may be used subject to the following conditions:

(a) To avoid unnecessary confinement, each portable tank constructed of metal or fibre-reinforced plastics shall be fitted with a pressure-relief device that may be of the reclosing spring-loaded type, a frangible disc or a fusible element. The set to discharge or burst pressure, as applicable, shall not be greater than 2.65 bar for portable tanks with minimum test pressures greater than 4 bar;

(b) For UN 3375 only, the suitability for transport in tanks shall be demonstrated. One method to evaluate this suitability is test 8 (d) in test series 8 (see "*Manual of Tests and Criteria*", Part 1, sub-section 18.7);

(c) Substances shall not be allowed to remain in the portable tank for any period that could result in caking. Appropriate measures shall be taken to avoid accumulation and packing of substances in the tank (e.g. cleaning, etc).

TP33 The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. For solids which are transported above their melting point see 4.2.1.19.

TP34 Portable tanks need not be subjected to the impact test in 6.7.4.14.1 if the portable tank is marked "NOT FOR RAIL TRANSPORT" on the plate specified in 6.7.4.15.1 and also in letters of at least 10 cm high on both sides of the outer jacket.

TP35 *Deleted.*

TP36 Fusible elements in the vapour space may be used on portable tanks.

TP37 *Deleted.*

TP38 *Deleted.*

TP39 *Deleted.*

TP40 Portable tanks shall not be transported when connected with spray application equipment.

TP41 The 2.5 year internal examination may be waived or substituted by other test methods or inspection procedures specified by the competent authority or its authorized body, provided that the portable tank is dedicated to the transport of the organometallic substances to which this tank special provision is assigned. However, this examination is required when the conditions of 6.7.2.19.7 are met.

4.2.6 Transitional measures

Portable tanks and MEGCs manufactured before 1 January 2012, that conform to the marking requirements of 6.7.2.20.1, 6.7.3.16.1, 6.7.4.15.1 or 6.7.5.13.1 of the Model Regulations on the Transport of Dangerous Goods annexed to the 15th revised edition of the Recommendations on the Transport of Dangerous Goods, as relevant, may continue to be used if they comply with all other relevant requirements of the current edition of the Model Regulations including, when applicable, the requirement of 6.7.2.20.1 (g) for marking the symbol "S" on the plate when the shell or the compartment is divided by surge plates into sections of not more than 7 500 litres capacity. When the shell, or the compartment, was already divided by surge plates into sections of not more than 7 500 litres capacity before 1 January 2012, the capacity of the shell, or respectively of the compartment, need not be supplemented with the symbol "S" until the next periodic inspection or test according to 6.7.2.19.5 is performed.

Portable tanks manufactured before 1 January 2014 need not be marked with the portable tank instruction as required in 6.7.2.20.2, 6.7.3.16.2 and 6.7.4.15.2 until the next periodic inspection and test.

Portable tanks and MECGs manufactured before 1 January 2014 need not comply with the requirements of 6.7.2.13.1 (f), 6.7.3.9.1 (e), 6.7.4.8.1 (e) and 6.7.5.6.1 (d) concerning the marking of the pressure relief devices.

CHAPTER 4.3

USE OF BULK CONTAINERS

4.3.1 General provisions

4.3.1.1 This section provides general requirements applicable to the use of containers for the transport of solid substances in bulk. Substances shall be transported in bulk containers conforming to the applicable bulk container instruction identified by the letters BK in Column 10 of the Dangerous Goods List, with the following meaning:

BK1: the transport in sheeted bulk containers is permitted

BK2: the transport in closed bulk containers is permitted

BK3: the transport in flexible bulk containers is permitted

The bulk container used shall conform to the requirements of Chapter 6.8.

4.3.1.2 Except as provided in 4.3.1.3, bulk containers shall only be used when a substance is assigned to a bulk container code in Column 10 of the Dangerous Goods List in Chapter 3.2.

4.3.1.3 When a substance is not assigned a bulk container code in Column 10 of the Dangerous Goods List in Chapter 3.2, interim approval for transport may be issued by the competent authority of the country of origin. The approval shall be included in the documentation of the consignment and contain, as a minimum, the information normally provided in the bulk container instruction and the conditions under which the substance shall be transported. Appropriate measures should be initiated by the competent authority to include the assignment in the Dangerous Goods List.

4.3.1.4 Substances which may become liquid at temperatures likely to be encountered during transport, are not permitted in bulk containers.

4.3.1.5 Bulk containers shall be siftproof and shall be so closed that none of the contents can escape under normal conditions of transport including the effect of vibration, or by changes of temperature, humidity or pressure.

4.3.1.6 Bulk solids shall be loaded into bulk containers and evenly distributed in a manner that minimises movement that could result in damage to the container or leakage of the dangerous goods.

4.3.1.7 Where venting devices are fitted they shall be kept clear and operable.

4.3.1.8 Bulk solids shall not react dangerously with the material of the bulk container, gaskets, equipment including lids and tarpaulins and with protective coatings which are in contact with the contents or significantly weaken them. Bulk containers shall be so constructed or adapted that the goods can not penetrate between wooden floor coverings or come into contact with those parts of the bulk containers that may be affected by the materials or residues thereof.

4.3.1.9 Before being filled and offered for transport each bulk container shall be inspected and cleaned to ensure that it does not contain any residue on the interior or exterior of the bulk container that could:

(a) cause a dangerous reaction with the substance intended for transport;

(b) detrimentally affect the structural integrity of the bulk container; or

(c) affect the dangerous goods retention capabilities of the bulk container.

4.3.1.10 During transport, no dangerous residues shall adhere to the outer surfaces of bulk containers.

4.3.1.11 If several closure systems are fitted in series, the system which is located nearest to the substance to be transported shall be closed first before filling.

4.3.1.12 Empty bulk containers that have contained a dangerous substance shall be treated in the same manner as is required by these Regulations for a filled bulk container, unless adequate measures have been taken to nullify any hazard.

4.3.1.13 If bulk containers are used for the transport of bulk goods liable to cause a dust explosion, or evolve flammable vapours (e. g. for certain wastes) measures shall be taken to exclude sources of ignition and prevent dangerous electrostatic discharge during transport filling or discharge of the substance.

4.3.1.14 Substances, for example wastes, which may react dangerously with one another and substances of different classes and goods not subject to these Regulations, which are liable to react dangerously with one another shall not be mixed together in the same bulk container. Dangerous reactions are:

(a) combustion and/or evolution of considerable heat;

(b) emission of flammable and/or toxic gases;

(c) formation of corrosive liquids; or

(d) formation of unstable substances.

4.3.1.15 Before a bulk container is filled it shall be visually examined to ensure it is structurally serviceable, its interior walls, ceiling and floors are free from protrusions or damage and that any inner liners or substance retaining equipment are free from rips, tears or any damage that would compromise its cargo retention capabilities. Structurally serviceable means the bulk container does not have major defects in its structural components, such as top and bottom side rails, top and bottom end rails, door sill and header, floor cross members, corner posts, and corner fittings in a freight container. Major defects include:

(a) Bends, cracks or breaks in structural or supporting members, or any damage to service or operational equipment that affect the integrity of the container;

(b) Any distortion of the overall configuration or any damage to lifting attachments or handling equipment interface features great enough to prevent proper alignment of handling equipment, mounting and securing chassis or vehicle, or insertion into ships' cells; and, where applicable

(c) Door hinges, door seals and hardware that are seized, twisted, broken, missing, or otherwise inoperative;

4.3.1.16 Before a flexible bulk container is filled it shall be visually examined to ensure it is structurally serviceable, its textile slings, load-bearing structure straps, body fabric, lock device parts including metal and textile parts are free from protrusions or damage and that inner liners are free from rips, tears or any damage.

4.3.1.16.1 For flexible bulk containers, the period of use permitted for the transport of dangerous goods shall be two years from the date of manufacture of the flexible bulk container.

4.3.1.16.2 A venting device shall be fitted if a dangerous accumulation of gases may develop within the flexible bulk container. The vent shall be so designed that the penetration of foreign substances or the ingress of water is prevented under normal conditions of transport.

4.3.2 Additional provisions applicable to bulk goods of Divisions 4.2, 4.3, 5.1, 6.2 and Classes 7 and 8

4.3.2.1 ***Bulk goods of Division 4.2***

Only closed bulk containers (code BK2) may be used. The total mass carried in a bulk container shall be such that its spontaneous ignition temperature is greater than 55 °C.

4.3.2.2 ***Bulk goods of Division 4.3***

Only closed bulk containers (code BK2) and flexible bulk containers (code BK3) may be used. These goods shall be transported in bulk containers which are waterproof.

4.3.2.3 ***Bulk goods of Division 5.1***

Bulk containers shall be so constructed or adapted that the goods cannot come into contact with wood or any other incompatible material.

4.3.2.4 ***Bulk goods of Division 6.2***

4.3.2.4.1 *Bulk transport of animal material of Division 6.2*

Animal material containing infectious substances (UN Nos. 2814, 2900 and 3373) is authorized for transport in bulk containers provided the following conditions are met:

(a) Sheeted bulk containers BK1 are permitted provided that they are not filled to maximum capacity to avoid substances coming into contact with the sheeting. Closed bulk containers BK2 are also permitted;

(b) Closed and sheeted bulk containers, and their openings, shall be leak-proof by design or by the fitting of a suitable liner;

(c) The animal material shall be thoroughly treated with an appropriate disinfectant before loading prior to transport;

(d) Sheeted bulk containers shall be covered by an additional top liner weighted down by absorbent material treated with an appropriate disinfectant;

(e) Closed or sheeted bulk containers shall not be re-used until after they have been thoroughly cleaned and disinfected.

NOTE: *Additional provisions may be required by appropriate national health authorities.*

4.3.2.4.2 *Bulk wastes of Division 6.2 (UN No. 3291)*

(a) Only closed bulk containers (BK2) shall be permitted;

(b) Closed bulk containers and their openings shall be leakproof by design. These bulk containers shall have non porous interior surfaces and shall be free from cracks or other features which could damage packagings inside, impede disinfection or permit inadvertent release;

(c) Wastes of UN No. 3291 shall be contained within the closed bulk container in UN type tested and approved sealed leakproof plastics bags tested for solids of packing group II and marked in accordance with 6.1.3.1. Such plastics bags shall be capable of passing the tests for tear and impact resistance according to ISO 7765-1:1988 “Plastics film and sheeting – Determination of impact resistance by the free-falling dart method – Part 1: Staircase methods” and ISO 6383-2:1983 “Plastics – Film and sheeting – Determination of tear resistance – Part 2: Elmendorf method”. Each bag shall have an impact resistance of at least 165 g and a tear resistance of at least 480 g in both parallel and perpendicular

planes with respect to the length of the bag. The maximum net mass of each plastics bag shall be 30 kg;

(d) Single articles exceeding 30 kg such as soiled mattresses may be transported without the need for a plastics bag when authorized by the competent authority;

(e) Wastes of UN No. 3291 which contain liquids shall only be transported in plastics bags containing sufficient absorbent material to absorb the entire amount of liquid without it spilling in the bulk container;

(f) Wastes of UN No. 3291 containing sharp objects shall only be transported in UN type tested and approved rigid packagings meeting the provisions of packing instructions P621, IBC620 or LP621;

(g) Rigid packagings specified in packing instructions P621, IBC620 or LP621 may also be used. They shall be properly secured to prevent damage during normal conditions of transport. Wastes transported in rigid packagings and plastics bags together in the same closed bulk container shall be adequately segregated from each other, e.g. by suitable rigid barriers or dividers, mesh nets or otherwise securing, such that they prevent damage to the packagings during normal conditions of transport;

(h) Wastes of UN No. 3291 in plastics bags shall not be compressed in a closed bulk container in such a way that bags may be rendered no longer leakproof;

(i) The closed bulk container shall be inspected for leakage or spillage after each journey. If any wastes of UN No. 3291 have leaked or been spilled in the closed bulk container, it shall not be re-used until after it has been thoroughly cleaned and, if necessary, disinfected or decontaminated with an appropriate agent. No other goods shall be transported together with UN No. 3291 other than medical or veterinary wastes. Any such other wastes transported in the same closed bulk container shall be inspected for possible contamination.

4.3.2.5 ***Bulk material of Class 7***

For the transport of unpackaged radioactive material, see 4.1.9.2.4.

4.3.2.6 ***Bulk goods of Class 8***

Only closed bulk containers (code BK2) may be used. These goods shall be transported in bulk containers which are watertight.

PART 5

CONSIGNMENT PROCEDURES

CHAPTER 5.1

GENERAL PROVISIONS

5.1.1 Application and general provisions

5.1.1.1 This Part sets forth the provisions for dangerous goods consignments relative to authorization of consignments and advance notifications, marking, labelling, documentation (by manual, electronic data processing (EDP) or electronic data interchange (EDI) techniques) and placarding.

5.1.1.2 Except as otherwise provided in these Regulations, no person may offer dangerous goods for transport unless those goods are properly marked, labelled, placarded, described and certified on a transport document, and otherwise in a condition for transport as required by this Part.

NOTE: *In accordance with the GHS, a GHS pictogram not required by these Regulations should only appear in transport as part of a complete GHS label and not independently (see GHS 1.4.10.4.4).*

5.1.2 Use of overpacks

5.1.2.1 Unless marks and labels representative of all dangerous goods in the overpack are visible, the overpack shall be:

(a) marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high; and

(b) labelled and marked with the proper shipping name, UN number and other marks, as required for packages by Chapter 5.2, for each item of dangerous goods contained in the overpack.

Labelling of overpacks containing radioactive material shall be in accordance with 5.2.2.1.12.

NOTE: *The size requirement for the "OVERPACK" mark shall apply as from 1 January 2016.*

5.1.2.2 Each package of dangerous goods contained in the overpack shall comply with all applicable provisions of these Regulations. The "overpack" mark is an indication of compliance with this requirement. The intended function of each package shall not be impaired by the overpack.

5.1.2.3 Each package bearing package orientation marks as prescribed in 5.2.1.7 of these Regulations and which is overpacked or placed in a large packaging shall be oriented in accordance with such marks.

5.1.3 Empty packagings

5.1.3.1 Other than for Class 7, a packaging which previously contained dangerous goods shall be identified, marked, labelled and placarded as required for those dangerous goods unless steps such as cleaning, purging of vapours or refilling with a non-dangerous substance are taken to nullify any hazard.

5.1.3.2 Freight containers, tanks, IBCs, as well as other packagings and overpacks, used for the transport of radioactive material shall not be used for the storage or transport of other goods unless decontaminated below the level of 0.4 Bq/cm2 for beta and gamma emitters and low toxicity alpha emitters and 0.04 Bq/cm^2 for all other alpha emitters.

5.1.4 Mixed packing

When two or more dangerous goods are packed within the same outer packaging, the package shall be labelled and marked as required for each substance. Subsidiary hazard labels need not be applied if the hazard is already represented by a primary hazard label.

5.1.5 General provisions for Class 7

5.1.5.1 *Approval of shipments and notification*

5.1.5.1.1 *General*

In addition to the approval of package designs described in Chapter 6.4, multilateral shipment approval is also required in certain circumstances (5.1.5.1.2 and 5.1.5.1.3). In some circumstances it is also necessary to notify competent authorities of a shipment (5.1.5.1.4).

5.1.5.1.2 *Shipment approvals*

Multilateral approval shall be required for:

(a) The shipment of Type B(M) packages not conforming to the requirements of 6.4.7.5 or designed to allow controlled intermittent venting;

(b) The shipment of Type B(M) packages containing radioactive material with an activity greater than 3 000 A1 or 3 000 A2, as appropriate, or 1 000 TBq, whichever is the lower;

(c) The shipment of packages containing fissile materials if the sum of the criticality safety indexes of the packages in a single freight container or in a single conveyance exceeds 50. Excluded from this requirement shall be shipments by seagoing vessels, if the sum of the criticality safety indexes does not exceed 50 for any hold, compartment or defined deck area and the distance of 6 m between groups of packages or overpacks as required in table 7.1.8.4.2 is met;

(d) Radiation protection programmes for shipments by special use vessels in accordance with 7.2.3.2.2; and

(e) The shipment of SCO-III.

except that a competent authority may authorize transport into or through its country without shipment approval, by a specific provision in its design approval (see 5.1.5.2.1).

5.1.5.1.3 *Shipment approval by special arrangement*

A competent authority may approve provisions under which consignments that do not satisfy all the applicable requirements of these Regulations may be transported under special arrangement (see 1.5.4).

5.1.5.1.4 *Notifications*

Notification to competent authorities is required as follows:

(a) Before the first shipment of any package requiring competent authority approval, the consignor shall ensure that copies of each applicable competent authority certificate applying to that package design have been submitted to the competent authority of the country of origin of the shipment and to the competent authority of each country through or into which the consignment is to be transported. The consignor is not required to await an acknowledgement from the competent authority, nor is the competent authority required to make such acknowledgement of receipt of the certificate;

(b) For each of the following types of shipments:

(i) Type C packages containing radioactive material with an activity greater than 3 000 A1 or 3 000 A2, as appropriate, or 1 000 TBq, whichever is the lower;

(ii) Type B(U) packages containing radioactive material with an activity greater than 3 000 A1 or 3 000 A2, as appropriate, or 1 000 TBq, whichever is the lower;

(iii) Type B(M) packages;

(iv) Shipment under special arrangement,

the consignor shall notify the competent authority of the country of origin of the shipment and the competent authority of each country through or into which the consignment is to be transported. This notification shall be in the possession of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance;

(c) The consignor is not required to send a separate notification if the required information has been included in the application for approval of shipment (see 6.4.23.2);

(d) The consignment notification shall include:

(i) sufficient information to enable the identification of the package or packages including all applicable certificate numbers and identification marks;

(ii) information on the date of shipment, the expected date of arrival and proposed routeing;

(iii) the names of the radioactive material or nuclides;

(iv) descriptions of the physical and chemical forms of the radioactive material, or whether it is special form radioactive material or low dispersible radioactive material; and

(v) the maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix symbol (see 1.2.2.1). For fissile material, the mass of fissile material (or of each fissile nuclide for mixtures when appropriate) in units of grams (g), or multiples thereof, may be used in place of activity.

5.1.5.2 ***Certificates issued by Competent Authority***

5.1.5.2.1 Certificates issued by the competent authority are required for the following:

(a) Designs for

(i) special form radioactive material;

(ii) low dispersible radioactive material;

(iii) fissile material excepted under 2.7.2.3.5 (f);

(iv) packages containing 0.1 kg or more of uranium hexafluoride;

(v) packages containing fissile material unless excepted by 2.7.2.3.5, 6.4.11.2 or 6.4.11.3;

(vi) Type B(U) packages and Type B(M) packages;

(vii) Type C packages;

(b) Special arrangements;

(c) Certain shipments (see 5.1.5.1.2);

(d) Determination of the basic radionuclide values referred to in 2.7.2.2.1 for individual radionuclides which are not listed in Table 2.7.2.2.1 (see 2.7.2.2.2 (a));

(e) Alternative activity limits for an exempt consignment of instruments or articles (see 2.7.2.2.2 (b));

The certificates shall confirm that the applicable requirements are met, and for design approvals shall attribute to the design an identification mark.

The certificates of approval for the package design and the shipment may be combined into a single certificate.

Certificates and applications for these certificates shall be in accordance with the requirements in 6.4.23.

5.1.5.2.2 The consignor shall be in possession of a copy of each applicable certificate.

5.1.5.2.3 For package designs where it is not required that a competent authority issue a certificate of approval, the consignor shall, on request, make available for inspection by the relevant competent authority, documentary evidence of the compliance of the package design with all the applicable requirements.

5.1.5.3 ***Determination of transport index (TI) and criticality safety index (CSI)***

5.1.5.3.1 The transport index (TI) for a package, overpack or freight container, or for unpackaged LSA-I, SCO-I or SCO-III, shall be the number derived in accordance with the following procedure:

(a) Determine the maximum dose rate in units of millisieverts per hour (mSv/h) at a distance of 1 m from the external surfaces of the package, overpack, freight container, or unpackaged LSA-I, SCO-I or SCO-III. The value determined shall be multiplied by 100. For uranium and thorium ores and their concentrates, the maximum dose rate at any point 1 m from the external surface of the load may be taken as:

0.4 mSv/h for ores and physical concentrates of uranium and thorium;
0.3 mSv/h for chemical concentrates of thorium;
0.02 mSv/h for chemical concentrates of uranium, other than uranium hexafluoride;

(b) For tanks, freight containers and unpackaged LSA-I, SCO-I and SCO-III, the value determined in step (a) above shall be multiplied by the appropriate factor from Table 5.1.5.3.1;

(c) The value obtained in steps (a) and (b) above shall be rounded up to the first decimal place (e.g. 1.13 becomes 1.2), except that a value of 0.05 or less may be considered as zero and the resulting number is the *TI* value.

Table 5.1.5.3.1: Multiplication factors for tanks, freight containers and unpackaged LSA-I, SCO-I and SCO-III

Size of load [a]	Multiplication factor
size of load ≤ 1 m^2	1
1 m^2 < size of load ≤ 5 m^2	2
5 m^2 < size of load ≤ 20 m^2	3
20 m^2 < size of load	10

[a] *Largest cross-sectional area of the load being measured.*

5.1.5.3.2 The TI for each rigid overpack, freight container or conveyance shall be determined as the sum of the TIs of all the packages contained therein. For a shipment from a single consignor, the consignor may determine the TI by direct measurement of dose rate.

The TI for a non-rigid overpack shall be determined only as the sum of the TIs of all the packages within the overpack.

5.1.5.3.3 The criticality safety index for each overpack or freight container shall be determined as the sum of the CSIs of all the packages contained. The same procedure shall be followed for determining the total sum of the CSIs in a consignment or aboard a conveyance.

5.1.5.3.4 Packages, overpacks and freight containers shall be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table 5.1.5.3.4 and with the following requirements:

(a) For a package, overpack or freight container, both the transport index and the surface dose rate conditions shall be taken into account in determining which is the appropriate category. Where the transport index satisfies the condition for one category but the surface dose rate satisfies the condition for a different category, the package, overpack or freight container shall be assigned to the higher category. For this purpose, category I-WHITE shall be regarded as the lowest category;

(b) The TI shall be determined following the procedures specified in 5.1.5.3.1 and 5.1.5.3.2;

(c) If the surface dose rate is greater than 2 mSv/h, the package or overpack shall be transported under exclusive use and under the provisions of 7.2.3.1.3, 7.2.3.2.1, or 7.2.3.3.3, as appropriate;

(d) A package transported under a special arrangement shall be assigned to category III-YELLOW except under the provisions of 5.1.5.3.5;

(e) An overpack or freight container which contains packages transported under special arrangement shall be assigned to category III-YELLOW except under the provisions of 5.1.5.3.5.

Table 5.1.5.3.4: Categories of packages, overpacks and freight containers

Conditions		
Transport index	**Maximum dose rate at any point on external surface**	**Category**
0[a]	Not more than 0.005 mSv/h	I-WHITE
More than 0 but not more than 1[a]	More than 0.005 mSv/h but not more than 0.5 mSv/h	II-YELLOW
More than 1 but not more than 10	More than 0.5 mSv/h but not more than 2 mSv/h	III-YELLOW
More than 10	More than 2 mSv/h but not more than 10 mSv/h	III-YELLOW [b]

[a] *If the measured TI is not greater than 0.05, the value quoted may be zero in accordance with 5.1.5.3.1(c).*

[b] *Shall also be transported under exclusive use except for freight containers (see Table 7.1.8.3.3).*

5.1.5.3.5 In all cases of international transport of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, the categorization shall be in accordance with the certificate of the country of origin of design.

5.1.5.4 *Specific provisions for excepted packages of radioactive material of Class 7*

5.1.5.4.1 Excepted packages of radioactive material of Class 7 shall be legibly and durably marked on the outside of the packaging with:

(a) The UN number preceded by the letters “UN”;

(b) An identification of either the consignor or consignee, or both; and

(c) The permissible gross mass if this exceeds 50 kg.

5.1.5.4.2 The documentation requirements of Chapter 5.4 do not apply to excepted packages of radioactive material of Class 7, except that:

(a) The UN number preceded by the letters "UN" and the name and address of the consignor and the consignee and, if relevant, the identification mark for each competent authority certificate of approval (see 5.4.1.5.7.1 (g)) shall be shown on a transport document such as a bill of lading, air waybill or other similar document complying with the requirements of 5.4.1.2.1 to 5.4.1.2.4;

(b) The requirements of 5.4.1.6.2 and, if relevant, those of 5.4.1.5.7.1 (g), 5.4.1.5.7.3 and 5.4.1.5.7.4 shall apply;

(c) The requirements of 5.4.2 and 5.4.4 shall apply.

5.1.5.4.3 The requirements of 5.2.1.5.8 and 5.2.2.1.12.5 shall apply if relevant.

CHAPTER 5.2

MARKING AND LABELLING

5.2.1 Marking

5.2.1.1 Unless provided otherwise in these Regulations, the proper shipping name for the dangerous goods as determined in accordance with 3.1.2 and the corresponding UN number preceded by the letters "UN", shall be displayed on each package. The UN number and the letters "UN" shall be at least 12 mm high, except for packages of 30 litres capacity or less or of 30 kg maximum net mass and for cylinders of 60 *l* water capacity or less when they shall be at least 6 mm in height and except for packages of 5 *l* capacity or less or of 5 kg maximum net mass when they shall be of an appropriate size. In the case of unpackaged articles the mark shall be displayed on the article, on its cradle or on its handling, storage or launching device. For goods of Division 1.4, Compatibility Group S, the division and compatibility group letter shall also be marked unless the label for 1.4S is displayed. A typical package mark is:

Corrosive liquid, acidic, organic, n.o.s. (Caprylyl chloride) UN 3265.

5.2.1.2 All package marks required by 5.2.1.1:

(a) Shall be readily visible and legible;

(b) Shall be able to withstand open weather exposure without a substantial reduction in effectiveness;

(c) Shall be displayed on a background of contrasting colour on the external surface of the package; and

(d) Shall not be located with other package marks that could substantially reduce their effectiveness.

5.2.1.3 Salvage packagings including large salvage packagings and salvage pressure receptacles shall additionally be marked with the word "SALVAGE". The lettering of the "SALVAGE" mark shall be at least 12 mm high.

NOTE: *The size requirement for the "SALVAGE" mark shall apply as from 1 January 2016.*

5.2.1.4 Intermediate bulk containers of more than 450 litres capacity and large packagings shall be marked on two opposing sides.

5.2.1.5 *Special marking provisions for radioactive material*

5.2.1.5.1 Each package shall be legibly and durably marked on the outside of the packaging with an identification of either the consignor or consignee, or both. Each overpack shall be legibly and durably marked on the outside of the overpack with an identification of either the consignor or consignee, or both unless these marks of all packages within the overpack are clearly visible.

5.2.1.5.2 The marking of excepted packages of radioactive material of Class 7 shall be as required by 5.1.5.4.1.

5.2.1.5.3 Each package of gross mass exceeding 50 kg shall have its permissible gross mass legibly and durably marked on the outside of the packaging.

5.2.1.5.4 Each package which conforms to:

(a) a Type IP-1 package, a Type IP-2 package or a Type IP-3 package design shall be legibly and durably marked on the outside of the packaging with “TYPE IP-1”, “TYPE IP-2” or “TYPE IP-3” as appropriate;

(b) a Type A package design shall be legibly and durably marked on the outside of the packaging with “TYPE A”;

(c) a Type IP-2 package, a Type IP-3 or a Type A package design shall be legibly and durably marked on the outside of the packaging with the international vehicle registration code (VRI Code) of the country of origin of design and either the name of the manufacturer or other identification of the packaging specified by the competent authority of the country of origin of design.

5.2.1.5.5 Each package which conforms to a design approved under one or more of paragraphs 5.1.5.2.1, 6.4.22.1 to 6.4.22.4, 6.4.23.4 to 6.4.23.7 and 6.4.24.2 shall be legibly and durably marked on the outside of the package with the following information:

(a) the identification mark allocated to that design by the competent authority;

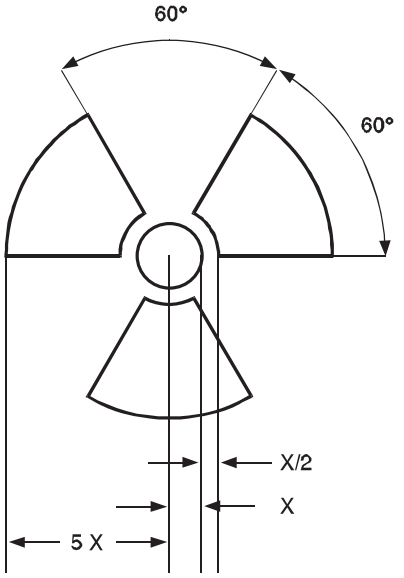
(b) a serial number to uniquely identify each packaging which conforms to that design;

(c) Type B(U)”, “Type B(M)” or “Type C”, in the case of a Type B(U), Type B(M) or Type C package design.

5.2.1.5.6 Each package which conforms to a Type B(U), Type B(M) or Type C package design shall have the outside of the outermost receptacle which is resistant to the effects of fire and water plainly marked by embossing, stamping or other means resistant to the effects of fire and water with the trefoil symbol shown in the figure below:

Figure 5.2.1: Basic trefoil symbol

Proportions based on a central circle of radius X.
The minimum allowable size of X shall be 4 mm.



Any mark on the package made in accordance with the requirements of 5.2.1.5.4 (a) and (b) and 5.2.1.5.5 (c) relating to the package type that does not relate to the UN number and proper shipping name assigned to the consignment shall be removed or covered.

5.2.1.5.7 Where LSA-I or SCO-I material is contained in receptacles or wrapping materials and is transported under exclusive use as permitted by 4.1.9.2.4, the outer surface of these receptacles or wrapping materials may bear the mark "RADIOACTIVE LSA-I" or "RADIOACTIVE SCO-I", as appropriate.

5.2.1.5.8 In all cases of international transport of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, marking shall be in accordance with the certificate of the country of origin of the design.

5.2.1.6 ***Special marking provisions for environmentally hazardous substances***

5.2.1.6.1 Unless otherwise specified in these Regulations, packages containing environmentally hazardous substances meeting the criteria of 2.9.3 (UN Nos. 3077 and 3082) shall be durably marked with the environmentally hazardous substance mark.

5.2.1.6.2 The environmentally hazardous substance mark shall be located adjacent to the marks required by 5.2.1.1. The requirements of 5.2.1.2 and 5.2.1.4 shall be met.

5.2.1.6.3 The environmentally hazardous substance mark shall be as shown in Figure 5.2.2.

Figure 5.2.2: Environmentally hazardous substance mark

The mark shall be in the form of a square set at an angle of 45 degrees (diamond-shaped). The symbol (fish and tree) shall be black on white or suitable contrasting background. The minimum dimensions shall be 100 mm × 100 mm and the minimum width of line forming the diamond shall be 2 mm. If the size of the package so requires, the dimensions/line thickness may be reduced, provided the mark remains clearly visible. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

NOTE 1: *The labelling provisions of 5.2.2 apply in addition to any requirement for packages to bear the environmentally hazardous substance mark.*

NOTE 2: *The provisions of 5.2.1.6.3 from the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016.*

5.2.1.7 ***Orientation arrows***

5.2.1.7.1 Except as provided in 5.2.1.7.2:

(a) Combination packagings having inner packagings containing liquid dangerous goods;

(b) Single packagings fitted with vents;

(c) Closed or open cryogenic receptacles intended for the transport of refrigerated liquefied gases; and

(d) Machinery or apparatus containing liquid dangerous goods when it is required to ensure the liquid dangerous goods remain in their intended orientation (see special provision 301 of chapter 3.3),

shall be legibly marked with package orientation arrows which are similar to the illustration shown below or with those meeting the specifications of ISO 780:1997. The orientation arrows shall appear on two opposite vertical sides of the package with the arrows pointing in the correct upright direction. They shall be rectangular and of a size that is clearly visible commensurate with the size of the package. Depicting a rectangular border around the arrows is optional.

Figure 5.2.3

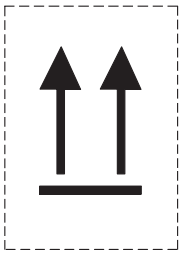
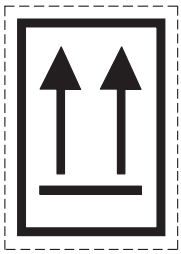


Figure 5.2.4



Two black or red arrows on white or suitable contrasting background.
The rectangular border is optional

All features shall be in approximate proportion to those shown.

5.2.1.7.2 Orientation arrows are not required on:

(a) Outer packagings containing pressure receptacles except closed or open cryogenic receptacles;

(b) Outer packagings containing dangerous goods in inner packagings each containing not more than 120 ml, with sufficient absorbent material between the inner and outer packagings to completely absorb the liquid contents;

(c) Outer packagings containing division 6.2 infectious substances in primary receptacles each containing not more than 50 ml;

(d) Type IP-2, type IP-3, type A, type B(U), type B(M) or type C packages containing Class 7 radioactive material;

(e) Outer packagings containing articles which are leak-tight in all orientations (e.g. alcohol or mercury in thermometers, aerosols, etc.); or

(f) Outer packagings containing dangerous goods in hermetically sealed inner packagings each containing not more than 500 ml.

5.2.1.7.3 Arrows for purposes other than indicating proper package orientation shall not be displayed on a package marked in accordance with this sub-section.

5.2.1.8 ***Excepted quantities mark***

Packages containing excepted quantities of dangerous goods shall be marked according to 3.5.4.

5.2.1.9 ***Lithium battery mark***

5.2.1.9.1 Packages containing lithium cells or batteries prepared in accordance with special provision 188 shall be marked as shown in Figure 5.2.5.

5.2.1.9.2 The mark shall indicate the UN number, preceded by the letters “UN”, i.e. “UN 3090” for lithium metal cells or batteries or “UN 3480” for lithium ion cells or batteries. Where the lithium cells or batteries are contained in, or packed with, equipment, the UN number, preceded by the letters “UN”, i.e.

"UN 3091" or "UN 3481" as appropriate shall be indicated. Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers shall be indicated on one or more marks.

Figure 5.2.5: Lithium battery mark

* *Place for UN number(s)*

The mark shall be in the form of a rectangle or a square with hatched edging. The dimensions shall be a minimum of 100 mm wide × 100 mm high and the minimum width of the hatching shall be 5 mm. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion or lithium metal batteries or cells) shall be black on white or suitable contrasting background. The hatching shall be red. If the size of the package so requires, the dimensions may be reduced to not less than 100 mm wide × 70 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

NOTE: *The mark shown in Figure 5.2.5 in 5.2.1.9 of the twenty-first revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations, may continue to be applied until 31 December 2026.*

5.2.2 Labelling

5.2.2.1 *Labelling provisions*

NOTE: *These provisions relate essentially to danger labels. However, additional marks or symbols indicating precautions to be taken in handling or storing a package (e.g. a symbol representing an umbrella indicating that a package shall be kept dry) may be displayed on a package if appropriate.*

5.2.2.1.1 Labels identifying primary and subsidiary hazards shall conform to models Nos. 1 to 9 illustrated in 5.2.2.2.2. The "EXPLOSIVE" subsidiary hazard label is model No. 1.

5.2.2.1.2 Where articles or substances are specifically listed in the Dangerous Goods List, a danger class label shall be affixed for the hazard shown in Column 3. A subsidiary hazard label shall also be affixed for any hazard indicated by a class or division number in the Column 4 of the Dangerous Goods List. However, special provisions indicated in Column 6 may also require a subsidiary hazard label where no subsidiary hazard is indicated in Column 4 or may exempt from the requirement for a subsidiary hazard label where such a hazard is indicated in the Dangerous Goods List.

5.2.2.1.3 Except as provided in 5.2.2.1.3.1, if a substance which meets the definition of more than one class is not specifically listed by name in the Dangerous Goods List in Chapter 3.2, the provisions in Chapter 2.0 shall be used to determine the primary hazard class of the goods. In addition to the label required

for that primary hazard class, subsidiary hazard labels shall also be applied as specified in the Dangerous Goods List.

5.2.2.1.3.1 Packages containing substances of Class 8 need not bear subsidiary hazard label model No. 6.1 if the toxicity arises solely from the destructive effect on tissue. Packages containing substances of Division 4.2 need not bear subsidiary hazard label model No. 4.1.

5.2.2.1.4 *Labels for Class 2 gases with subsidiary hazard(s)*

Division	Subsidiary hazard(s) shown in Chapter 2.2	Primary hazard label	Subsidiary hazard label(s)
2.1	None	2.1	None
2.2	None	2.2	None
	5.1	2.2	5.1
2.3	None	2.3	None
	2.1	2.3	2.1
	5.1	2.3	5.1
	5.1, 8	2.3	5.1, 8
	8	2.3	8
	2.1, 8	2.3	2.1, 8

5.2.2.1.5 Three separate labels have been provided for Class 2, one for flammable gases of Division 2.1 (red), one for non-flammable, non-toxic gases of Division 2.2 (green) and one for toxic gases of Division 2.3 (white). Where the Dangerous Goods List indicates that a Class 2 gas possesses single or multiple subsidiary hazards, labels shall be used in accordance with the table in 5.2.2.1.4.

5.2.2.1.6 Except as provided in 5.2.2.2.1.2, each label shall:

(a) Be located on the same surface of the package near the proper shipping name mark, if the package dimensions are adequate;

(b) Be so placed on the packaging that they are not covered or obscured by any part or attachment to the packaging or any other label or mark; and

(c) When primary and subsidiary hazard labels are required, be displayed next to each other.

Where a package is of such an irregular shape or small size that a label cannot be satisfactorily affixed, the label may be attached to the package by a securely affixed tag or other suitable means.

5.2.2.1.7 Intermediate bulk containers of more than 450 litres capacity and large packagings shall be labelled on two opposing sides.

5.2.2.1.8 Labels shall be affixed on a surface of contrasting colour.

5.2.2.1.9 *Special provisions for the labelling of self-reactive substances*

An “EXPLOSIVE” subsidiary hazard label (Model No. 1) shall be applied for type B self-reactive substances, unless the competent authority has permitted this label to be dispensed with for a specific packaging because test data have proved that the self-reactive substance in such a packaging does not exhibit explosive behaviour.

5.2.2.1.10 *Special provisions for the labelling of organic peroxides*

The Division 5.2 label (model No. 5.2) shall be affixed to packages containing organic peroxides classified as types B, C, D, E or F. This label also implies that the product may be flammable and

hence no “FLAMMABLE LIQUID”, subsidiary hazard label (model No. 3) is required. In addition, the following subsidiary hazard labels shall be applied:

(a) An “EXPLOSIVE” subsidiary hazard label (model No. 1) for organic peroxides type B, unless the competent authority has permitted this label to be dispensed with for a specific packaging because test data have proved that the organic peroxide in such a packaging does not exhibit explosive behaviour;

(b) A “CORROSIVE” subsidiary hazard label (model No. 8) is required when packing group I or II criteria of Class 8 are met.

5.2.2.1.11 *Special provisions for the labelling of infectious substances packages*

In addition to the primary hazard label (model No. 6.2), infectious substances packages shall bear any other label required by the nature of the contents.

5.2.2.1.12 *Special provisions for the labelling of radioactive material*

5.2.2.1.12.1 Except when enlarged labels are used in accordance with 5.3.1.1.5.1, each package, overpack and freight container containing radioactive material shall bear the labels conforming to the applicable models Nos. 7A, 7B or 7C, according to the appropriate category. Labels shall be affixed to two opposite sides on the outside of the package or overpack or on the outside of all four sides of a freight container or tank. In addition, each package, overpack and freight container containing fissile material, other than fissile material excepted under the provisions of 2.7.2.3.5 shall bear labels conforming to model No. 7E; such labels, where applicable shall be affixed adjacent to the labels conforming to the applicable model Nos. 7A, 7B or 7C. Labels shall not cover the marks specified in 5.2.1. Any labels which do not relate to the contents shall be removed or covered.

5.2.2.1.12.2 Each label conforming to the applicable model No. 7A, 7B or 7C shall be completed with the following information:

(a) Contents:

(i) except for LSA-I material, the name(s) of the radionuclide(s) as taken from Table 2.7.2.2.1, using the symbols prescribed therein. For mixtures of radionuclides, the most restrictive nuclides shall be listed to the extent the space on the line permits. The group of LSA or SCO shall be shown following the name(s) of the radionuclide(s). The terms “LSA-II”, “LSA-III”, “SCO-I” and “SCO-II” shall be used for this purpose;

(ii) for LSA-I material, the term “LSA-I” is all that is necessary; the name of the radionuclide is not necessary;

(b) Activity: The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with the appropriate SI prefix symbol (see 1.2.2.1). For fissile material, the total mass of fissile nuclides in units of grams (g), or multiples thereof, may be used in place of activity;

(c) For overpacks and freight containers the “contents” and “activity” entries on the label shall bear the information required in 5.2.2.1.12.2 (a) and 5.2.2.1.12.2 (b), respectively, totalled together for the entire contents of the overpack or freight container except that on labels for overpacks or freight containers containing mixed loads of packages containing different radionuclides, such entries may read “See Transport Documents”;

(d) Transport index: The number determined in accordance with 5.1.5.3.1 and 5.1.5.3.2 (except for category I-WHITE).

5.2.2.1.12.3 Each label conforming to the model No. 7E shall be completed with the criticality safety index (CSI) as stated in the certificate of approval applicable in the countries through or into which the consignment is transported and issued by the competent authority or as specified in 6.4.11.2 or 6.4.11.3.

5.2.2.1.12.4 For overpacks and freight containers, the label conforming to model No. 7E shall bear the sum of the criticality safety indexes of all the packages contained therein.

5.2.2.1.12.5 In all cases of international transport of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, labelling shall be in accordance with the certificate of the country of origin of design.

5.2.2.1.13 *Labels for articles containing dangerous goods transported as UN Nos. 3537, 3538, 3539, 3540, 3541, 3542, 3543, 3544, 3545, 3546, 3547 and 3548*

5.2.2.1.13.1 Packages containing articles or articles transported unpackaged shall bear labels according to 5.2.2.1.2 reflecting the hazards established according to 2.0.5. If the article contains one or more lithium batteries with, for lithium metal batteries, an aggregate lithium content of 2 g or less, and for lithium ion batteries, a Watt-hour rating of 100 Wh or less, the lithium battery mark (Figure 5.2.5) shall be affixed to the package or unpackaged article. If the article contains one or more lithium batteries with, for lithium metal batteries, an aggregate lithium content of more than 2 g and for lithium ion batteries, a Watt-hour rating of more than 100 Wh, the lithium battery label (5.2.2.1.2 No. 9A) shall be affixed to the package or unpackaged article.

5.2.2.1.13.2 When it is required to ensure articles containing liquid dangerous goods remain in their intended orientation, orientation marks meeting 5.2.1.7.1 shall be affixed and visible on at least two opposite vertical sides of the package or of the unpackaged article where possible, with the arrows pointing in the correct upright direction.

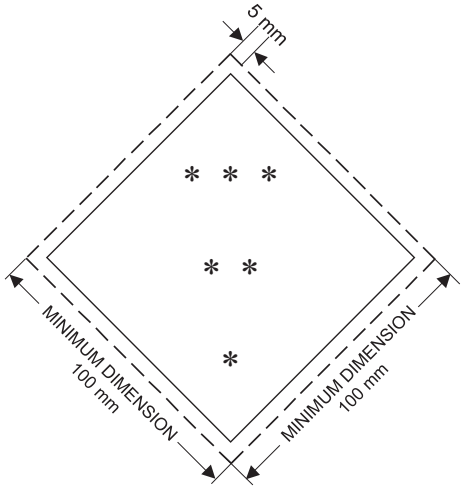
5.2.2.2 *Provisions for labels*

5.2.2.2.1 Labels shall satisfy the provisions of this section and conform, in terms of colour, symbols and general format, to the specimen labels shown in 5.2.2.2.2.

NOTE: *Where appropriate, labels in 5.2.2.2.2 are shown with a dotted outer boundary as provided for in 5.2.2.2.1.1. This is not required when the label is applied on a background of contrasting colour.*

5.2.2.2.1.1 Labels shall be configured as shown in Figure 5.2.6.

Figure 5.2.6: Class/division label



* The class or, for divisions 5.1 and 5.2, the Division number shall be shown in the bottom corner

** Additional text/numbers/symbol/letters shall (if mandatory) or may (if optional) be shown in this bottom half

*** The class or division symbol or, for divisions 1.4, 1.5 and 1.6, the division number and for Model No 7E the word “FISSILE” shall be shown in this top half

5.2.2.2.1.1.1 Labels shall be displayed on a background of contrasting colour, or shall have either a dotted or solid outer boundary line.

5.2.2.2.1.1.2 The label shall be in the form of a square set at an angle of 45 degrees (diamond-shaped). The minimum dimensions shall be 100 mm × 100 mm. There shall be a line inside the edge forming the diamond which shall be parallel and approximately 5 mm from the outside of that line to the edge of the label.

5.2.2.2.1.1.3 If the size of the package so requires the dimensions may be reduced proportionally, provided the symbols and other elements of the label remain clearly visible. Dimensions for cylinders shall comply with 5.2.2.2.1.2.

NOTE: *The provisions of 5.2.2.2.1.1 from the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016. When so applied, 5.2.2.2.1.1.1, 5.2.2.2.1.1.2 and 5.2.2.2.1.1.3 shall not apply until 31 December 2016.*

5.2.2.2.1.2 Cylinders for Class 2 may, on account of their shape, orientation and securing mechanisms for transport, bear labels representative of those specified in this section, which have been reduced in size, according to ISO 7225:2005 "Gas cylinders – Precautionary labels", for display on the non-cylindrical part (shoulder) of such cylinders. Labels may overlap to the extent provided for by ISO 7225:2005, however, in all cases, the labels representing the primary hazard and the numbers appearing on any label shall remain fully visible and the symbols recognisable.

NOTE: *When the diameter of the cylinder is too small to permit the display of the reduced size labels on the non-cylindrical upper part of the cylinder, the reduced sized labels may be displayed on the cylindrical part.*

5.2.2.2.1.3 With the exception of labels for divisions 1.4, 1.5 and 1.6 of Class 1, the upper half of the label shall contain the pictorial symbol and the lower half shall contain the class or division number 1, 2, 3, 4, 5.1, 5.2, 6, 7, 8 or 9 as appropriate. However, for label model No. 9A, the upper half of the label shall only contain the seven vertical stripes of the symbol and the lower half shall contain the group of batteries of the symbol and the class number. Except for label model No. 9A, the label may include such text as the UN number, or words describing the hazard class (e.g. "flammable") in accordance with 5.2.2.2.1.5 provided that the text does not obscure or detract from the other required label elements.

5.2.2.2.1.4 In addition, except for divisions 1.4, 1.5 and 1.6, labels for Class 1 shall show in the lower half, above the class number, the division number and the compatibility group letter for the substance or article. Labels for divisions 1.4, 1.5 and 1.6 shall show in the upper half the division number, and in the lower half the class number and the compatibility group letter. For Division 1.4, Compatibility Group S, no label is generally required. However, in cases where a label is considered necessary for such goods, it shall be based on model No. 1.4.

5.2.2.2.1.5 On labels other than those for material of Class 7, the insertion of any text (other than the class or division number) in the space below the symbol shall be confined to particulars indicating the nature of the hazard and precautions to be taken in handling. For label 9A, no text other than the class mark shall be included in the bottom part of the label.

5.2.2.2.1.6 The symbols, text and numbers shall be shown in black on all labels except for:

(a) The Class 8 label, where the text (if any) and class number shall appear in white;

(b) Labels with entirely green, red or blue backgrounds where they may be shown in white;

(c) The Division 5.2 label, where the symbol may be shown in white; and

(d) The Division 2.1 label displayed on cylinders and gas cartridges for liquefied petroleum gases, where they may be shown in the background colour of the receptacle if adequate contrast is provided.

5.2.2.2.1.7 All labels shall be able to withstand open weather exposure without a substantial reduction in effectiveness.

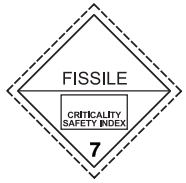
5.2.2.2.2 *Specimen labels*

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 1: Explosive substances or articles						
1	Divisions 1.1, 1.2, 1.3	Exploding bomb: black	Orange	1 (black)		** Place for division – to be left blank if explosive is the subsidiary hazard * Place for compatibility group – to be left blank if explosive is the subsidiary hazard
1.4	Division 1.4	1.4: black Numerals shall be about 30 mm in height and be about 5 mm thick (for a label measuring 100 mm × 100 mm)	Orange	1 (black)		* Place for compatibility group
1.5	Division 1.5	1.5: black Numerals shall be about 30 mm in height and be about 5 mm thick (for a label measuring 100 mm × 100 mm)	Orange	1 (black)		* Place for compatibility group
1.6	Division 1.6	1.6: black Numerals shall be about 30 mm in height and be about 5 mm thick (for a label measuring 100 mm × 100 mm)	Orange	1 (black)		* Place for compatibility group

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels		Note
Class 2: Gases							
2.1	Division 2.1: Flammable gases	Flame: black or white (except as provided for in 5.2.2.2.1.6 d))	Red	2 (black or white)			-
2.2	Division 2.2: Non-flammable, non-toxic gases	Gas cylinder: black or white	Green	2 (black or white)			-
2.3	Division 2.3: Toxic gases	Skull and crossbones: black	White	2 (black)			-

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels		Note
Class 3: Flammable liquids							
3	-	Flame: black or white	Red	3 (black or white)			-
Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases							
4.1	Division 4.1: Flammable solids, self-reactive substances, polymerizing substances and solid desensitized explosives	Flame: black	White with 7 vertical red stripes	4 (black)			-
4.2	Division 4.2: Substances liable to spontaneous combustion	Flame: black	Upper half white, lower half red	4 (black)			-
4.3	Division 4.3: Substances which, in contact with water emit flammable gases	Flame: black or white	Blue	4 (black or white)			-

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 5: Oxidizing substances and organic peroxides						
5.1	Division 5.1: Oxidizing substances	Flame over circle: black	Yellow	5.1 (black)		-
5.2	Division 5.2: Organic peroxides	Flame: black or white	Upper half red, lower half yellow	5.2 (black)	 	-
Class 6: Toxic substances and infectious substances						
6.1	Division 6.1: Toxic substances	Skull and crossbones: black	White	6 (black)		-
6.2	Division 6.2: Infectious substances	Three crescents superimposed on a circle: black	White	6 (black)		The lower half of the label may bear the inscriptions: "INFECTIOUS SUBSTANCE" and "In the case of damage or leakage immediately notify Public Health Authority" in black colour

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 7: Radioactive material						
7A	Category I - WHITE	Trefoil: black	White	7 (black)		Text (mandatory), black in lower half of label: “RADIOACTIVE” “CONTENTS ...” “ACTIVITY ...” One red vertical bar shall follow the word: “RADIOACTIVE”
7B	Category II - YELLOW	Trefoil: black	Upper half yellow with white border, lower half white	7 (black)		Text (mandatory), black in lower half of label: “RADIOACTIVE” “CONTENTS ...” “ACTIVITY ...” In a black outlined box: “TRANSPORT INDEX”; Two red vertical bars shall follow the word: “RADIOACTIVE”
7C	Category III - YELLOW	Trefoil: black	Upper half yellow with white border, lower half white	7 (black)		Text (mandatory), black in lower half of label: “RADIOACTIVE” “CONTENTS ...” “ACTIVITY ...” In a black outlined box: “TRANSPORT INDEX”. Three red vertical bars shall follow the word: “RADIOACTIVE”
7E	Fissile material	-	White	7 (black)		Text (mandatory): black in upper half of label: “FISSILE”; In a black outlined box in the lower half of label: “CRITICALITY SAFETY INDEX”

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 8: Corrosive substances						
8	-	Liquids, spilling from two glass vessels and attacking a hand and a metal: black	Upper half white, lower half black with white border	8 (white)		-
Class 9: Miscellaneous dangerous substances and articles, including environmentally hazardous substances						
9	-	7 vertical stripes in upper half: black	White	9 underlined (black)		-
9A	-	7 vertical stripes in upper half: black; battery group, one broken and emitting flame in lower half: black	White	9 underlined (black)		-

CHAPTER 5.3

PLACARDING AND MARKING OF CARGO TRANSPORT UNITS AND BULK CONTAINERS

5.3.1 Placarding

5.3.1.1 *Placarding provisions*

5.3.1.1.1 *Deleted.*

5.3.1.1.2 Placards shall be affixed to the exterior surface of cargo transport units and bulk containers to provide a warning that the contents of the unit are dangerous goods and present hazards. Placards shall correspond to the primary hazard of the goods contained in the cargo transport unit and bulk container except that:

(a) Placards are not required on cargo transport units carrying any quantity of explosives of Division 1.4, Compatibility Group S; and

(b) Placards indicating the highest hazard only need be affixed on cargo transport units carrying substances and articles of more than one division in Class 1.

Placards shall be displayed on a background of contrasting colour, or shall have either a dotted or solid outer boundary line.

5.3.1.1.3 Placards shall also be displayed for those subsidiary hazards for which a subsidiary hazard label is required according to 5.2.2.1.2. However, cargo transport units containing goods of more than one class need not bear a subsidiary hazard placard if the hazard represented by that placard is already indicated by a primary hazard placard.

5.3.1.1.4 Cargo transport units carrying dangerous goods or the residue of dangerous goods in unpurged tanks or empty uncleaned bulk containers shall display placards clearly visible on at least two opposing sides of the units and in any case in such a position as may be seen by all those involved in the loading or unloading process. Where the cargo transport unit has a multiple compartment tank which is carrying two or more dangerous goods and/or the residues of dangerous goods, appropriate placards shall be displayed along each side at the position of the relevant compartments. If all compartments have to bear the same placards, these placards need to be displayed only once along each side of the cargo transport unit. For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed placards, placards may be replaced by labels conforming to 5.2.2.2 to be affixed on two opposite sides of the portable tank.

5.3.1.1.5 *Special provisions for Class 7*

5.3.1.1.5.1 Large freight containers carrying unpackaged LSA-I material or SCO-I or packages other than excepted packages, and tanks shall bear four placards which conform to the model No.7D given in Figure 5.3.1. The placards shall be affixed in a vertical orientation to each side wall and each end wall of the large freight container or tank. Any placards which do not relate to the contents shall be removed. Instead of using both labels and placards, it is permitted as an alternative to use enlarged labels only, as shown in label models Nos. 7A, 7B and 7C, except having the minimum size shown in Figure 5.3.1.

5.3.1.1.5.2 Rail and road vehicles carrying packages, overpacks or freight containers labelled with any of the labels shown in 5.2.2.2.2 as models Nos. 7A, 7B, 7C and 7E, or carrying consignments under exclusive use, shall display the placard shown in Figure 5.3.1 (model No.7D) on each of:

(a) the two external lateral walls in the case of a rail vehicle;

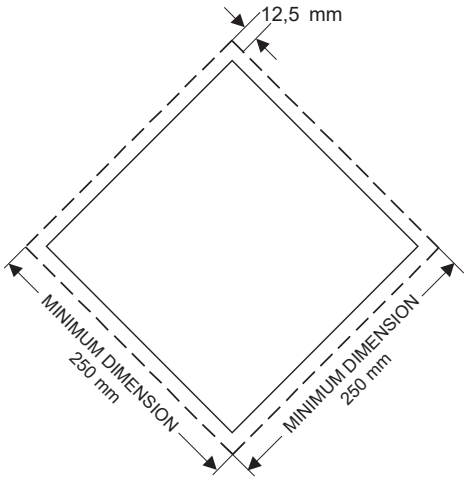
(b) the two external lateral walls and the external rear wall in the case of a road vehicle.

In the case of a vehicle without sides the placards may be affixed directly on the cargo-carrying unit provided that they are readily visible; in the case of physically large tanks or freight containers, the placards on the tanks or freight containers shall suffice. In the case of vehicles which have insufficient area to allow the fixing of larger placards, the dimensions of the placard as described in Figure 5.3.1 may be reduced to 100 mm. Any placards which do not relate to the contents shall be removed.

5.3.1.2 ***Specifications for placards***

5.3.1.2.1 Except as provided in 5.3.1.2.2 for the Class 7 placard, and in 5.3.2.3.2 for the environmentally hazardous substance mark, a placard shall be configured as shown in Figure 5.3.0.

Figure 5.3.0: Placard (except for class 7)



The placard shall be in the form of a square set at an angle of 45 degrees (diamond-shaped). The minimum dimensions shall be 250 mm × 250 mm (to the edge of the placard). The line inside the edge shall be parallel and 12.5 mm from the outside of that line to the edge of the placard. The symbol and line inside the edge shall correspond in colour to the label for the class or division of the dangerous goods in question. The class or division symbol/numeral shall be positioned and sized in proportion to those prescribed in 5.2.2.2 for the corresponding class or division of the dangerous goods in question. The placard shall display the number of the class or division (and for goods in Class 1, the compatibility group letter) of the dangerous goods in question in the manner prescribed in 5.2.2.2 for the corresponding label, in digits not less than 25 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

NOTE: *The provisions of 5.3.1.2.1 from the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016.*

5.3.1.2.2 For Class 7, the placard shall have minimum overall dimensions of 250 mm by 250 mm (except as permitted by 5.3.1.1.5.2) with a black line running 5 mm inside the edge and parallel with it, and shall be otherwise as shown in Figure 5.3.1 below. When different dimensions are used, the relative proportions shall be maintained. The number "7" shall not be less than 25 mm high. The background colour of the upper half of the placard shall be yellow and of the lower half white, the colour of the trefoil and the printing shall be black. The use of the word "RADIOACTIVE" in the bottom half is optional to allow the use of this placard to display the appropriate United Nations number for the consignment.

Figure 5.3.1: Placard for radioactive material of Class 7

(No. 7D)

Symbol (trefoil): black; Background: upper half yellow with white border, lower half white;
The lower half shall show the word RADIOACTIVE or alternatively, when required (see 5.3.2.1), the appropriate UN number; and the figure "7" in the bottom corner

5.3.2 Marking

5.3.2.1 ***Display of UN numbers***

5.3.2.1.1 Except for goods of Class 1, the UN number shall be displayed as required by this section on consignments of:

(a) Solids, liquids or gases transported in tank cargo transport units including on each component of a multicompartment tank cargo transport unit;

(b) Solids in bulk containers;

(c) Packaged dangerous goods of a single commodity which constitute a full load for the cargo transport unit;

(d) Unpackaged LSA-I material, SCO-I or SCO-III of Class 7 in or on a vehicle, or in a freight container, or in a tank; and

(e) Packaged radioactive material with a single UN number in or on a vehicle, or in a freight container, when required to be transported under exclusive use.

5.3.2.1.2 The UN number for the goods shall be displayed in black digits not less than 65 mm high, either:

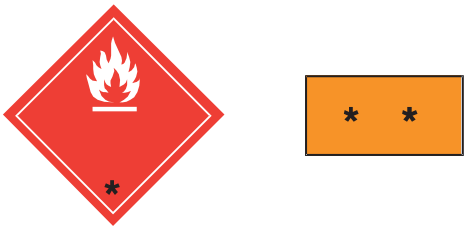
(a) Against a white background in the area below the pictorial symbol and above the class or division number and the compatibility group letter in a manner that does not obscure or detract from the other required label elements (see Figures 5.3.1 and 5.3.2); or

(b) On an orange rectangular panel not less than 120 mm high and 300 mm wide, with a 10 mm black border, to be placed immediately adjacent to each placard (see Figure 5.3.3). For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed placards, the UN number may be displayed on an orange rectangular panel of appropriately reduced size on the external surface of the tank in characters not less than 25 mm high.

5.3.2.1.3 *Examples of display of UN numbers*

Figure 5.3.2

Figure 5.3.3



* location of class or division number
** location of UN number

5.3.2.2 ***Elevated temperature substance mark***

Cargo transport units containing a substance that is transported or offered for transport in a liquid state at a temperature equal to or exceeding 100 °C or in a solid state at a temperature equal to or exceeding 240 °C shall bear on each side and on each end the mark shown in Figure 5.3.4.

Figure 5.3.4: Mark for carriage at elevated temperature

The mark shall be an equilateral triangle. The colour of the mark shall be red. The minimum dimension of the sides shall be 250 mm. For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed marks, the minimum dimensions of the sides may be reduced to 100 mm. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

NOTE: *The provisions of 5.3.2.2 from the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016.*

5.3.2.3 ***Environmentally hazardous substance mark***

5.3.2.3.1 A cargo transport unit or bulk container containing environmentally hazardous substances meeting the criteria of 2.9.3 (UN Nos. 3077 and 3082) shall be marked on at least two opposing sides of the unit or bulk container and in any case in such a position as may be seen by all those involved in the loading or unloading processes, with the environmentally hazardous substance mark to be affixed in accordance with the provisions of 5.3.1.1.4 for placards.

5.3.2.3.2 The environmentally hazardous substance mark for cargo transport units and bulk containers shall be as described in 5.2.1.6.3 and Figure 5.2.2, except that the minimum dimensions shall be 250 mm × 250 mm. For portable tanks with a capacity of not more than 3 000 litres and with an available surface area insufficient to affix the prescribed marks, the minimum dimensions may be reduced to 100 mm × 100 mm.

NOTE: *The requirements of 5.3.2.3.2 shall apply as from 1st January 2017.*

CHAPTER 5.4

DOCUMENTATION

Introductory note

NOTE: *These Regulations do not preclude the use of electronic data processing (EDP) and electronic data interchange (EDI) transmission techniques as an alternative to paper documentation. All references to "dangerous goods transport document" in this Chapter also include provision of the required information by use of EDP and EDI transmission techniques.*

5.4.1 Dangerous goods transport information

5.4.1.1 *General*

5.4.1.1.1 Except as otherwise provided, the consignor who offers dangerous goods for transport shall give to the carrier the information applicable to those dangerous goods, including any additional information and documentation as specified in these Regulations. This information may be provided on a dangerous goods transport document or, with the agreement of the carrier, by EDP or EDI techniques.

5.4.1.1.2 When a paper document is used, the consignor shall give the initial carrier a copy of the dangerous goods transport document, completed and signed as required in this Chapter.

5.4.1.1.3 When the dangerous goods transport information is given to the carrier by EDP or EDI techniques, the consignor shall be able to produce the information without delay as a paper document, with the information in the sequence required by this Chapter.

5.4.1.2 *Form of the transport document*

5.4.1.2.1 A dangerous goods transport document may be in any form, provided it contains all of the information required by these Regulations.

5.4.1.2.2 If both dangerous and non-dangerous goods are listed in one document, the dangerous goods shall be listed first, or otherwise be emphasised.

5.4.1.2.3 *Continuation page*

A dangerous goods transport document may consist of more than one page, provided pages are consecutively numbered.

5.4.1.2.4 The information on a dangerous goods transport document shall be easy to identify, legible and durable.

5.4.1.2.5 *Example of a dangerous goods transport document*

The form shown in Figure 5.4.1 at the end of this Chapter is an example of a dangerous goods transport document[1].

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[1] *For standardized formats, see also the relevant recommendations of the UNECE United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), in particular Recommendation No. 1 (United Nations Lay-out Key for Trade Documents) (ECE/TRADE/137, edition 81.3), UN Layout Key for Trade Documents - Guidelines for Applications (ECE/TRADE/270, edition 2002), Revised Recommendation No. 11 (Documentary Aspects of the International Transport of Dangerous Goods) (ECE/TRADE/C/CEFACT/2008/8) and Recommendation No. 22 (Lay-out Key for standard Consignment Instructions) (ECE/TRADE/168, edition 1989). Refer also to the UN/CEFACT Summary of Trade Facilitation Recommendations (ECE/TRADE/346, edition 2006) and the United Nations Trade Data Elements Directory (UNTDED) (ECE/TRADE/362, edition 2005).*

5.4.1.3 ***Consignor, consignee and date***

The name and address of the consignor and the consignee of the dangerous goods shall be included on the dangerous goods transport document. The date the dangerous goods transport document or an electronic copy of it was prepared or given to the initial carrier shall be included.

5.4.1.4 ***Information required on the dangerous goods transport document***

5.4.1.4.1 *Dangerous goods description*

The dangerous goods transport document shall contain the following information for each dangerous substance, material or article offered for transport:

(a) The UN number preceded by the letters "UN";

(b) The proper shipping name, as determined according to 3.1.2, including the technical name enclosed in parenthesis, as applicable (see 3.1.2.8);

(c) The primary hazard class or, when assigned, the division of the goods, including for Class 1, the compatibility group letter. The words "Class" or "Division" may be included preceding the primary hazard class or division numbers;

(d) Subsidiary hazard class or division number(s) corresponding to the subsidiary hazard label(s) required to be applied, when assigned, shall be entered following the primary hazard class or division and shall be enclosed in parenthesis. The words "Class" or "Division" may be included preceding the subsidiary hazard class or division numbers;

(e) Where assigned, the packing group for the substance or article which may be preceded by "PG" (e.g."PG II").

5.4.1.4.2 *Sequence of the dangerous goods description*

The five elements of the dangerous goods description specified in 5.4.1.4.1 shall be shown in the order listed above (i.e. (a), (b), (c), (d), (e)) with no information interspersed, except as provided in these Regulations. Examples of a dangerous goods description are:

UN1098 ALLYL ALCOHOL 6.1 (3) I
UN1098, ALLYL ALCOHOL, Division 6.1, (Class 3), PG I

NOTE: *In addition to the requirements of these Regulations, other elements of information may be required by the competent authority or for certain modes of transport (e.g. flash point for sea transport). Unless permitted or required by these Regulations, additional information shall be placed after the dangerous goods description.*

5.4.1.4.3 *Information which supplements the proper shipping name in the dangerous goods description*

The proper shipping name in the dangerous goods description shall be supplemented as follows:

(a) Technical names for "n.o.s." and other generic descriptions: Proper shipping names that are assigned special provision 274 or 318 in Column 6 of the Dangerous Goods List shall be supplemented with their technical or chemical group names as described in 3.1.2.8;

(b) Empty uncleaned packagings, bulk containers and tanks: Empty means of containment (including packagings, IBCs, bulk containers, portable tanks, tank-vehicles and tank-wagons) which contain the residue of dangerous goods of classes other than Class 7 shall be described as such by, for example, placing the words "**EMPTY**

UNCLEANED" or "**RESIDUE LAST CONTAINED**" before or after the dangerous goods description specified in 5.4.1.4.1 (a) to (e);

(c) Wastes: For waste dangerous goods (other than radioactive wastes) which are being transported for disposal, or for processing for disposal, the proper shipping name shall be preceded by the word **"WASTE"**, unless this is already a part of the proper shipping name;

(d) Molten substances: When a substance, which is solid in accordance with the definition in 1.2.1, is offered for transport in the molten state, the qualifying word "**MOLTEN**" shall be added as part of the proper shipping name, unless it is already part of the proper shipping name (see 3.1.2.5);

(e) Elevated temperature substances: If the proper shipping name of a substance which is transported or offered for transport in a liquid state at a temperature equal to or exceeding 100 °C, or in a solid state at a temperature equal to or exceeding 240 °C, does not convey the elevated temperature condition (for example, by using the term **"MOLTEN"** or **"ELEVATED TEMPERATURE"** as part of the shipping name), the word **"HOT"** shall immediately precede the proper shipping name.

(f) Stabilized and temperature controlled substances: Unless already part of the proper shipping name the word "**STABILIZED**" shall be added to the proper shipping name if stabilization is used and the words "**TEMPERATURE CONTROLLED**" shall be added to the proper shipping name if stabilization is by temperature control or a combination of chemical stabilization and temperature control (see 3.1.2.6).

5.4.1.5 ***Information required in addition to the dangerous goods description***

In addition to the dangerous goods description the following information shall be included after the dangerous goods description on the dangerous goods transport document.

5.4.1.5.1 *Total quantity of dangerous goods*

Except for empty uncleaned packagings, the total quantity of dangerous goods covered by the description (by volume or mass as appropriate) of each item of dangerous goods bearing a different proper shipping name, UN number or packing group shall be included. For Class 1 dangerous goods, the quantity shall be the net explosive mass. For dangerous goods transported in salvage packagings, an estimate of the quantity of dangerous goods shall be given. The number and kind (e.g. drum, box, etc.) of packages shall also be indicated. UN packaging codes may only be used to supplement the description of the kind of package (e.g. one box (4G)). Abbreviations may be used to specify the unit of measurement for the total quantity.

NOTE: *The number, type and capacity of each inner packaging within the outer packaging of a combination packaging is not required to be indicated.*

5.4.1.5.2 *Limited quantities*

When dangerous goods are transported according to the exceptions for dangerous goods packed in limited quantities provided for in Column 7a of the Dangerous Goods List and Chapter 3.4, the words "**limited quantity**" or "**LTD QTY**" shall be included.

5.4.1.5.3 *Salvage packagings including large salvage packagings and salvage pressure receptacles*

For dangerous goods transported in salvage packagings in accordance with 4.1.1.18, including large salvage packagings, larger size packagings or large packagings of appropriate type and performance level to be used as a salvage packaging, the words "**SALVAGE PACKAGING**" shall be included.

For dangerous goods transported in salvage pressure receptacles in accordance with 4.1.1.19, the words "**SALVAGE PRESSURE RECEPTACLE**" shall be included.

5.4.1.5.4 *Substances stabilized by temperature control*

If the words "**TEMPERATURE CONTROLLED**" are part of the proper shipping name (see also 3.1.2.6), the control and emergency temperatures (see 7.1.5.3) shall be indicated in the transport document, as follows:

"Control temperature: .... °C Emergency temperature: **.... °C"**

5.4.1.5.5 *Self-reactive substances, polymerizing substances and organic peroxides*

For self-reactive substances, organic peroxides and polymerizing substances which require temperature control during transport, the control and emergency temperatures (see 7.1.5.3) shall be indicated on the dangerous goods transport document, as follows:

"Control temperature: .... ° C Emergency temperature: .... °C"

5.4.1.5.5.1 When for certain self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 the competent authority has permitted the "EXPLOSIVE" subsidiary hazard label (model No. 1) to be dispensed with for the specific package, a statement to this effect shall be included.

5.4.1.5.5.2 When organic peroxides and self-reactive substances are transported under conditions where approval is required (for organic peroxides, see 2.5.3.2.5, 4.1.7.2.2, 4.2.1.13.1 and 4.2.1.13.3; for self-reactive substances, see 2.4.2.3.2.4 and 4.1.7.2.2), a statement to this effect shall be included in the dangerous goods transport document. A copy of the classification approval and conditions of transport for non-listed organic peroxides and self-reactive substances shall be attached to the dangerous goods transport document.

5.4.1.5.5.3 When a sample of an organic peroxide (see 2.5.3.2.5.1) or a self-reactive substance (see 2.4.2.3.2.4(b)) is transported, a statement to this effect shall be included in the dangerous goods transport document.

5.4.1.5.6 *Infectious substances*

The full address of the consignee shall be shown on the document, together with the name of a responsible person and his telephone number.

5.4.1.5.7 *Radioactive material*

5.4.1.5.7.1 The following information shall be included for each consignment of Class 7 material, as applicable, in the order given:

(a) The name or symbol of each radionuclide or, for mixtures of radionuclides, an appropriate general description or a list of the most restrictive nuclides;

(b) A description of the physical and chemical form of the material, or a notation that the material is special form radioactive material or low dispersible radioactive material. A generic chemical description is acceptable for chemical form;

(c) The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix symbol (see 1.2.2.1). For fissile material, the mass of fissile material (or mass of each fissile nuclide for mixtures when appropriate) in units of grams (g), or appropriate multiples thereof, may be used in place of activity;

(d) The category of the package, overpack or freight container, as assigned per 5.1.5.3.4, i.e. I-WHITE, II-YELLOW, III-YELLOW;

(e) The TI as determined per 5.1.5.3.1 and 5.1.5.3.2 (except for category I-WHITE);

(f) For fissile material:

(i) Shipped under one exception of 2.7.2.3.5 (a) to (f), reference to that paragraph;

(ii) Shipped under 2.7.2.3.5 (c) to (e), the total mass of fissile nuclides;

(iii) Contained in a package for which one of 6.4.11.2 (a) to (c) or 6.4.11.3 is applied, reference to that paragraph;

(iv) The criticality safety index, where applicable.;

(g) The identification mark for each competent authority certificate of approval (special form radioactive material, low dispersible radioactive material, fissile material excepted under 2.7.2.3.5 (f), special arrangement, package design, or shipment) applicable to the consignment;

(h) For consignments of more than one package, the information contained in 5.4.1.4.1 (a) to (c) and 5.4.1.5.7.1 (a) to (g) shall be given for each package. For packages in an overpack, freight container, or conveyance, a detailed statement of the contents of each package within the overpack, freight container, or conveyance and, where appropriate, of each overpack, freight container, or conveyance shall be included. If packages are to be removed from the overpack, freight container, or conveyance at a point of intermediate unloading, appropriate transport documents shall be made available;

(i) Where a consignment is required to be shipped under exclusive use, the statement "EXCLUSIVE USE SHIPMENT"; and

(j) For LSA-II, LSA-III, SCO-I, SCO-II and SCO-III, the total activity of the consignment as a multiple of A_2. For radioactive material for which the A_2 value is unlimited, the multiple of A_2 shall be zero.

5.4.1.5.7.2 The transport document shall include a statement regarding actions, if any, that are required to be taken by the carrier. The statement shall be in the languages deemed necessary by the carrier or the authorities concerned, and shall include at least the following points:

(a) Supplementary requirements for loading, stowage, transport, handling and unloading of the package, overpack or freight container including any special stowage provisions for the safe dissipation of heat (see 7.1.8.3.2), or a statement that no such requirements are necessary;

(b) Restrictions on the mode of transport or conveyance and any necessary routeing instructions;

(c) Emergency arrangements appropriate to the consignment.

5.4.1.5.7.3 In all cases of international transport of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, the UN number and proper shipping name required in 5.4.1.4.1 shall be in accordance with the certificate of the country of origin of design.

5.4.1.5.7.4 The applicable competent authority certificates need not necessarily accompany the consignment. The consignor shall make them available to the carrier(s) before loading and unloading.

5.4.1.5.8 *Transport of solids in bulk containers*

For bulk containers other than freight containers, the following statement shall be shown on the transport document (see 6.8.4.6):

"Bulk container BK(x)[2] approved by the competent authority of…"

5.4.1.5.9 *Transport of IBCs or portable tanks after the date of expiry of the last periodic test or inspection*

For transport in accordance with 4.1.2.2 (b), 6.7.2.19.6 (b), 6.7.3.15.6 (b) or 6.7.4.14.6 (b), a statement to this effect shall be included in the transport document, as follows: "Transport in accordance with 4.1.2.2 (b)", "Transport in accordance with 6.7.2.19.6 (b)", "Transport in accordance with 6.7.3.15.6 (b)" or "Transport in accordance with 6.7.4.14.6 (b)" as appropriate.

5.4.1.5.10 *Firework classification reference*

When fireworks of UN Nos. 0333, 0334, 0335, 0336 and 0337 are transported, the dangerous goods transport document shall include a classification reference(s) issued by the competent authority.

The classification reference(s) shall consist of the competent authority's state, indicated by the distinguishing sign used on vehicles in international road traffic[3], the competent authority identification and a unique serial reference. Examples of such classification references are:

GB/HSE123456
D/BAM1234
USA EX20091234.

5.4.1.5.11 *Classification where new data is available (see 2.0.0.2)*

For transport in accordance with 2.0.0.2, a statement to this effect shall be included in the transport document, as follows "Classified in accordance with 2.0.0.2".

5.4.1.5.12 *Additional entries in the case of the application of special provisions*

Where, in accordance with a special provision in Chapter 3.3, additional information is necessary, this additional information shall be included in the dangerous goods transport document.

5.4.1.5.13 *Actual holding time*

In the case of portable tanks carrying refrigerated liquefied gases the consignor shall enter in the transport document the date at which the actual holding time ends, in the following format:

"END OF HOLDING TIME: …….. (DD/MM/YYYY)".

5.4.1.6 Certification

5.4.1.6.1 The dangerous goods transport document shall include a certification or declaration that the consignment is acceptable for transport and that the goods are properly packaged, marked and labelled, and in proper condition for transport in accordance with the applicable regulations. The text for this certification is:

> "I hereby declare that the contents of this consignment are fully and accurately described above[4] by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations."

The certification shall be signed and dated by the consignor. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

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2 *x shall be replaced with "1" or "2" as appropriate.*

3 *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968*

4 *or below*

5.4.1.6.2 If the dangerous goods documentation is presented to the carrier by means of EDP or EDI transmission techniques, the signature(s) may be electronic signature(s) or may be replaced by the name(s) (in capitals) of the person authorized to sign.

5.4.1.6.3 When the dangerous goods transport information is given to a carrier by EDP or EDI techniques and subsequently the dangerous goods are transferred to a carrier that requires a paper dangerous goods transport document, the carrier shall ensure that the paper document indicates "Original received electronically" and the name of the signatory shall be shown in capital letters.

5.4.2 Container/vehicle packing certificate

5.4.2.1 When dangerous goods are packed or loaded into any container[5] or vehicle which will be transported by sea, those responsible for packing of the container or vehicle shall provide a "container/vehicle packing certificate" specifying the container/vehicle identification number(s) and certifying that the operation has been carried out in accordance with the following conditions:

(a) The container/vehicle was clean, dry and apparently fit to receive the goods;

(b) Packages, which need to be segregated in accordance with applicable segregation requirements, have not been packed together onto or in the container/vehicle;

(c) All packages have been externally inspected for damage, and only sound packages have been loaded;

(d) All goods have been properly loaded and, where necessary, adequately braced with securing material to suit the mode(s) of transport for the intended journey;

(e) Goods loaded in bulk have been evenly distributed within the container/vehicle;

(f) For consignments including goods of Class 1 other than Division 1.4, the container/vehicle is structurally serviceable in accordance with 7.1.3.2.1;

(g) The container/vehicle and packages are properly marked, labelled and placarded, as appropriate;

(h) When substances presenting a risk of asphyxiation are used for cooling or conditioning purposes (such as dry ice (UN 1845) or nitrogen, refrigerated liquid (UN 1977) or argon, refrigerated liquid (UN 1951)), the container/vehicle is externally marked in accordance with 5.5.3.6; and

(i) A dangerous goods transport document, as indicated in 5.4.1.1, has been received for each dangerous goods consignment loaded in the container/vehicle.

NOTE: *The container/vehicle packing certificate is not required for tanks.*

5.4.2.2 The information required in the dangerous goods transport document and the container/vehicle packing certificate may be incorporated into a single document, if not, these documents shall be attached. If the information is incorporated into a single document, the document shall include a signed declaration such as "It is declared that the packing of the goods into the container/vehicle has been carried out in accordance with the applicable provisions". This declaration shall be dated and the person signing this declaration shall be

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[5] *Container means an article of transport equipment that is of a permanent character and accordingly strong enough to be suitable for repeated use; specially designed to facilitate the transport of goods, by one or more modes of transport, without intermediate reloading; designed to be secured and/or readily handled, having fittings for these purposes, and approved in accordance with the International Convention for Safe Containers (CSC), 1972, as amended. The term "container" includes neither vehicle nor packaging. However, a container that is transported on a chassis is included.*

identified on the document. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

5.4.2.3 If the container/vehicle packing certificate is presented to the carrier by means of EDP or EDI transmission techniques, the signature(s) may be electronic signature(s) or may be replaced by the name(s) (in capitals) of the person authorized to sign.

5.4.2.4 When the container/vehicle packing certificate is given to a carrier by EDP or EDI techniques and subsequently the dangerous goods are transferred to a carrier that requires a paper dangerous goods transport document, the carrier shall ensure that the paper document indicates "Original received electronically" and the name of the signatory shall be shown in capital letters.

5.4.3 Emergency response information

For consignments for which a dangerous goods transport document is required by these Regulations, appropriate information shall be immediately available at all times for use in emergency response to accidents and incidents involving dangerous goods in transport. The information shall be available away from the packages containing the dangerous goods and immediately accessible in the event of an accident or incident. Methods of compliance include:

(a) Appropriate entries in the transport document; or

(b) Provision of a separate document such as a safety data sheet; or

(c) Provision of a separate document, such as the International Civil Aviation Organization (ICAO) "Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods" or the International Maritime Organization (IMO) "Emergency Procedures for Ships Carrying Dangerous Goods" and "Medical First Aid Guide in Accidents Involving Dangerous Goods", for use in conjunction with the transport document.

5.4.4 Retention of dangerous goods transport information

5.4.4.1 The consignor shall retain a copy of the dangerous goods transport document and additional information and documentation as specified in these Regulations, for a minimum period of three months.

5.4.4.2 When the documents are kept electronically or in a computer system, the consignor shall be able to reproduce them in a printed form.

Figure 5.4.1: Multimodal Dangerous Goods Form (next page)

MULTIMODAL DANGEROUS GOODS FORM

1. Shipper / Consignor /Sender	2. Transport document number	
	3. Page 1 of Pages	4. Shipper's reference
		5. Freight Forwarder's reference
6. Consignee	7. Carrier (to be completed by the carrier)	

SHIPPER'S DECLARATION

I hereby declare that the contents of this consignment are fully and accurately described below by the proper shipping name, and are classified, packaged, marked and labelled /placarded and are in all respects in proper condition for transport according to the applicable international and national governmental regulations.

8. This shipment is within the limitations prescribed for: (Delete non-applicable) PASSENGER AND CARGO AIRCRAFT — CARGO AIRCRAFT ONLY		9. Additional handling information
10. Vessel / flight no. and date	11. Port / place of loading	
12. Port / place of discharge	13. Destination	

14. Shipping marks	* Number and kind of packages; description of goods	Gross mass (kg)	Net mass	Cube (m^3)

15. Container identification No./ vehicle registration No.	16. Seal number (s)	17. Container/vehicle size & type	18. Tare (kg)	19. Total gross mass (including tare) (kg)

CONTAINER/VEHICLE PACKING CERTIFICATE I hereby declare that the goods described above have been packed/loaded into the container/vehicle identified above in accordance with the applicable provisions ** MUST BE COMPLETED AND SIGNED FOR ALL CONTAINER/VEHICLE LOADS BY PERSON RESPONSIBLE FOR PACKING/LOADING	21.RECEIVING ORGANISATION RECEIPT Received the above number of packages/containers/trailers in apparent good order and condition unless stated hereon: RECEIVING ORGANISATION REMARKS:	
20. Name of company	Haulier's name	22. Name of company (OF SHIPPER PREPARING THIS NOTE)
Name / Status of declarant	Vehicle reg. no.	Name / Status of declarant
Place and date	Signature and date	Place and date
Signature of declarant	DRIVER'S SIGNATURE	Signature of declarant

** For the purposes of these Model Regulations, see 5.4.2.1

* FOR DANGEROUS GOODS: you must specify: UN No., proper shipping name, hazard class, packing group (where assigned) and any other element of information required under applicable national and international regulations

BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS BLACK HATCHINGS

MULTIMODAL DANGEROUS GOODS FORM

Continuation Sheet

1. Shipper / Consignor /Sender	2. Transport document number	
	3. Page 1 of Pages	4. Shipper's reference
		5. Freight Forwarder's reference

14. Shipping marks	* Number and kind of packages; description of goods	Gross mass (kg)	Net mass	Cube (m^3)

* FOR DANGEROUS GOODS: you must specify: UN No., proper shipping name, hazard class, packing group (where assigned) and any other element of information required under applicable national and international regulations

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CHAPTER 5.5

SPECIAL PROVISIONS

5.5.1 ***Deleted.***

5.5.2 Special provisions applicable to fumigated cargo transport units (UN 3359)

5.5.2.1 ***General***

5.5.2.1.1 Fumigated cargo transport units (UN 3359) containing no other dangerous goods are not subject to any provisions of these Regulations other than those of this section.

5.5.2.1.2 When the fumigated cargo transport unit is loaded with dangerous goods in addition to the fumigant, any provision of these Regulations relevant to these goods (including placarding, marking and documentation) applies in addition to the provisions of this section.

5.5.2.1.3 Only cargo transport units that can be closed in such a way that the escape of gas is reduced to a minimum shall be used for the transport of cargo under fumigation.

5.5.2.2 ***Training***

Persons engaged in the handling of fumigated cargo transport units shall be trained commensurate with their responsibilities.

5.5.2.3 ***Marking and placarding***

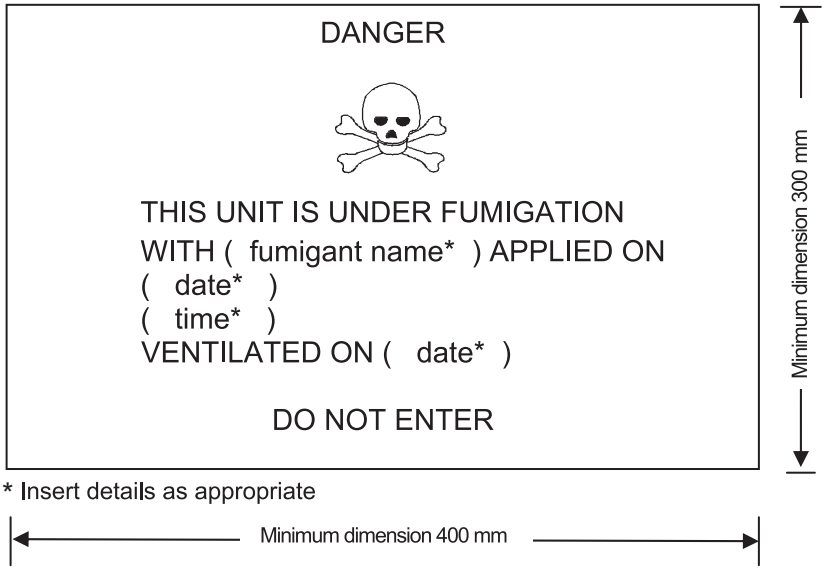
5.5.2.3.1 A fumigated cargo transport unit shall be marked with a warning mark, as specified in 5.5.2.3.2, affixed at each access point in a location where it will be easily seen by persons opening or entering the cargo transport unit. This mark shall remain on the cargo transport unit until the following provisions are met:

(a) The fumigated cargo transport unit has been ventilated to remove harmful concentrations of fumigant gas; and

(b) The fumigated goods or materials have been unloaded.

5.5.2.3.2 The fumigation warning mark shall be as shown in Figure 5.5.1.

Figure 5.5.1: Fumigation warning mark



The mark shall be a rectangle. The minimum dimensions shall be 400 mm wide × 300 mm high and the minimum width of the outer line shall be 2 mm. The mark shall be in black print on a white background with lettering not less than 25 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

NOTE: *The provisions of 5.5.2.3.2 from the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied until 31 December 2016.*

5.5.2.3.3 If the fumigated cargo transport unit has been completely ventilated either by opening the doors of the unit or by mechanical ventilation after fumigation, the date of ventilation shall be marked on the fumigation warning mark.

5.5.2.3.4 When the fumigated cargo transport unit has been ventilated and unloaded, the fumigation warning mark shall be removed.

5.5.2.3.5 Class 9 placards (Model No. 9, see 5.2.2.2.2) shall not be affixed to a fumigated cargo transport unit except as required for other Class 9 substances or articles packed therein.

5.5.2.4 ***Documentation***

5.5.2.4.1 Documents associated with the transport of cargo transport units that have been fumigated and have not been completely ventilated before transport shall include the following information:

(a) UN 3359, fumigated cargo transport unit, 9, or UN 3359, fumigated cargo transport unit, class 9;

(b) The date and time of fumigation; and

(c) The type and amount of the fumigant used.

5.5.2.4.2 The transport document may be in any form, provided it contains the information required in 5.5.2.4.1. This information shall be easy to identify, legible and durable.

5.5.2.4.3 Instructions for disposal of any residual fumigant including fumigation devices (if used) shall be provided.

5.5.2.4.4 A document is not required when the fumigated cargo transport unit has been completely ventilated and the date of ventilation has been marked on the warning mark (see 5.5.2.3.3 and 5.5.2.3.4).

5.5.3 Special provisions applicable to packages and cargo transport units containing substances presenting a risk of asphyxiation when used for cooling or conditioning purposes (such as dry ice (UN 1845) or nitrogen, refrigerated liquid (UN 1977) or argon, refrigerated liquid (UN 1951) or nitrogen)

NOTE: *In the context of this section the term "conditioning" may be used in a broader scope and includes protection.*

5.5.3.1 *Scope*

5.5.3.1.1 This section is not applicable to substances which may be used for cooling or conditioning purposes when transported as a consignment of dangerous goods. When they are transported as a consignment, these substances shall be transported under the relevant entry of the Dangerous Goods List in Chapter 3.2 in accordance with the associated conditions of transport.

5.5.3.1.2 This section is not applicable to gases in cooling cycles.

5.5.3.1.3 Dangerous goods used for cooling or conditioning portable tanks or MEGCs during transport are not subject to this section.

5.5.3.1.4 Cargo transport units containing substances used for cooling or conditioning purposes include cargo transport units containing substances used for cooling or conditioning purposes inside packages as well as cargo transport units with unpackaged substances used for cooling or conditioning purposes.

5.5.3.2 *General*

5.5.3.2.1 Cargo transport units containing substances used for cooling or conditioning purposes (other than fumigation) during transport are not subject to any provisions of these Regulations other than those of this section.

5.5.3.2.2 When dangerous goods are loaded in cargo transport units containing substances used for cooling or conditioning purposes any provisions of these Regulations relevant to these dangerous goods apply in addition to the provisions of this section.

5.5.3.2.3 For air transport, arrangements between consignor and operator shall be made for each consignment, to ensure that ventilation safety procedures are followed.

5.5.3.2.4 Persons engaged in the handling or transport of cargo transport units containing substances used for cooling or conditioning purposes shall be trained commensurate with their responsibilities.

5.5.3.3 *Packages containing a coolant or conditioner*

5.5.3.3.1 Packaged dangerous goods requiring cooling or conditioning assigned to packing instructions P203, P620, P650, P800, P901 or P904 of 4.1.4.1 shall meet the appropriate requirements of that packing instruction.

5.5.3.3.2 For packaged dangerous goods requiring cooling or conditioning assigned to other packing instructions, the packages shall be capable of withstanding very low temperatures and shall not be affected or significantly weakened by the coolant or conditioner. Packages shall be designed and constructed to permit the release of gas to prevent a build-up of pressure that could rupture the packaging. The dangerous goods shall be packed in such a way as to prevent movement after the dissipation of any coolant or conditioner.

5.5.3.3.3 Packages containing a coolant or conditioner shall be transported in well ventilated cargo transport units.

5.5.3.4 ***Marking of packages containing a coolant or conditioner***

5.5.3.4.1 Packages containing dangerous goods used for cooling or conditioning shall be marked with the proper shipping name of these dangerous goods followed by the words "AS COOLANT" or "AS CONDITIONER" as appropriate.

5.5.3.4.2 The marks shall be durable, legible and placed in such a location and of such a size relative to the package as to be readily visible.

5.5.3.5 ***Cargo transport units containing unpackaged dry ice***

5.5.3.5.1 If dry ice in unpackaged form is used, it shall not come into direct contact with the metal structure of a cargo transport unit to avoid embrittlement of the metal. Measures shall be taken to provide adequate insulation between the dry ice and the cargo transport unit by providing a minimum of 30 mm separation (e.g. by using suitable low heat conducting materials such as timber planks, pallets etc).

5.5.3.5.2 Where dry ice is placed around packages, measures shall be taken to ensure that packages remain in the original position during transport after the dry ice has dissipated.

5.5.3.6 ***Marking of cargo transport units***

5.5.3.6.1 Cargo transport units containing dangerous goods used for cooling or conditioning purposes shall be marked with a warning mark, as specified in 5.5.3.6.2 affixed at each access point in a location where it will be easily seen by persons opening or entering the cargo transport unit. This mark shall remain on the cargo transport unit until the following provisions are met:

(a) The cargo transport unit has been ventilated to remove harmful concentrations of coolant or conditioner; and

(b) The cooled or conditioned goods have been unloaded.

5.5.3.6.2 The warning mark shall be as shown in Figure 5.5.2

Figure 5.5.2: Asphyxiation warning mark for cargo transport units

* Insert proper shipping name or the name of the asphyxiant gas used as the coolant/conditioner. The lettering shall be in capitals, all be on one line and shall be at least 25 mm high. If the length of the proper shipping name is too long to fit in the space provided, the lettering may be reduced to the maximum size possible to fit. For example: CARBON DIOXIDE, SOLID. Additional information such as "AS COOLANT" or "AS CONDITIONER" may be added.

The mark shall be a rectangle. The minimum dimensions shall be 150 mm wide × 250 mm high. The word "WARNING" shall be in red or white and be at least 25 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

5.5.3.7 ***Documentation***

5.5.3.7.1 Documents (such as a bill of lading or cargo manifest) associated with the transport of cargo transport units containing or have contained substances used for cooling or conditioning purposes and have not been completely ventilated before transport shall include the following information:

(a) The UN number preceded by the letters "UN"; and

(b) The proper shipping name followed by the words "AS COOLANT" or "AS CONDITIONER" as appropriate.

For example: UN 1845, CARBON DIOXIDE, SOLID, AS COOLANT.

5.5.3.7.2 The transport document may be in any form, provided it contains the information required in 5.5.3.7.1. This information shall be easy to identify, legible and durable.

5.5.4 Dangerous goods in equipment in use or intended for use during transport

5.5.4.1 Dangerous goods (e.g. lithium batteries, fuel cell cartridges) contained in equipment such as data loggers and cargo tracking devices, attached to or placed in packages, overpacks, containers or load compartments are not subject to any provisions of these Regulations other than the following:

(a) the equipment shall be in use or intended for use during transport;

(b) the contained dangerous goods (e.g. lithium batteries, fuel cell cartridges) shall meet the applicable construction and test requirements specified in these Regulations; and

(c) the equipment shall be capable of withstanding the shocks and loadings normally encountered during transport.

5.5.4.2 When such equipment containing dangerous goods is transported as a consignment, the relevant entry of the Dangerous Goods List in Chapter 3.2 shall be used and all applicable provisions of these Regulations shall apply.

PART 6

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PACKAGINGS, INTERMEDIATE BULK CONTAINERS (IBCs), LARGE PACKAGINGS, PORTABLE TANKS, MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs) AND BULK CONTAINERS

CHAPTER 6.1

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PACKAGINGS

6.1.1 General

6.1.1.1 The requirements of this Chapter do not apply to:

(a) Packages containing radioactive material, which shall comply with the Regulations of the International Atomic Energy Agency (IAEA), except that:

(i) Radioactive material possessing other dangerous properties (subsidiary hazards) shall also comply with special provision 172; and

(ii) Low specific activity (LSA) material and surface contaminated objects (SCO) may be carried in certain packagings defined in these Regulations provided that the supplementary provisions set out in the IAEA Regulations are also met;

(b) Pressure receptacles;

(c) Packages whose net mass exceeds 400 kg;

(d) Packagings for liquids, other than combination packagings, with a capacity exceeding 450 litres;

(e) Packagings for Division 6.2 infectious substances of Category A except for UN 3549.

6.1.1.2 The requirements for packagings in 6.1.4 are based on packagings currently used. In order to take into account progress in science and technology, there is no objection to the use of packagings having specifications different from those in 6.1.4, provided that they are equally effective, acceptable to the competent authority and able to successfully fulfil the requirements described in 6.1.1.3 and 6.1.5. Methods of testing other than those described in these Regulations are acceptable, provided they are equivalent.

6.1.1.3 Every packaging intended to contain liquids shall successfully undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.1.1.4 which shows the capability of meeting the appropriate test level indicated in 6.1.5.4.3:

(a) Before it is first used for transport;

(b) After remanufacturing or reconditioning, before it is re-used for transport.

For this test, packagings need not have their own closures fitted.

The inner receptacle of composite packagings may be tested without the outer packaging provided the test results are not affected. This test is not necessary for inner packagings of combination packagings.

6.1.1.4 Packagings shall be manufactured, reconditioned and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each packaging meets the requirements of this Chapter.

NOTE: *ISO 16106:2020 "Transport packages for dangerous goods – Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings – Guidelines for the application of ISO 9001" provides acceptable guidance on procedures which may be followed.*

6.1.1.5 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for transport are capable of passing the applicable performance tests of this Chapter.

6.1.2 Code for designating types of packagings

6.1.2.1 The code consists of:

(a) An Arabic numeral indicating the kind of packaging, e.g. drum, jerrican, etc., followed by;

(b) A capital letter(s) in Latin characters indicating the nature of the material, e.g. steel, wood, etc., followed where necessary by;

(c) An Arabic numeral indicating the category of packaging within the kind to which the packaging belongs.

6.1.2.2 In the case of composite packagings, two capital letters in Latin characters are used in sequence in the second position of the code. The first indicates the material of the inner receptacle and the second that of the outer packaging.

6.1.2.3 In the case of combination packagings, only the code number for the outer packaging is used.

6.1.2.4 The letters "T" or "V" or "W" may follow the packaging code. The letter "T" signifies a salvage packaging conforming to the requirements of 6.1.5.1.11. The letter "V" signifies a special packaging conforming to the requirements of 6.1.5.1.7. The letter "W" signifies that the packaging, although of the same type indicated by the code, is manufactured to a specification different from that in 6.1.4 and is considered equivalent under the requirements of 6.1.1.2.

6.1.2.5 The following numerals shall be used for the kinds of packaging:

1. Drum
2. *(Reserved)*
3. Jerrican
4. Box
5. Bag
6. Composite packaging

6.1.2.6 The following capital letters shall be used for the types of material:

A. Steel (all types and surface treatments)
B. Aluminium
C. Natural wood
D. Plywood
F. Reconstituted wood
G. Fibreboard
H. Plastics material
L. Textile
M. Paper, multiwall
N. Metal (other than steel or aluminium)
P. Glass, porcelain or stoneware

NOTE: *"Plastics materials" is taken to include other polymeric materials such as rubber.*

6.1.2.7 The following table indicates the codes to be used for designating types of packagings depending on the kind of packagings, the material used for their construction and their category; it also refers to the paragraphs to be consulted for the appropriate requirements:

Kind	Material	Category	Code	Paragraph
1. Drums	A. Steel	non-removable head	1A1	6.1.4.1
		removable head	1A2	
	B. Aluminium	non-removable head	1B1	6.1.4.2
		removable head	1B2	
	D. Plywood		1D	6.1.4.5
	G. Fibre		1G	6.1.4.7
	H. Plastics	non-removable head	1H1	6.1.4.8
		removable head	1H2	
	N. Metal, other than steel or aluminium	non-removable head	1N1	6.1.4.3
		removable head	1N2	
2. (Reserved)				
3. Jerricans	A. Steel	non-removable head	3A1	6.1.4.4
		removable head	3A2	
	B. Aluminium	non-removable head	3B1	6.1.4.4
		removable head	3B2	
	H. Plastics	non-removable head	3H1	6.1.4.8
		removable head	3H2	
4. Boxes	A. Steel		4A	6.1.4.14
	B. Aluminium		4B	6.1.4.14
	C. Natural wood	Ordinary	4C1	6.1.4.9
		with sift-proof walls	4C2	
	D. Plywood		4D	6.1.4.10
	F. Reconstituted wood		4F	6.1.4.11
	G. Fibreboard		4G	6.1.4.12
	H. Plastics	expanded	4H1	6.1.4.13
		Solid	4H2	
	N. Metal, other than steel or aluminium		4N	6.1.4.14
5. Bags	H. Woven plastics	without inner liner or coating	5H1	6.1.4.16
		sift-proof	5H2	
		water-resistant	5H3	
	H. Plastics film		5H4	6.1.4.17
	L. Textile	without inner liner or coating	5L1	6.1.4.15
		sift proof	5L2	
		water-resistant	5L3	
	M. Paper	multiwall	5M1	6.1.4.18
		multiwall, water-resistant	5M2	

Kind	Material	Category	Code	Paragraph
6.Composite packagings	H. Plastics receptacle	in steel drum	6HA1	6.1.4.19
		in steel crate or box	6HA2	6.1.4.19
		in aluminium drum	6HB1	6.1.4.19
		in aluminium crate or box	6HB2	6.1.4.19
		in wooden box	6HC	6.1.4.19
		in plywood drum	6HD1	6.1.4.19
		in plywood box	6HD2	6.1.4.19
		in fibre drum	6HG1	6.1.4.19
		in fibreboard box	6HG2	6.1.4.19
		in plastics drum	6HH1	6.1.4.19
		in solid plastics box	6HH2	6.1.4.19
	P. Glass, porcelain or stoneware receptacle	in steel drum	6PA1	6.1.4.20
		in steel crate or box	6PA2	6.1.4.20
		in aluminium drum	6PB1	6.1.4.20
		in aluminium crate or box	6PB2	6.1.4.20
		in wooden box	6PC	6.1.4.20
		in plywood drum	6PD1	6.1.4.20
		in wickerwork hamper	6PD2	6.1.4.20
		in fibre drum	6PG1	6.1.4.20
		in fibreboard box	6PG2	6.1.4.20
		in expanded plastics packaging	6PH1	6.1.4.20
		in solid plastics packaging	6PH2	6.1.4.20

6.1.3 Marking

NOTE 1: *The marks indicate that the packaging which bears them correspond to a successfully tested design type and that it complies with the requirements of this Chapter which are related to the manufacture, but not to the use, of the packaging. In itself, therefore, the marks do not necessarily confirm that the packaging may be used for any substance: generally the type of packaging (e.g. steel drum), its maximum capacity and/or mass, and any special requirements are specified for each substance in Part 3 of these Regulations.*

NOTE 2: *The marks are intended to be of assistance to packaging manufacturers, reconditioners, packaging users, carriers and regulatory authorities. In relation to the use of a new packaging, the original marks are a means for its manufacturer(s) to identify the type and to indicate those performance test regulations that have been met.*

NOTE 3: *The marks do not always provide full details of the test levels, etc., and these may need to be taken further into account, e.g. by reference to a test certificate, to test reports or to a register of successfully tested packagings. For example, a packaging having an X or Y mark may be used for substances to which a packing group having a lesser degree of danger has been assigned with the relevant maximum permissible value of the relative density[1] determined by taking into account the factor 1.5 or 2.25 indicated in the test requirements for packagings in 6.1.5 as appropriate, i.e. packing group I packaging tested for products of relative density 1.2 could be used as a packing group II packaging for products of relative density 1.8 or a packing group III packaging of relative density 2.7, provided of course that all the performance criteria can still be met with the higher relative density product.*

6.1.3.1 Each packaging intended for use according to these Regulations shall bear marks which are durable, legible and placed in a location and of such a size relative to the packaging as to be readily visible.

[1] *Relative density (d) is considered to be synonymous with Specific Gravity (SG) and is used throughout this text.*

For packages with a gross mass of more than 30 kg, the marks or a duplicate thereof shall appear on the top or on a side of the packaging. Letters, numerals and symbols shall be at least 12 mm high, except for packagings of 30 *l* capacity or less or of 30 kg maximum net mass, when they shall be at least 6 mm in height and except for packagings of 5 *l* capacity or less or of 5 kg maximum net mass when they shall be of an appropriate size.

The marks shall show:

(a) The United Nations packaging symbol 

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This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8.

For embossed metal packagings the capital letters "UN" may be applied as the symbol;

(b) The code designating the type of packaging according to 6.1.2;

(c) A code in two parts:

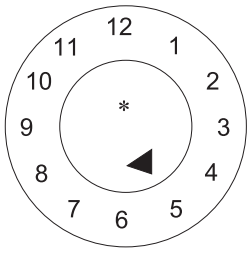
(i) a letter designating the packing group(s) for which the design type has been successfully tested:

X for packing groups I, II and III
Y for packing groups II and III
Z for packing group III only;

(ii) the relative density, rounded off to the first decimal, for which the design type has been tested for packagings without inner packagings intended to contain liquids; this may be omitted when the relative density does not exceed 1.2. For packagings intended to contain solids or inner packagings, the maximum gross mass in kilograms;

(d) Either the letter "S" denoting that the packaging is intended for the transport of solids or inner packagings or, for packagings (other than combination packagings) intended to contain liquids, the hydraulic test pressure which the packaging was shown to withstand in kPa rounded down to the nearest 10 kPa;

(e) The last two digits of the year during which the packaging was manufactured. Packagings of types lH and 3H shall also be appropriately marked with the month of manufacture; this may be marked on the packaging in a different place from the remainder of the marks. An appropriate method is:



* The last two digits of the year of manufacture may be displayed at that place. In such a case and when the clock is placed adjacent to the UN design type mark, the indication of the year in the mark may be waived. However, when the clock is not placed adjacent to the UN design type mark, the two digits of the year in the mark and in the clock shall be identical.

NOTE: *Other methods that provide the minimum required information in a durable, visible and legible form are also acceptable.*

(f) The State authorizing the allocation of the mark, indicated by the distinguishing sign used on vehicles in international road traffic[2];

(g) The name of the manufacturer or other identification of the packaging specified by the competent authority.

6.1.3.2 In addition to the durable marks prescribed in 6.1.3.1, every new metal drum of a capacity greater than 100 litres shall bear the marks described in 6.1.3.1 (a) to (e) on the bottom, with an indication of the nominal thickness of at least the metal used in the body (in mm, to 0.1 mm), in permanent form (e.g. embossed). When the nominal thickness of either head of a metal drum is thinner than that of the body, the nominal thicknesses of the top head, body, and bottom head shall be marked on the bottom in permanent form (e.g. embossed), for example "1.0-1.2-1.0" or "0.9-1.0-1.0". Nominal thicknesses of metal shall be determined according to the appropriate ISO standard, for example ISO 3574:1999 for steel. The marks indicated in 6.1.3.1 (f) and (g) shall not be applied in a permanent form (e.g. embossed) except as provided in 6.1.3.5.

6.1.3.3 Every packaging other than those referred to in 6.1.3.2 liable to undergo a reconditioning process shall bear the marks indicated in 6.1.3.1 (a) to (e) in a permanent form. Marks are permanent if they are able to withstand the reconditioning process (e.g. embossed). For packagings other than metal drums of a capacity greater than 100 litres, these permanent marks may replace the corresponding durable marks prescribed in 6.1.3.1.

6.1.3.4 For remanufactured metal drums, if there is no change to the packaging type and no replacement or removal of integral structural components, the required marks need not be permanent (e.g. embossed). Every other remanufactured metal drum shall bear the marks in 6.1.3.1 (a) to (e) in a permanent form (e.g. embossed) on the top head or side.

6.1.3.5 Metal drums made from materials (e.g. stainless steel) designed to be reused repeatedly may bear the marks indicated in 6.1.3.1 (f) and (g) in a permanent form (e.g. embossed).

6.1.3.6 Packagings manufactured with recycled plastics material as defined in 1.2.1 shall be marked "REC". This mark shall be placed near the marks prescribed in 6.1.3.1.

6.1.3.7 Marks shall be applied in the sequence shown in 6.1.3.1; each mark required in these sub-paragraphs and when appropriate, (h) to (j) of 6.1.3.8, shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable. For examples, see 6.1.3.10.

Any additional marks authorized by a competent authority shall still enable the other marks required in 6.1.3.1 to be correctly identified.

6.1.3.8 After reconditioning a packaging, the reconditioner shall apply to it, in sequence, durable marks showing:

(h) The State in which the reconditioning was carried out, indicated by the distinguishing sign used on vehicles in international road traffic[2];

(i) The name of the reconditioner or other identification of the packaging specified by the competent authority;

(j) The year of reconditioning; the letter "R"; and, for every packaging successfully passing the leakproofness test in 6.1.1.3, the additional letter "L".

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[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

6.1.3.9 When, after reconditioning, the marks required by 6.1.3.1 (a) to (d) no longer appear on the top head or the side of a metal drum, the reconditioner also shall apply them in a durable form followed by 6.1.3.8 (h), (i) and (j). These marks shall not identify a greater performance capability than that for which the original design type had been tested and marked.

6.1.3.10 ***Examples for marking NEW packagings***

	4G/Yl45/S/02 NL/VL823	as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g)	For a new fibreboard box
	lAl/Y1.4/l50/98 NL/VL824	as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g)	For a new steel drum to contain liquids
	1A2/Y150/S/01 NL/VL825	as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g)	For a new steel drum to contain solids, or inner packagings
	4HW/Y136/S/98 NL/VL826	as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g)	For a new plastics box of equivalent specification
	1A2/Y/100/01 USA/MM5	as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g)	For a remanufactured steel drum to contain liquids

6.1.3.11 ***Examples for marking RECONDITIONED packagings***

	lA1/Y1.4/150/97 NL/RB/01 RL	as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.8 (h), (i) and (j)
	1A2/Y150/S/99 USA/RB/00 R	as in 6.1.3.1 (a), (b), (c), (d), and (e) as in 6.1.3.8 (h), (i) and (j)

6.1.3.12 ***Example for marking SALVAGE packagings***

	1A2T/Y300/S/01 USA/abc	as in 6.1.3.1 (a), (b), (c), (d) and (e) as in 6.1.3.1 (f) and (g)

NOTE: *The marking, for which examples are given in 6.1.3.10, 6.1.3.11 and 6.1.3.12, may be applied in a single line or in multiple lines provided the correct sequence is respected.*

6.1.3.13 Where a packaging conforms to one or more than one tested packaging design type, including one or more than one tested IBC or large packaging design type, the packaging may bear more than one mark to indicate the relevant performance test requirements that have been met. Where more than one mark appears on a packaging, the marks shall appear in close proximity to one another and each mark shall appear in its entirety.

6.1.4 Requirements for packagings

6.1.4.0 ***General requirements***

Any permeation of the substance contained in the packaging shall not constitute a danger under normal conditions of transport.

6.1.4.1 ***Steel drums***

1A1	non-removable head
1A2	removable head

6.1.4.1.1 Body and heads shall be constructed of steel sheet of a suitable type and of adequate thickness in relation to the capacity of the drum and to its intended use.

NOTE: *In the case of carbon steel drums, "suitable" steels are identified in ISO 3573:1999 "Hot rolled carbon steel sheet of commercial and drawing qualities" and ISO 3574:1999 "Cold-reduced carbon steel sheet of commercial and drawing qualities". For carbon steel drums below 100 litres "suitable" steels in addition to the above standards are also identified in ISO 11949:1995 "Cold-reduced electrolytic tinplate", ISO 11950:1995 "Cold-reduced electrolytic chromium/chromium oxide-coated steel" and ISO 11951:1995 "Cold-reduced blackplate in coil form for the production of tinplate or electrolytic chromium/chromium oxide-coated steel".*

6.1.4.1.2 Body seams shall be welded on drums intended to contain more than 40 litres of liquid. Body seams shall be mechanically seamed or welded on drums intended to contain solids or 40 litres or less of liquids.

6.1.4.1.3 Chimes shall be mechanically seamed or welded. Separate reinforcing rings may be applied.

6.1.4.1.4 The body of a drum of a capacity greater than 60 litres shall, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If there are separate rolling hoops they shall be fitted tightly on the body and so secured that they cannot shift. Rolling hoops shall not be spot welded.

6.1.4.1.5 Openings for filling, emptying and venting in the bodies or heads of non-removable head (1A1) drums shall not exceed 7 cm in diameter. Drums with larger openings are considered to be of the removable head type (1A2). Closures for openings in the bodies and heads of drums shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Closure flanges may be mechanically seamed or welded in place. Gaskets or other sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.1.4.1.6 Closure devices for removable head drums shall be so designed and applied that they will remain secure and drums will remain leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with all removable heads.

6.1.4.1.7 If materials used for body, heads, closures and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments shall be applied. These coatings or treatments shall retain their protective properties under normal conditions of transport.

6.1.4.1.8 Maximum capacity of drum: 450 litres

6.1.4.1.9 Maximum net mass: 400 kg

6.1.4.2 ***Aluminium drums***

1B1 non-removable head
1B2 removable head

6.1.4.2.1 Body and heads shall be constructed of aluminium at least 99 % pure or of an aluminium base alloy. Material shall be of a suitable type and of adequate thickness in relation to the capacity of the drum and to its intended use.

6.1.4.2.2 All seams shall be welded. Chime seams, if any, shall be reinforced by the application of separate reinforcing rings.

6.1.4.2.3 The body of a drum of a capacity greater than 60 litres shall, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If there are separate rolling hoops they shall be fitted tightly on the body and so secured that they cannot shift. Rolling hoops shall not be spot welded.

6.1.4.2.4 Openings for filling, emptying and venting in the bodies or heads of non-removable head (1B1) drums shall not exceed 7 cm in diameter. Drums with larger openings are considered to be of the removable head type (1B2). Closures for openings in the bodies and heads of drums shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Closure flanges shall be welded in place so that the weld provides a leakproof seam. Gaskets or other sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.1.4.2.5 Closure devices for removable head drums shall be so designed and applied that they will remain secure and drums will remain leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with all removable heads.

6.1.4.2.6 If materials used for body, heads, closures and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments shall be applied. These coatings or treatments shall retain their protective properties under normal conditions of transport.

6.1.4.2.7 Maximum capacity of drum: 450 litres

6.1.4.2.8 Maximum net mass: 400 kg

6.1.4.3 ***Drums of metal other than steel or aluminium***

1N1 non-removable head
1N2 removable head

6.1.4.3.1 The body and heads shall be constructed of a metal or of a metal alloy other than steel or aluminium. Material shall be of a suitable type and of adequate thickness in relation to the capacity of the drum and to its intended use.

6.1.4.3.2 Chime seams, if any, shall be reinforced by the application of separate reinforcing rings. All seams, if any, shall be joined (welded, soldered, etc.) in accordance with the technical state of the art for the used metal or metal alloy.

6.1.4.3.3 The body of a drum of a capacity greater than 60 litres shall, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If there are separate rolling hoops they shall be fitted tightly on the body and so secured that they cannot shift. Rolling hoops shall not be spot welded.

6.1.4.3.4 Openings for filling, emptying and venting in the bodies or heads of non-removable head (1N1) drums shall not exceed 7 cm in diameter. Drums with larger openings are considered to be of the removable head type (1N2). Closures for openings in the bodies and heads of drums shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Closure flanges shall be joined in place (welded, solded, etc.) in accordance with the technical state of the art for the used metal or metal alloy so that the seam join is leakproof. Gaskets or other sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.1.4.3.5 Closure devices for removable head drums shall be so designed and applied that they will remain secure and drums will remain leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with all removable heads.

6.1.4.3.6 If materials used for body, heads, closures and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments shall be applied. These coatings or treatments shall retain their protective properties under normal conditions of transport.

6.1.4.3.7 Maximum capacity of drum: 450 litres

6.1.4.3.8 Maximum net mass: 400 kg

6.1.4.4 ***Steel or aluminium jerricans***

3A1 steel, non-removable head
3A2 steel, removable head
3B1 aluminium, non-removable head
3B2 aluminium, removable head

6.1.4.4.1 Body and heads shall be constructed of steel sheet, of aluminium at least 99 % pure or of an aluminium base alloy. Material shall be of a suitable type and of adequate thickness in relation to the capacity of the jerrican and to its intended use.

6.1.4.4.2 Chimes of steel jerricans shall be mechanically seamed or welded. Body seams of steel jerricans intended to contain more than 40 litres of liquid shall be welded. Body seams of steel jerricans intended to contain 40 litres or less shall be mechanically seamed or welded. For aluminium jerricans, all seams shall be welded. Chime seams, if any, shall be reinforced by the application of a separate reinforcing ring.

6.1.4.4.3 Openings in jerricans (3A1 and 3B1) shall not exceed 7 cm in diameter. Jerricans with larger openings are considered to be of the removable head type (3A2 and 3B2). Closures shall be so designed that they will remain secure and leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.1.4.4.4 If materials used for body, heads, closures and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments shall be applied. These coatings or treatments shall retain their protective properties under normal conditions of transport.

6.1.4.4.5 Maximum capacity of jerrican: 60 litres

6.1.4.4.6 Maximum net mass: 120 kg

6.1.4.5 ***Plywood drums***

1D

6.1.4.5.1 The wood used shall be well-seasoned, commercially dry and free from any defect likely to lessen the effectiveness of the drum for the purpose intended. If a material other than plywood is used for the manufacture of the heads, it shall be of a quality equivalent to the plywood.

6.1.4.5.2 At least two-ply plywood shall be used for the body and at least three-ply plywood for the heads; the plies shall be firmly glued together by a water-resistant adhesive with their grain crosswise.

6.1.4.5.3 The body and heads of the drum and their joins shall be of a design appropriate to the capacity of the drum and to its intended use.

6.1.4.5.4 In order to prevent sifting of the contents, lids shall be lined with kraft paper or some other equivalent material which shall be securely fastened to the lid and extend to the outside along its full circumference.

6.1.4.5.5 Maximum capacity of drum: 250 litres

6.1.4.5.6 Maximum net mass: 400 kg

6.1.4.6 *Deleted.*

6.1.4.7 ***Fibre drums***

1G

6.1.4.7.1 The body of the drum shall consist of multiple plies of heavy paper or fibreboard (without corrugations) firmly glued or laminated together and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastics material, etc.

6.1.4.7.2 Heads shall be of natural wood, fibreboard, metal, plywood, plastics or other suitable material and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastics material, etc.

6.1.4.7.3 The body and heads of the drum and their joins shall be of a design appropriate to the capacity of the drum and to its intended use.

6.1.4.7.4 The assembled packaging shall be sufficiently water-resistant so as not to delaminate under normal conditions of transport.

6.1.4.7.5 Maximum capacity of drum: 450 litres

6.1.4.7.6 Maximum net mass: 400 kg

6.1.4.8 ***Plastics drums and jerricans***

1H1 drums, non-removable head
1H2 drums, removable head
3H1 jerricans, non-removable head
3H2 jerricans, removable head

6.1.4.8.1 The packaging shall be manufactured from suitable plastics material and be of adequate strength in relation to its capacity and intended use. Except for recycled plastics material as defined in 1.2.1, no used material other than production residues or regrind from the same manufacturing process may be used. The packaging shall be adequately resistant to ageing and to degradation caused either by the substance contained or by ultra-violet radiation.

6.1.4.8.2 If protection against ultra-violet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, retesting may be waived if the carbon black content does not exceed 2 % by mass or if the pigment content does not exceed 3 % by mass; the content of inhibitors of ultra-violet radiation is not limited.

6.1.4.8.3 Additives serving purposes other than protection against ultra-violet radiation may be included in the composition of the plastics material provided that they do not adversely affect the chemical and physical properties of the material of the packaging. In such circumstances, retesting may be waived.

6.1.4.8.4 The wall thickness at every point of the packaging shall be appropriate to its capacity and intended use, taking into account the stresses to which each point is liable to be exposed.

6.1.4.8.5 Openings for filling, emptying and venting in the bodies or heads of non-removable head drums (1H1) and jerricans (3H1) shall not exceed 7 cm in diameter. Drums and jerricans with larger openings are considered to be of the removable head type (1H2 and 3H2). Closures for openings in the bodies or heads of drums and jerricans shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Gaskets or other sealing elements shall be used with closures unless the closure is inherently leakproof.

6.1.4.8.6 Closure devices for removable head drums and jerricans shall be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Gaskets shall be used with all removable heads unless the drum or jerrican design is such that, where the removable head is properly secured, the drum or jerrican is inherently leakproof.

6.1.4.8.7 Maximum capacity of drums and jerricans:

1H1, 1H2: 450 litres
3H1, 3H2: 60 litres

6.1.4.8.8 Maximum net mass:

1H1, 1H2: 400 kg
3H1, 3H2: 120 kg

6.1.4.9 ***Boxes of natural wood***

4C1 ordinary
4C2 with sift-proof walls

6.1.4.9.1 The wood used shall be well-seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the box. The strength of the material used and the method of construction shall be appropriate to the capacity and intended use of the box. The tops and bottoms may be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

6.1.4.9.2 Fastenings shall be resistant to vibration experienced under normal conditions of transport. End grain nailing shall be avoided whenever practicable. Joins which are likely to be highly stressed shall be made using clenched or annular ring nails or equivalent fastenings.

6.1.4.9.3 Box 4C2: each part shall consist of one piece or be equivalent thereto. Parts are considered equivalent to one piece when one of the following methods of glued assembly is used: Lindermann joint, tongue and groove joint, ship lap or rabbet joint or butt joint with at least two corrugated metal fasteners at each joint.

6.1.4.9.4 Maximum net mass: 400 kg

6.1.4.10 ***Plywood boxes***

4D

6.1.4.10.1 Plywood used shall be at least 3-ply. It shall be made from well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the box. The strength of the material used and the method of construction shall be appropriate to the capacity and intended use of the box. All adjacent plies shall be glued with water-resistant adhesive. Other suitable materials may be used together with plywood in the construction of boxes. Boxes shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

6.1.4.10.2 Maximum net mass: 400 kg

6.1.4.11 ***Reconstituted wood boxes***

4F

6.1.4.11.1 The walls of boxes shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type. The strength of the material used and the method of construction shall be appropriate to the capacity of the boxes and to their intended use.

6.1.4.11.2 Other parts of the boxes may be made of other suitable material.

6.1.4.11.3 Boxes shall be securely assembled by means of suitable devices.

6.1.4.11.4 Maximum net mass: 400 kg

6.1.4.12 ***Fibreboard boxes***

4G

6.1.4.12.1 Strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used, appropriate to the capacity of the box and to its intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the

Cobb method of determining water absorption, is not greater than 155 g/m^2 - see ISO 535:l991. It shall have proper bending qualities. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting of corrugated fibreboard shall be firmly glued to the facings.

6.1.4.12.2 The ends of boxes may have a wooden frame or be entirely of wood or other suitable material. Reinforcements of wooden battens or other suitable material may be used.

6.1.4.12.3 Manufacturing joins in the body of boxes shall be taped, lapped and glued, or lapped and stitched with metal staples. Lapped joins shall have an appropriate overlap.

6.1.4.12.4 Where closing is effected by gluing or taping, a water-resistant adhesive shall be used.

6.1.4.12.5 Boxes shall be designed so as to provide a good fit to the contents.

6.1.4.12.6 Maximum net mass: 400 kg

6.1.4.13 ***Plastics boxes***

4H1 expanded plastics boxes
4H2 solid plastics boxes

6.1.4.13.1 The box shall be manufactured from suitable plastics material and be of adequate strength in relation to its capacity and intended use. The box shall be adequately resistant to ageing and to degradation caused either by the substance contained or by ultra-violet radiation.

6.1.4.13.2 An expanded plastics box shall comprise two parts made of a moulded expanded plastics material, a bottom section containing cavities for the inner packagings and a top section covering and interlocking with the bottom section. The top and bottom sections shall be designed so that the inner packagings fit snugly. The closure cap for any inner packaging shall not be in contact with the inside of the top section of this box.

6.1.4.13.3 For dispatch, an expanded plastics box shall be closed with a self-adhesive tape having sufficient tensile strength to prevent the box from opening. The adhesive tape shall be weather resistant and its adhesive compatible with the expanded plastics material of the box. Other closing devices at least equally effective may be used.

6.1.4.13.4 For solid plastics boxes, protection against ultra-violet radiation, if required, shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the box. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, retesting may be waived if the carbon black content does not exceed 2 % by mass or if the pigment content does not exceed 3 % by mass; the content of inhibitors of ultra-violet radiation is not limited.

6.1.4.13.5 Additives serving purposes other than protection against ultra-violet radiation may be included in the composition of the plastics material provided that they do not adversely affect the chemical or physical properties of the material of the box. In such circumstances, retesting may be waived.

6.1.4.13.6 Solid plastics boxes shall have closure devices made of a suitable material of adequate strength and so designed as to prevent the box from unintentional opening.

6.1.4.13.7 Maximum net mass:

4H1: 60 kg
4H2: 400 kg

6.1.4.14 ***Steel, aluminium or other metal boxes***

4A steel boxes
4B aluminium boxes
4N metal, other than steel or aluminium, boxes

6.1.4.14.1 The strength of the metal and the construction of the box shall be appropriate to the capacity of the box and to its intended use.

6.1.4.14.2 Boxes shall be lined with fibreboard or felt packing pieces or shall have an inner liner or coating of suitable material, as required. If a double seamed metal liner is used, steps shall be taken to prevent the ingress of substances, particularly explosives, into the recesses of the seams.

6.1.4.14.3 Closures may be of any suitable type; they shall remain secured under normal conditions of transport.

6.1.4.14.4 Maximum net mass: 400 kg

6.1.4.15 ***Textile bags***

5L1 without inner liner or coating
5L2 sift-proof
5L3 water-resistant

6.1.4.15.1 The textiles used shall be of good quality. The strength of the fabric and the construction of the bag shall be appropriate to the capacity of the bag and to its intended use.

6.1.4.15.2 Bags, sift-proof, 5L2: the bag shall be made sift-proof, for example by the use of:

(a) Paper bonded to the inner surface of the bag by a water-resistant adhesive such as bitumen; or

(b) Plastics film bonded to the inner surface of the bag; or

(c) One or more inner liners made of paper or plastics material.

6.1.4.15.3 Bags, water-resistant, 5L3: to prevent the entry of moisture the bag shall be made waterproof, for example by the use of:

(a) Separate inner liners of water-resistant paper (e.g. waxed kraft paper, tarred paper or plastics-coated kraft paper); or

(b) Plastics film bonded to the inner surface of the bag; or

(c) One or more inner liners made of plastics material.

6.1.4.15.4 Maximum net mass: 50 kg

6.1.4.16 ***Woven plastics bags***

5H1 without inner liner or coating
5H2 sift-proof
5H3 water-resistant

6.1.4.16.1 Bags shall be made from stretched tapes or monofilaments of a suitable plastics material. The strength of the material used and the construction of the bag shall be appropriate to the capacity of the bag and to its intended use.

6.1.4.16.2 If the fabric is woven flat, the bags shall be made by sewing or some other method ensuring closure of the bottom and one side. If the fabric is tubular, the bag shall be closed by sewing, weaving or some other equally strong method of closure.

6.1.4.16.3 Bags, sift-proof, 5H2: the bag shall be made sift-proof, for example by means of:

(a) Paper or a plastics film bonded to the inner surface of the bag; or

(b) One or more separate inner liners made of paper or plastics material.

6.1.4.16.4 Bags, water-resistant, 5H3: to prevent the entry of moisture, the bag shall be made waterproof, for example by means of:

(a) Separate inner liners of water-resistant paper (e.g. waxed kraft paper, double-tarred kraft paper or plastics-coated kraft paper); or

(b) Plastics film bonded to the inner or outer surface of the bag; or

(c) One or more inner plastics liners.

6.1.4.16.5 Maximum net mass: 50 kg

6.1.4.17 ***Plastics film bags***

5H4

6.1.4.17.1 Bags shall be made of a suitable plastics material. The strength of the material used and the construction of the bag shall be appropriate to the capacity of the bag and to its intended use. Joins and closures shall withstand pressures and impacts liable to occur under normal conditions of transport.

6.1.4.17.2 Maximum net mass: 50 kg

6.1.4.18 ***Paper bags***

5M1 multiwall
5M2 multiwall, water-resistant

6.1.4.18.1 Bags shall be made of a suitable kraft paper or of an equivalent paper with at least three plies, the middle ply of which may be net-cloth with adhesive bonding to the outer ply. The strength of the paper and the construction of the bags shall be appropriate to the capacity of the bag and to its intended use. Joins and closures shall be sift-proof.

6.1.4.18.2 Bags 5M2: to prevent the entry of moisture, a bag of four plies or more shall be made waterproof by the use of either a water-resistant ply as one of the two outermost plies or a water-resistant barrier made of a suitable protective material between the two outermost plies; a bag of three plies shall be made waterproof by the use of a water-resistant ply as the outermost ply. Where there is a danger of the substance contained reacting with moisture or where it is packed damp, a waterproof ply or barrier, such as double-tarred kraft paper, plastics-coated kraft paper, plastics film bonded to the inner surface of the bag, or one or more inner plastics liners, shall also be placed next to the substance. Joins and closures shall be waterproof.

6.1.4.18.3 Maximum net mass: 50 kg

6.1.4.19 ***Composite packagings (plastics material)***

6HA1 plastics receptacle with outer steel drum
6HA2 plastics receptacle with outer steel crate or box
6HB1 plastics receptacle with outer aluminium drum
6HB2 plastics receptacle with outer aluminium crate or box
6HC plastics receptacle with outer wooden box

6HD1	plastics receptacle with outer plywood drum
6HD2	plastics receptacle with outer plywood box
6HG1	plastics receptacle with outer fibre drum
6HG2	plastics receptacle with outer fibreboard box
6HH1	plastics receptacle with outer plastics drum
6HH2	plastics receptacle with outer solid plastics box

6.1.4.19.1 *Inner receptacle*

6.1.4.19.1.1 The requirements of 6.1.4.8.1 and 6.1.4.8.3 to 6.1.4.8.6 apply to inner plastics receptacles.

6.1.4.19.1.2 The inner plastics receptacle shall fit snugly inside the outer packaging, which shall be free of any projection that might abrade the plastics material.

6.1.4.19.1.3 Maximum capacity of inner receptacle:

6HA1, 6HB1, 6HD1, 6HG1, 6HH1: 250 litres
6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2: 60 litres

6.1.4.19.1.4 Maximum net mass:

6HA1, 6HB1, 6HD1, 6HG1, 6HH1: 400 kg
6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2: 75 kg

6.1.4.19.2 *Outer packaging*

6.1.4.19.2.1 Plastics receptacle with outer steel or aluminium drum 6HA1 or 6HB1; the relevant requirements of 6.1.4.1 or 6.1.4.2, as appropriate, apply to the construction of the outer packaging.

6.1.4.19.2.2 Plastics receptacle with outer steel or aluminium crate or box 6HA2 or 6HB2; the relevant requirements of 6.1.4.14 apply to the construction of the outer packaging.

6.1.4.19.2.3 Plastics receptacle with outer wooden box 6HC; the relevant requirements of 6.1.4.9 apply to the construction of the outer packaging.

6.1.4.19.2.4 Plastics receptacle with outer plywood drum 6HD1; the relevant requirements of 6.1.4.5 apply to the construction of the outer packaging.

6.1.4.19.2.5 Plastics receptacle with outer plywood box 6HD2; the relevant requirements of 6.1.4.10 apply to the construction of the outer packaging.

6.1.4.19.2.6 Plastics receptacle with outer fibre drum 6HG1; the requirements of 6.1.4.7.1 to 6.1.4.7.4 apply to the construction of the outer packaging.

6.1.4.19.2.7 Plastics receptacle with outer fibreboard box 6HG2; the relevant requirements of 6.1.4.12 apply to the construction of the outer packaging.

6.1.4.19.2.8 Plastics receptacle with outer plastics drum 6HH1; the requirements of 6.1.4.8.1 and 6.1.4.8.2 to 6.1.4.8.6 apply to the construction of the outer packaging.

6.1.4.19.2.9 Plastics receptacles with outer solid plastics box (including corrugated plastics material) 6HH2; the requirements of 6.1.4.13.1 and 6.1.4.13.4 to 6.1.4.13.6 apply to the construction of the outer packaging.

6.1.4.20 ***Composite packagings (glass, porcelain or stoneware)***

6PA1	receptacle with outer steel drum
6PA2	receptacle with outer steel crate or box
6PB1	receptacle with outer aluminium drum
6PB2	receptacle with outer aluminium crate or box

6PC	receptacle with outer wooden box
6PD1	receptacle with outer plywood drum
6PD2	receptacle with outer wickerwork hamper
6PG1	receptacle with outer fibre drum
6PG2	receptacle with outer fibreboard box
6PH1	receptacle with outer expanded plastics packaging
6PH2	receptacle with outer solid plastics packaging

6.1.4.20.1 *Inner receptacle*

6.1.4.20.1.1 Receptacles shall be of a suitable form (cylindrical or pear-shaped) and be made of good quality material free from any defect that could impair their strength. The walls shall be sufficiently thick at every point.

6.1.4.20.1.2 Screw-threaded plastics closures, ground glass stoppers or closures at least equally effective shall be used as closures for receptacles. Any part of the closure likely to come into contact with the contents of the receptacle shall be resistant to those contents. Care shall be taken to ensure that the closures are so fitted as to be leakproof and are suitably secured to prevent any loosening during transport. If vented closures are necessary, they shall comply with 4.1.1.8.

6.1.4.20.1.3 The receptacle shall be firmly secured in the outer packaging by means of cushioning and/or absorbent materials.

6.1.4.20.1.4 Maximum capacity of receptacle: 60 litres

6.1.4.20.1.5 Maximum net mass: 75 kg

6.1.4.20.2 *Outer packaging*

6.1.4.20.2.1 Receptacle with outer steel drum 6PA1; the relevant requirements of 6.1.4.1 apply to the construction of the outer packaging. The removable lid required for this type of packaging may nevertheless be in the form of a cap.

6.1.4.20.2.2 Receptacle with outer steel crate or box 6PA2; the relevant requirements of 6.1.4.14 apply to the construction of the outer packaging. For cylindrical receptacles the outer packaging shall, when upright, rise above the receptacle and its closure. If the crate surrounds a pear-shaped receptacle and is of matching shape, the outer packaging shall be fitted with a protective cover (cap).

6.1.4.20.2.3 Receptacle with outer aluminium drum 6PB1; the relevant requirements of 6.1.4.2 apply to the construction of the outer packaging.

6.1.4.20.2.4 Receptacle with outer aluminium crate or box 6PB2; the relevant requirements of 6.1.4.14 apply to the construction of the outer packaging.

6.1.4.20.2.5 Receptacle with outer wooden box 6PC; the relevant requirements of 6.1.4.9 apply to the construction of the outer packaging.

6.1.4.20.2.6 Receptacle with outer plywood drum 6PD1; the relevant requirements of 6.1.4.5 apply to the construction of the outer packaging.

6.1.4.20.2.7 Receptacle with outer wickerwork hamper 6PD2; the wickerwork hamper shall be properly made with material of good quality. It shall be fitted with a protective cover (cap) so as to prevent damage to the receptacle.

6.1.4.20.2.8 Receptacle with outer fibre drum 6PG1; the relevant requirements of 6.1.4.7.1 to 6.1.4.7.4 apply to the construction of the outer packaging.

6.1.4.20.2.9 Receptacle with outer fibreboard box 6PG2; the relevant requirements of 6.1.4.12 apply to the construction of the outer packaging.

6.1.4.20.2.10 Receptacle with outer expanded plastics or solid plastics packaging (6PH1 or 6PH2); the materials of both outer packagings shall meet the relevant requirements of 6.1.4.13. Solid plastics packaging shall be manufactured from high density polyethylene or some other comparable plastics material. The removable lid for this type of packaging may nevertheless be in the form of a cap.

6.1.5 Test requirements for packagings

6.1.5.1 *Performance and frequency of tests*

6.1.5.1.1 The design type of each packaging shall be tested as provided in 6.1.5 in accordance with procedures established by the competent authority.

6.1.5.1.2 Each packaging design type shall successfully pass the tests prescribed in this Chapter before being used. A packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes packagings which differ from the design type only in their lesser design height.

6.1.5.1.3 Tests shall be repeated on production samples at intervals established by the competent authority. For such tests on paper or fibreboard packagings, preparation at ambient conditions is considered equivalent to the requirements of 6.1.5.2.3.

6.1.5.1.4 Tests shall also be repeated after each modification which alters the design, material or manner of construction of a packaging.

6.1.5.1.5 The competent authority may permit the selective testing of packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and packagings such as drums, bags and boxes which are produced with small reductions in external dimension(s).

6.1.5.1.6 *Reserved.*

NOTE: *For the conditions for using different inner packagings in an outer packaging and permissible variations in inner packagings, see 4.1.1.5.1. These conditions do not limit the use of inner packagings when applying 6.1.5.1.7.*

6.1.5.1.7 Articles or inner packagings of any type for solids or liquids may be assembled and transported without testing in an outer packaging under the following conditions:

(a) The outer packaging shall have been successfully tested in accordance with 6.1.5.3 with fragile (e.g. glass) inner packagings containing liquids using the packing group I drop height;

(b) The total combined gross mass of inner packagings shall not exceed one half the gross mass of inner packagings used for the drop test in (a) above;

(c) The thickness of cushioning material between inner packagings and between inner packagings and the outside of the packaging shall not be reduced below the corresponding thicknesses in the originally tested packaging; and if a single inner packaging was used in the original test, the thicknesses of cushioning between inner packagings shall not be less than the thickness of cushioning between the outside of the packaging and the inner packaging in the original test. If either fewer or smaller inner packagings are used (as compared to the inner packagings used in the drop test), sufficient additional cushioning material shall be used to take up void spaces;

(d) The outer packaging shall have passed successfully the stacking test in 6.1.5.6 while empty. The total mass of identical packages shall be based on the combined mass of inner packagings used for the drop test in (a) above;

(e) Inner packagings containing liquids shall be completely surrounded with a sufficient quantity of absorbent material to absorb the entire liquid contents of the inner packagings;

(f) If the outer packaging is intended to contain inner packagings for liquids and is not leakproof, or is intended to contain inner packagings for solids and is not siftproof, a means of containing any liquid or solid contents in the event of leakage shall be provided in the form of a leakproof liner, plastics bag or other equally efficient means of containment. For packagings containing liquids, the absorbent material required in (e) above shall be placed inside the means of containing the liquid contents;

(g) For air transport, packagings shall comply with 4.1.1.4.1;

(h) Packagings shall be marked in accordance with 6.1.3 as having been tested to packing group I performance for combination packagings. The marked gross mass in kilograms shall be the sum of the mass of the outer packaging plus one half of the mass of the inner packaging(s) as used for the drop test referred to in (a) above. Such a packaging mark shall also contain a letter "V" as described in 6.1.2.4.

6.1.5.1.8 The competent authority may at any time require proof, by tests in accordance with this section, that serially-produced packagings meet the requirements of the design type tests.

6.1.5.1.9 If an inner treatment or coating is required for safety reasons, it shall retain its protective properties even after the tests.

6.1.5.1.10 Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one sample.

6.1.5.1.11 *Salvage packagings*

Salvage packagings (see 1.2.1) shall be tested and marked in accordance with the provisions applicable to packing group II packagings intended for the transport of solids or inner packagings, except as follows:

(a) The test substance used in performing the tests shall be water, and the packagings shall be filled to not less than 98 % of their maximum capacity. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass so long as they are placed so that the test results are not affected. Alternatively, in performing the drop test, the drop height may be varied in accordance with 6.1.5.3.5 (b);

(b) Packagings shall, in addition, have been successfully subjected to the leakproofness test at 30 kPa, with the results of this test reflected in the test report required by 6.1.5.7; and

(c) Packagings shall be marked with the letter "T" as described in 6.1.2.4.

6.1.5.2 *Preparation of packagings for testing*

6.1.5.2.1 Tests shall be carried out on packagings prepared as for transport including, with respect to combination packagings, the inner packagings used. Inner or single receptacles or packagings other than bags shall be filled to not less than 98 % of their maximum capacity for liquids or 95 % for solids. Bags shall be filled to the maximum mass at which they may be used. For combination packagings where the inner packaging is designed to carry liquids and solids, separate testing is required for both liquid and solid contents. The substances or articles to be transported in the packagings may be replaced by other substances or articles except where this would invalidate the results of the tests. For solids, when another substance is used it shall have the same physical characteristics (mass, grain size, etc.) as the substance to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected.

6.1.5.2.2 In the drop tests for liquids, when another substance is used, it shall be of similar relative density and viscosity to those of the substance being transported. Water may also be used for the liquid drop test under the conditions in 6.1.5.3.5.

6.1.5.2.3 Paper or fibreboard packagings shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h.). There are three options, one of which shall be chosen. The preferred atmosphere is 23 ± 2 °C and 50 % ± 2 % r.h. The two other options are 20 ± 2 °C and 65 % ± 2 % r.h. or 27 ± 2 °C and 65 % ± 2 % r.h.

NOTE: *Average values shall fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to vary by up to ± 5 % relative humidity without significant impairment of test reproducibility.*

6.1.5.2.4 Additional steps shall be taken to ascertain that the plastics material used in the manufacture of plastics drums, plastics jerricans and composite packagings (plastics material) intended to contain liquids complies with the requirements in 6.1.1.2, 6.1.4.8.1 and 6.1.4.8.3. This may be done, for example, by submitting sample receptacles or packagings to a preliminary test extending over a long period, for example six months, during which the samples would remain filled with the substances they are intended to contain, and after which the samples shall be submitted to the applicable tests listed in 6.1.5.3, 6.1.5.4, 6.1.5.5 and 6.1.5.6. For substances which may cause stress-cracking or weakening in plastics drums or jerricans, the sample, filled with the substance or another substance that is known to have at least as severe a stress-cracking influence on the plastics material in question, shall be subjected to a superimposed load equivalent to the total mass of identical packages which might be stacked on it during transport. The minimum height of the stack including the test sample shall be 3 metres.

6.1.5.3 ***Drop test***

6.1.5.3.1 *Number of test samples (per design type and manufacturer) and drop orientation*

For other than flat drops the centre of gravity shall be vertically over the point of impact.

Where more than one orientation is possible for a given drop test, the orientation most likely to result in failure of the packaging shall be used.

Packaging	No. of test samples	Drop orientation
Steel drums Aluminum drums Metal drums, other than steel or aluminum drums Steel jerricans Aluminum jerricans Plywood drums Fibre drums Plastics drums and jerricans Composite packagings which are in the shape of a drum	Six (three for each drop)	*First drop* (using three samples): the packaging shall strike the target diagonally on the chime or, if the packaging has no chime, on a circumferential seam or an edge. *Second drop* (using the other three samples): the packaging shall strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body.
Boxes of natural wood Plywood boxes Reconstituted wood boxes Fibreboard boxes Plastics boxes Steel or aluminum boxes Composite packagings which are in the shape of a box	Five (one for each drop)	*First drop*: flat on the bottom *Second drop*: flat on the top *Third drop*: flat on the long side *Fourth drop*: flat on the short side *Fifth drop*: on a corner
Bags – single-ply with a side seam	Three (three drops per bag)	*First drop*: flat on a wide face *Second drop*: flat on a narrow face *Third drop*: on an end of the bag
Bags – single-ply without a side seam, or multi-ply	Three (two drops per bag)	*First drop*: flat on a wide face *Second drop*: on an end of the bag

6.1.5.3.2 *Special preparation of test samples for the drop test*

The temperature of the test sample and its contents shall be reduced to -18 °C or lower for the following packagings:

(a) Plastics drums (see 6.1.4.8);

(b) Plastics jerricans (see 6.1.4.8);

(c) Plastics boxes other than expanded plastics boxes (see 6.1.4.13);

(d) Composite packagings (plastics material) (see 6.1.4.19); and

(e) Combination packagings with plastics inner packagings, other than plastics bags intended to contain solids or articles.

Where test samples are prepared in this way, the conditioning in 6.1.5.2.3 may be waived. Test liquids shall be kept in the liquid state by the addition of anti-freeze if necessary.

6.1.5.3.3 Removable head packagings for liquids shall not be dropped until at least 24 hours after filling and closing to allow for any possible gasket relaxation.

6.1.5.3.4 *Target*

The target shall be a non-resilient and horizontal surface and shall be:

(a) Integral and massive enough to be immovable;

(b) Flat with a surface kept free from local defects capable of influencing the test results;

(c) Rigid enough to be non-deformable under test conditions and not liable to become damaged by the tests; and

(d) Sufficiently large to ensure that the test package falls entirely upon the surface.

6.1.5.3.5 *Drop height*

For solids and liquids, if the test is performed with the solid or liquid to be carried or with another substance having essentially the same physical characteristics:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

For liquids in single packagings and for inner packagings of combination packagings, if the test is performed with water:

NOTE: *The term water includes water/antifreeze solutions with a minimum specific gravity of 0.95 for testing at - 18 °C.*

(a) Where the substances to be transported have a relative density not exceeding l.2:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

(b) Where the substances to be transported have a relative density exceeding 1.2, the drop height shall be calculated on the basis of the relative density (d) of the substance to be carried, rounded up to the first decimal, as follows:

Packing group I	Packing group II	Packing group III
d ×1.5 (m)	d × 1.0 (m)	d × 0.67 (m)

6.1.5.3.6 *Criteria for passing the test*

6.1.5.3.6.1 Each packaging containing liquid shall be leakproof when equilibrium has been reached between the internal and external pressures, except for inner packagings of combination packagings when it is not necessary that the pressures be equalized.

6.1.5.3.6.2 Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle (e.g. a plastics bag), even if the closure while retaining its containment function, is no longer sift-proof.

6.1.5.3.6.3 The packaging or outer packaging of a composite or combination packaging shall not exhibit any damage liable to affect safety during transport. Inner receptacles, inner packagings, or articles shall remain completely within the outer packaging and there shall be no leakage of the filling substance from the inner receptacle(s) or inner packaging(s).

6.1.5.3.6.4 Neither the outermost ply of a bag nor an outer packaging may exhibit any damage liable to affect safety during transport.

6.1.5.3.6.5 A slight discharge from the closure(s) upon impact is not considered to be a failure of the packaging provided that no further leakage occurs.

6.1.5.3.6.6 No rupture is permitted in packagings for goods of Class 1 which would permit the spillage of loose explosive substances or articles from the outer packaging.

6.1.5.4 ***Leakproofness test***

The leakproofness test shall be performed on all design types of packagings intended to contain liquids; however, this test is not required for the inner packagings of combination packagings.

6.1.5.4.1 *Number of test samples:* three test samples per design type and manufacturer.

6.1.5.4.2 *Special preparation of test samples for the test:* either vented closures shall be replaced by similar non-vented closures or the vent shall be sealed.

6.1.5.4.3 *Test method and pressure to be applied:* the packagings including their closures shall be restrained under water for 5 minutes while an internal air pressure is applied, the method of restraint shall not affect the results of the test.

The air pressure (gauge) to be applied shall be:

Packing group I	Packing group II	Packing group III
Not less than 30 kPa (0.3 bar)	Not less than 20 kPa (0.2 bar)	Not less than 20 kPa (0.2 bar)

Other methods at least equally effective may be used.

6.1.5.4.4 *Criterion for passing the test*: there shall be no leakage.

6.1.5.5 *Internal pressure (hydraulic) test*

6.1.5.5.1 *Packagings to be tested*: the internal pressure (hydraulic) test shall be carried out on all design types of metal, plastics and composite packagings intended to contain liquids. This test is not required for inner packagings of combination packagings.

6.1.5.5.2 *Number of test samples*: three test samples per design type and manufacturer.

6.1.5.5.3 *Special preparation of packagings for testing*: either vented closures shall be replaced by similar non-vented closures or the vent shall be sealed.

6.1.5.5.4 *Test method and pressure to be applied*: metal packagings and composite packagings (glass, porcelain or stoneware) including their closures shall be subjected to the test pressure for 5 minutes. Plastics packagings and composite packagings (plastics material) including their closures shall be subjected to the test pressure for 30 minutes. This pressure is the one to be included in the mark required by 6.1.3.1 (d). The manner in which the packagings are supported shall not invalidate the test. The test pressure shall be applied continuously and evenly; it shall be kept constant throughout the test period. The hydraulic pressure (gauge) applied, as determined by any one of the following methods, shall be:

(a) Not less than the total gauge pressure measured in the packaging (i.e. the vapour pressure of the filling liquid and the partial pressure of the air or other inert gases, minus 100 kPa) at 55 °C, multiplied by a safety factor of 1.5; this total gauge pressure shall be determined on the basis of a maximum degree of filling in accordance with 4.1.1.4 and a filling temperature of 15 °C;

(b) Not less than 1.75 times the vapour pressure at 50 °C of the liquid to be transported, minus 100 kPa but with a minimum test pressure of 100 kPa;

(c) Not less than 1.5 times the vapour pressure at 55 °C of the liquid to be transported, minus 100 kPa but with a minimum test pressure of 100 kPa.

6.1.5.5.5 In addition, packagings intended to contain liquids of packing group I shall be tested to a minimum test pressure of 250 kPa (gauge) for a test period of 5 or 30 minutes depending upon the material of construction of the packaging.

6.1.5.5.6 The special requirements for air transport, including minimum test pressures, may not be covered in 6.1.5.5.4.

6.1.5.5.7 *Criterion for passing the test:* no packaging may leak.

6.1.5.6 ***Stacking test***

All design types of packagings other than bags are subject to a stacking test.

6.1.5.6.1 *Number of test samples*: three test samples per design type and manufacturer.

6.1.5.6.2 *Test method*: the test sample shall be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport; where the contents of the test sample are liquids with relative density different from that of the liquid to be transported, the force shall be calculated in relation to the latter. The minimum height of the stack including the test sample shall be 3 meters. The duration of the test shall be 24 hours except that plastics drums, jerricans, and composite packagings 6HH1 and 6HH2 intended for liquids shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 °C.

6.1.5.6.3 *Criterion for passing the test*: no test sample may leak. In composite packagings or combination packagings, there shall be no leakage of the filling substance from the inner receptacle or inner packaging. No test sample may show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages. Plastics packagings shall be cooled to ambient temperature before the assessment.

6.1.5.7 ***Test Report***

6.1.5.7.1 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the packaging:

1. Name and address of the test facility;
2. Name and address of applicant (where appropriate);
3. A unique test report identification;
4. Date of the test report;
5. Manufacturer of the packaging;
6. Description of the packaging design type (e.g. dimensions, materials, closures, thickness, etc.), including method of manufacture (e.g. blow moulding) and which may include drawing(s) and/or photograph(s);
7. Maximum capacity;
8. Characteristics of test contents, e.g. viscosity and relative density for liquids and particle size for solids. For plastics packagings subject to the internal pressure test in 6.1.5.5, the temperature of the water used;
9. Test descriptions and results;
10. The test report shall be signed with the name and status of the signatory.

6.1.5.7.2 The test report shall contain statements that the packaging prepared as for transport was tested in accordance with the appropriate requirements of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority.

CHAPTER 6.2

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PRESSURE RECEPTACLES, AEROSOL DISPENSERS, SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

NOTE: *Aerosol dispensers, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas are not subject to the requirements of 6.2.1 to 6.2.3.*

6.2.1 General requirements

6.2.1.1 *Design and construction*

6.2.1.1.1 Pressure receptacles shall be designed, manufactured, tested and equipped in such a way as to withstand all conditions, including fatigue, to which they will be subjected during normal conditions of transport and intended use.

6.2.1.1.2 In recognition of scientific and technological advances, and recognizing that pressure receptacles other than those that bear "UN" certification marks may be used on a national or regional basis, pressure receptacles conforming to requirements other than those specified in these Regulations may be used if approved by the competent authorities in the countries of transport and use.

6.2.1.1.3 In no case shall the minimum wall thickness be less than that specified in the design and construction technical standards.

6.2.1.1.4 For welded pressure receptacles, only metals of weldable quality shall be welded.

6.2.1.1.5 The test pressure of pressure receptacle shells and bundles of cylinders shall be in accordance with packing instruction P200, or, for a chemical under pressure, with packing instruction P206. The test pressure for closed cryogenic receptacles shall be in accordance with packing instruction P203. The test pressure of a metal hydride storage system shall be in accordance with packing instruction P205. The test pressure of a cylinder shell for an adsorbed gas shall be in accordance with packing instruction P208.

6.2.1.1.6 Cylinders or cylinder shells assembled in bundles shall be structurally supported and held together as a unit. Cylinders or cylinder shells shall be secured in a manner that prevents movement in relation to the structural assembly and movement that would result in the concentration of harmful local stresses. Manifold assemblies (e.g. manifold, valves, and pressure gauges) shall be designed and constructed such that they are protected from impact damage and forces normally encountered in transport. Manifolds shall have at least the same test pressure as the cylinders. For toxic liquefied gases, each cylinder shell shall have an isolation valve to ensure that each cylinder can be filled separately and that no interchange of cylinder contents can occur during transport.

6.2.1.1.7 Contact between dissimilar metals which could result in damage by galvanic action shall be avoided.

6.2.1.1.8 *Additional requirements for the construction of closed cryogenic receptacles for refrigerated liquefied gases*

6.2.1.1.8.1 The mechanical properties of the metal used shall be established for each pressure receptacle, including the impact strength and the bending coefficient.

6.2.1.1.8.2 The pressure receptacles shall be thermally insulated. The thermal insulation shall be protected against impact by means of a jacket. If the space between the inner vessel and the jacket is evacuated of air (vacuum-insulation), the jacket shall be designed to withstand without permanent deformation an external pressure of at least 100 kPa (1 bar) calculated in accordance with a recognised technical code or a calculated

critical collapsing pressure of not less than 200 kPa (2 bar) gauge pressure. If the jacket is so closed as to be gas-tight (e.g. in the case of vacuum-insulation), a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the inner vessel or its service equipment. The device shall prevent moisture from penetrating into the insulation.

6.2.1.1.8.3 Closed cryogenic receptacles intended for the transport of refrigerated liquefied gases having a boiling point below -182 °C at atmospheric pressure shall not include materials which may react with oxygen or oxygen enriched atmospheres in a dangerous manner, when located in parts of the thermal insulation where there is a risk of contact with oxygen or with oxygen enriched liquid.

6.2.1.1.8.4 Closed cryogenic receptacles shall be designed and constructed with suitable lifting and securing arrangements.

6.2.1.1.9 *Additional requirements for the construction of acetylene cylinders*

Cylinder shells for UN 1001 acetylene, dissolved, and UN 3374 acetylene, solvent free, shall be filled with a porous material, uniformly distributed, of a type that conforms to the requirements and testing specified by a standard or technical code recognised by the competent authority and which:

(a) Is compatible with the cylinder shell and does not form harmful or dangerous compounds either with the acetylene or with the solvent in the case of UN 1001; and

(b) Is capable of preventing the spread of decomposition of the acetylene in the porous material.

In the case of UN 1001, the solvent shall be compatible with those parts of the cylinder that are in contact with it.

6.2.1.2 *Materials*

6.2.1.2.1 Construction materials of pressure receptacles which are in direct contact with dangerous goods shall not be affected or weakened by the dangerous goods intended to be transported and shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods.

6.2.1.2.2 Pressure receptacles shall be made of the materials specified in the design and construction technical standards and the applicable packing instruction for the substances intended for transport in the pressure receptacle. The materials shall be resistant to brittle fracture and to stress corrosion cracking as indicated in the design and construction technical standards.

6.2.1.3 *Service equipment*

6.2.1.3.1 Service equipment subjected to pressure, excluding porous, absorbent or adsorbent material, pressure relief devices, pressure gauges or indicators, shall be designed and constructed so that the burst pressure is at least 1.5 times the test pressure of the pressure receptacle.

6.2.1.3.2 Service equipment shall be configured or designed to prevent damage and unintended opening that could result in the release of the pressure receptacle contents during normal conditions of handling and transport. All closures shall be protected in the same manner as is required for valves in 4.1.6.1.8. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the shut-off valves and the piping from shearing or releasing the pressure receptacle contents.

6.2.1.3.3 Pressure receptacles which are not capable of being handled manually or rolled, shall be fitted with handling devices (skids, rings, straps) ensuring that they can be safely handled by mechanical means and so arranged as not to impair the strength of, nor cause undue stresses, in the pressure receptacle.

6.2.1.3.4 Individual pressure receptacles shall be equipped with pressure relief devices as specified in P200 (1), P205 or 6.2.1.3.6.4 and 6.2.1.3.6.5. Pressure-relief devices shall be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure. When fitted, pressure relief devices on manifolded horizontal pressure receptacles filled with flammable gas shall be

arranged to discharge freely to the open air in such a manner as to prevent any impingement of escaping gas upon the pressure receptacle itself under normal conditions of transport.

6.2.1.3.5 Pressure receptacles whose filling is measured by volume shall be provided with a level indicator.

6.2.1.3.6 *Additional requirements for closed cryogenic receptacles*

6.2.1.3.6.1 Each filling and discharge opening in a closed cryogenic receptacle used for the transport of flammable refrigerated liquefied gases shall be fitted with at least two mutually independent shut-off devices in series, the first being a stop-valve, the second being a cap or equivalent device.

6.2.1.3.6.2 For sections of piping which can be closed at both ends and where liquid product can be trapped, a method of automatic pressure-relief shall be provided to prevent excess pressure build-up within the piping.

6.2.1.3.6.3 Each connection on a closed cryogenic receptacle shall be clearly marked to indicate its function (e.g. vapour or liquid phase).

6.2.1.3.6.4 Pressure-relief devices

6.2.1.3.6.4.1 Every closed cryogenic receptacle shall be provided with at least one pressure-relief device. The pressure-relief device shall be of the type that will resist dynamic forces including surge.

6.2.1.3.6.4.2 Closed cryogenic receptacles may, in addition, have a frangible disc in parallel with the spring loaded device(s) in order to meet the requirements of 6.2.1.3.6.5.

6.2.1.3.6.4.3 Connections to pressure-relief devices shall be of sufficient size to enable the required discharge to pass unrestricted to the pressure-relief device.

6.2.1.3.6.4.4 All pressure-relief device inlets shall under maximum filling conditions be situated in the vapour space of the closed cryogenic receptacle and the devices shall be so arranged as to ensure that the escaping vapour is discharged unrestrictedly.

6.2.1.3.6.5 Capacity and setting of pressure-relief devices

NOTE: *In relation to pressure-relief devices of closed cryogenic receptacles, MAWP means the maximum effective gauge pressure permissible at the top of a loaded closed cryogenic receptacle in its operating position including the highest effective pressure during filling and discharge.*

6.2.1.3.6.5.1 The pressure-relief device shall open automatically at a pressure not less than the MAWP and be fully open at a pressure equal to 110 % of the MAWP. It shall, after discharge, close at a pressure not lower than 10 % below the pressure at which discharge starts and shall remain closed at all lower pressures.

6.2.1.3.6.5.2 Frangible discs shall be set to rupture at a nominal pressure which is the lower of either the test pressure or 150 % of the MAWP.

6.2.1.3.6.5.3 In the case of the loss of vacuum in a vacuum-insulated closed cryogenic receptacle the combined capacity of all pressure-relief devices installed shall be sufficient so that the pressure (including accumulation) inside the closed cryogenic receptacle does not exceed 120 % of the MAWP.

6.2.1.3.6.5.4 The required capacity of the pressure-relief devices shall be calculated in accordance with an established technical code recognized by the competent authority[1].

[1] *See for example CGA Publications S-1.2-2003 "Pressure Relief Device Standards-Part 2-Cargo and Portable Tanks for Compressed Gases" and S-1.1-2003 "Pressure Relief Device Standards-Part 1-Cylinders for Compressed Gases".*

6.2.1.4 ***Approval of pressure receptacles***

6.2.1.4.1 The conformity of pressure receptacles shall be assessed at time of manufacture as required by the competent authority. The technical documentation shall include full specifications on design and construction, and full documentation on the manufacturing and testing.

6.2.1.4.2 Quality assurance systems shall conform to the requirements of the competent authority.

6.2.1.4.3 Pressure receptacle shells and the inner vessels of closed cryogenic receptacles shall be inspected tested and approved by an inspection body.

6.2.1.4.4 For refillable cylinders, pressure drums and tubes the conformity assessment of the shell and the closure(s) may be carried out separately. In these cases, an additional assessment of the final assembly is not required.

For bundles of cylinders, the cylinder shells and the valve(s) may be assessed separately, but an additional assessment of the complete assembly is required.

For closed cryogenic receptacles, the inner vessels and the closures may be assessed separately, but an additional assessment of the complete assembly is required.

For acetylene cylinders, conformity assessment shall comprise either:

(a) One assessment of conformity covering both the cylinder shell and the contained porous material; or

(b) A separate assessment of conformity for the empty cylinder shell and an additional assessment of conformity covering the cylinder shell with the contained porous material.

6.2.1.5 ***Initial inspection and test***

6.2.1.5.1 New pressure receptacles, other than closed cryogenic receptacles, metal hydride storage systems and bundles of cylinders, shall be subjected to testing and inspection during and after manufacture in accordance with the applicable design standards or recognised technical codes including the following:

On an adequate sample of pressure receptacle shells:

(a) Testing of the mechanical characteristics of the material of construction;

(b) Verification of the minimum wall thickness;

(c) Verification of the homogeneity of the material for each manufacturing batch;

(d) Inspection of the external and internal conditions;

(e) Inspection of the threads used to fit closures;

(f) Verification of the conformance with the design standard;

For all pressure receptacle shells:

(g) A hydraulic pressure test. Pressure receptacle shells shall meet the acceptance criteria specified in the design and construction technical standard or technical code;

NOTE: *With the agreement of the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.*

(h) Inspection and assessment of manufacturing defects and either repairing them or rendering the pressure receptacle shells unserviceable. In the case of welded pressure receptacle shells, particular attention shall be paid to the quality of the welds;

(i) An inspection of the marks on the pressure receptacle shells;

(j) In addition, cylinder shells intended for the transport of UN 1001 acetylene, dissolved, and UN 3374 acetylene, solvent free, shall be inspected to ensure proper installation and condition of the porous material and, if applicable, the quantity of solvent.

On an adequate sample of closures:

(k) Verification of materials;

(l) Verification of dimensions;

(m) Verification of cleanliness;

(n) Inspection of completed assembly;

(o) Verification of the presence of marks.

For all closures:

(p) Testing for leakproofness

6.2.1.5.2 Closed cryogenic receptacles shall be subjected to testing and inspection during and after manufacture in accordance with the applicable design standards or recognized technical codes including the following:

On an adequate sample of inner vessels:

(a) Testing of the mechanical characteristics of the material of construction;

(b) Verification of the minimum wall thickness;

(c) Inspection of the external and internal conditions;

(d) Verification of the conformance with the design standard or code;

(e) Inspection of welds by radiographic, ultrasonic or other suitable non-destructive test method according to the applicable design and construction standard or code.

For all inner vessels:

(f) A hydraulic pressure test. The inner vessel shall meet the acceptance criteria specified in the design and construction technical standard or technical code;

NOTE: *With the agreement of the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.*

(g) Inspection and assessment of manufacturing defects and either repairing them or rendering the inner vessel unserviceable;

(h) An inspection of the marks.

On an adequate sample of closures:

(i) Verification of materials;

(j) Verification of dimensions;

(k) Verification of cleanliness;

(l) Inspection of completed assembly;

(m) Verification of the presence of marks.

For all closures:

(n) Testing for leakproofness.

On an adequate sample of completed closed cryogenic receptacles:

(o) Testing the satisfactory operation of service equipment;

(p) Verification of the conformance with the design standard or code.

For all completed closed cryogenic pressure receptacles:

(q) Testing for leakproofness.

6.2.1.5.3 For metal hydride storage systems, it shall be verified that the inspections and tests specified in 6.2.1.5.1 (a), (b), (c), (d), (e) if applicable, (f), (g), (h) and (i) have been performed on an adequate sample of the pressure receptacle shells used in the metal hydride storage system. In addition, on an adequate sample of metal hydride storage systems, the inspections and tests specified in 6.2.1.5.1 (c) and (f) shall be performed, as well as 6.2.1.5.1 (e), if applicable, and inspection of the external conditions of the metal hydride storage system.

Additionally, all metal hydride storage systems shall undergo the initial inspections and tests specified in 6.2.1.5.1 (h) and (i), as well as a leakproofness test and a test of the satisfactory operation of the service equipment.

6.2.1.5.4 For bundles of cylinders the cylinder shells and closures shall be subjected to initial inspection and tests specified in 6.2.1.5.1. An adequate sample of frames shall be proof load tested to two times the maximum gross weight of the bundles of cylinders.

Additionally, all manifolds of bundle of cylinders shall undergo a hydraulic pressure test and all the completed bundles of cylinders shall undergo a leakproofness test.

NOTE: *With the agreement of the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.*

6.2.1.6 ***Periodic inspection and test***

6.2.1.6.1 Refillable pressure receptacles, other than cryogenic receptacles, shall be subjected to periodic inspections and tests by a body authorized by the competent authority, in accordance with the following:

(a) Check of the external conditions of the pressure receptacle and verification of the equipment and the external marks;

(b) Check of the internal conditions of the pressure receptacle (e.g. internal inspection, verification of minimum wall thickness);

(c) Checking of the threads either:

(i) if there is evidence of corrosion; or

(ii) if the closures or other service equipment are removed;

(d) A hydraulic pressure test of the pressure receptacle shell and, if necessary, verification of the characteristics of the material by suitable tests;

NOTE 1: *With the agreement of the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.*

NOTE 2:*For seamless steel cylinder shells and tube shells the check of 6.2.1.6.1 (b) and hydraulic pressure test of 6.2.1.6.1 (d) may be replaced by a procedure conforming to ISO 16148:2016 "Gas cylinders – Refillable seamless steel gas cylinders and tubes – Acoustic emission examination (AT) and follow-up ultrasonic examination (UT) for periodic inspection and testing".*

NOTE 3:*The check of internal conditions of 6.2.1.6.1 (b) and the hydraulic pressure test of 6.2.1.6.1 (d) may be replaced by ultrasonic examination carried out in accordance with ISO 18119:2018 for seamless steel and seamless aluminium alloy cylinder shells. For a transitional period until 31 December 2024 the standard ISO 10461:2005 +A1:2006 may be used for seamless aluminium alloy cylinders and ISO 6406:2005 may be used for seamless steel cylinder shells for this same purpose.*

NOTE 4:*For bundles of cylinders the hydraulic test specified in (d) above shall be carried out on the cylinder shells and on the manifold.*

(e) Check of service equipment, if to be reintroduced into service. This check may be carried out separately from the inspection of the pressure receptacle shell; and

(f) A leakproofness test of bundles of cylinders after reassembly.

NOTE: *For the periodic inspection and test frequencies, see packing instruction P200 or, for a chemical under pressure, packing instruction P206 of 4.1.4.1.*

6.2.1.6.2 Cylinders intended for the transport of UN 1001 acetylene, dissolved and UN 3374 acetylene, solvent free, shall be examined only as specified in 6.2.1.6.1 (a), (c) and (e). In addition the condition of the porous material (e.g. cracks, top clearance, loosening, settlement) shall be examined.

6.2.1.6.3 Pressure relief valves for closed cryogenic receptacles shall be subject to periodic inspections and tests.

6.2.1.7 ***Requirements for manufacturers***

6.2.1.7.1 The manufacturer shall be technically able and shall possess all resources required for the satisfactory manufacture of pressure receptacles; this relates in particular to qualified personnel:

(a) to supervise the entire manufacturing process;

(b) to carry out joining of materials; and

(c) to carry out the relevant tests.

6.2.1.7.2 A proficiency test of the manufacturers of pressure receptacle shells and the inner vessels of closed cryogenic receptacle shall in all instances be carried out by an inspection body approved by the competent authority of the country of approval. Proficiency testing of manufacturers of closures shall be carried out if the competent authority requires it. This test shall be carried out either during design type approval or during production inspection and certification.

6.2.1.8 ***Requirements for inspection bodies***

6.2.1.8.1 Inspection bodies shall be independent from manufacturing enterprises and competent to perform the tests, inspections and approvals required.

6.2.2 Requirements for UN pressure receptacles

In addition to the general requirements of section 6.2.1, UN pressure receptacles shall comply with the requirements of this section, including the standards, as applicable. Manufacture of new pressure receptacles or service equipment according to any particular standard in 6.2.2.1 and 6.2.2.3 is not permitted after the date shown in the right hand column of the tables.

NOTE 1: *With the agreement of the competent authority, more recently published versions of the standards, if available, may be used.*

NOTE 2: *UN pressure receptacles constructed according to standards applicable at the date of manufacture may continue in use subject to the periodic inspection provisions of these Regulations.*

6.2.2.1 *Design, construction and initial inspection and test*

6.2.2.1.1 The following standards apply for the design, construction, and initial inspection and test of refillable UN cylinder shells, except that inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5:

Reference	Title	Applicable for manufacture
ISO 9809-1:1999	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing - Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa ***NOTE:*** *The note concerning the F factor in section 7.3 of this standard shall not be applied for UN cylinders.*	Until 31 December 2018
ISO 9809-1:2010	Gas cylinders -- Refillable seamless steel gas cylinders -- Design, construction and testing -- Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa	Until 31 December 2026
ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa	Until further notice
ISO 9809-2:2000	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing - Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa	Until 31 December 2018
ISO 9809-2:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa	Until 31 December 2026
ISO 9809-2:2019	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1 100 MPa	Until further notice
ISO 9809-3:2000	Gas cylinders – Refillable seamless steel gas cylinders - Design, construction and testing - Part 3: Normalized steel cylinders	Until 31 December 2018
ISO 9809-3:2010	Gas cylinders -- Refillable seamless steel gas cylinders -- Design, construction and testing -- Part 3: Normalized steel cylinders	Until 31 December 2026

Reference	Title	Applicable for manufacture
ISO 9809-3:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 3: Normalized steel cylinders and tubes	Until further notice
ISO 9809-4:2014	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa	Until further notice
ISO 7866:1999	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing ***NOTE:*** *The note concerning the F factor in section 7.2 of this standard shall not be applied for UN cylinders. Aluminium alloy 6351A – T6 or equivalent shall not be authorized.*	Until 31 December 2020
ISO 7866: 2012+ Cor 1:2014	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing ***NOTE:*** *Aluminium alloy 6351A or equivalent shall not be used.*	Until further notice
ISO 4706:2008	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below	Until further notice
ISO 18172-1:2007	Gas cylinders – Refillable welded stainless steel cylinders – Part 1: Test pressure 6 MPa and below	Until further notice
ISO 20703:2006	Gas cylinders – Refillable welded aluminium-alloy cylinders – Design, construction and testing	Until further notice
ISO 11119-1:2002	Gas cylinders of composite construction – Specification and test methods – Part 1: Hoop wrapped composite gas cylinders	Until 31 December 2020
ISO 11119-1:2012	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 *l*	Until further notice
ISO 11119-2:2002	Gas cylinders of composite construction – Specification and test methods – Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners	Until 31 December 2020
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 *l* with load-sharing metal liners	Until further notice
ISO 11119-3:2002	Gas cylinders of composite construction – Specification and test methods – Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners ***NOTE:*** *This standard shall not be used for linerless cylinders manufactured from two parts joined together.*	Until 31 December 2020
ISO 11119-3:2013	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 *l* with non-load-sharing metallic or non-metallic liners ***NOTE:*** *This standard shall not be used for linerless cylinders manufactured from two parts joined together.*	Until further notice

Reference	Title	Applicable for manufacture
ISO 11119-4:2016	Gas cylinders – Refillable composite gas cylinders – Design, construction and testing – Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 *l* with load-sharing welded metallic liners	Until further notice

NOTE 1: *In the above referenced standards composite cylinder shells shall be designed for a design life of not less than 15 years.*

NOTE 2: *Composite cylinder shells with a design life longer than 15 years shall not be filled after 15 years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme shall be part of the initial design type approval and shall specify inspections and tests to demonstrate that composite cylinder shells manufactured accordingly remain safe to the end of their design life. The service life test programme and the results shall be approved by the competent authority of the country of approval that is responsible for the initial approval of the cylinder design. The service life of a composite cylinder shell shall not be extended beyond its initial approved design life.*

6.2.2.1.2 The following standards apply for the design, construction, and initial inspection and test of UN tube shells, except that inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5:

Reference	Title	Applicable for manufacture
ISO 11120:1999	Gas cylinders – Refillable seamless steel tubes for compressed gas transport, of water capacity between 150 l and 3 000 *l* – Design, construction and testing ***NOTE:*** *The note concerning the F factor in section 7.1 of this standard shall not be applied for UN tubes*	Until 31 December 2022
ISO 11120:2015	Gas cylinders – Refillable seamless steel tubes of water capacity between 150 *l* and 3 000 *l* – Design, construction and testing	Until further notice
ISO 11119-1:2012	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 *l*	Until further notice
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 *l* with load-sharing metal liners	Until further notice
ISO 11119-3:2013	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 *l* with non-load-sharing metallic or non-metallic liners ***NOTE:*** *This standard shall not be used for linerless cylinders manufactured from two parts joined together.*	Until further notice
ISO 11515: 2013	Gas cylinders – Refillable composite reinforced tubes of water capacity between 450 L and 3 000 L – Design, construction and testing	Until 31 December 2026
ISO 11515:2013 + Amd 1:2018	Gas cylinders – Refillable composite reinforced tubes of water capacity between 450 *l* and 3000 *l* – Design, construction and testing	Until further notice

Reference	Title	Applicable for manufacture
ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa	Until further notice
ISO 9809-2:2019	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1 100 MPa	Until further notice
ISO 9809-3:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 3: Normalized steel cylinders and tubes	Until further notice

NOTE 1: *In the above referenced standards composite tube shells shall be designed for a design life of not less than 15 years.*

NOTE 2: *Composite tube shells with a design life longer than 15 years shall not be filled after 15 years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme shall be part of the initial design type approval and shall specify inspections and tests to demonstrate that composite tube shells manufactured accordingly remain safe to the end of their design life. The service life test programme and the results shall be approved by the competent authority of the country of approval that is responsible for the initial approval of the tube design. The service life of a composite tube shell shall not be extended beyond its initial approved design life.*

6.2.2.1.3 The following standards apply for the design, construction and initial inspection and test of UN acetylene cylinders, except that inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5:

For the cylinder shell:

Reference	Title	Applicable for manufacture
ISO 9809-1:1999	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa ***NOTE:*** *The note concerning the F factor in section 7.3 of this standard shall not be applied for UN cylinders.*	Until 31 December 2018
ISO 9809-1:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa	Until 31 December 2026
ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa	Until further notice
ISO 9809-3:2000	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 3: Normalized steel cylinders	Until 31 December 2018
ISO 9809-3:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 3: Normalized steel cylinders	Until 31 December 2026

Reference	Title	Applicable for manufacture
ISO 9809-3:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 3: Normalized steel cylinders and tubes	Until further notice
ISO 4706:2008	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below	Until further notice
ISO 7866:2012 + Cor 1:2014	Gas cylinders – Refillable seamless aluminum alloy gas cylinders – Design, construction and testing ***NOTE:*** *Aluminum alloy 6351A or equivalent shall not be used*	Until further notice

For acetylene cylinder including the porous material:

Reference	Title	Applicable for manufacture
ISO 3807-1:2000	Cylinders for acetylene – Basic requirements - Part 1: Cylinders without fusible plugs	Until 31 December 2020
ISO 3807-2:2000	Cylinders for acetylene – Basic requirements - Part 2: Cylinders with fusible plugs	Until 31 December 2020
ISO 3807: 2013	Gas cylinders – Acetylene cylinders – Basic requirements and type testing	Until further notice

6.2.2.1.4 The following standards apply for the design, construction, and initial inspection and test of UN closed cryogenic receptacles, except that inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5:

Reference	Title	Applicable for manufacture
ISO 21029-1:2004	Cryogenic vessels – Transportable vacuum insulated vessels of not more than 1 000 *l* volume – Part 1: Design, fabrication, inspection and tests	Until 31 December 2026
ISO 21029-1:2018 + Amd.1:2019	Cryogenic vessels – Transportable vacuum insulated vessels of not more than 1 000 litres volume – Part 1: Design, fabrication, inspection and tests	Until further notice

6.2.2.1.5 The following standards apply for the design, construction, and initial inspection and test of UN metal hydride storage systems, except that inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5:

Reference	Title	Applicable for manufacture
ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride	Until 31 December 2026
ISO 16111:2018	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride	Until further notice

6.2.2.1.6 The following standards apply for the design, construction and initial inspection and test of UN bundles of cylinders. Each cylinder in a UN bundle of cylinders shall be a UN cylinder or UN cylinder shell complying with the requirements of 6.2.2. The inspection requirements related to the conformity assessment system and approval for UN bundles of cylinders shall be in accordance with 6.2.2.5.

Reference	Title	Applicable for manufacture
ISO 10961:2010	Gas cylinders – Cylinder bundles – Design, manufacture, testing and inspection	Until 31 December 2026
ISO 10961:2019	Gas cylinders – Cylinder bundles – Design, manufacture, testing and inspection	Until further notice

NOTE: *Changing one or more cylinders or cylinder shells of the same design type, including the same test pressure, in an existing UN bundle of cylinders does not require a new conformity assessment of the existing bundle. Service equipment of the bundle of cylinders can also be replaced without requiring a new conformity assessment if it complies with the design type approval.*

6.2.2.1.7 The following standards apply for the design, construction and initial inspection and test of UN cylinders for adsorbed gases except that the inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5.

Reference	Title	Applicable for manufacture
ISO 11513:2011	Gas cylinders – Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) – Design, construction, testing, use and periodic inspection	Until 31 December 2026
ISO 11513:2019	Gas cylinders – Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) – Design, construction, testing, use and periodic inspection	Until further notice
ISO 9809-1:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa	Until 31 December 2026
ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa	Until further notice

6.2.2.1.8 The following standards apply for the design, construction and initial inspection and test of UN pressure drums, except that inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5:

Reference	Title	Applicable for manufacture
ISO 21172-1:2015	Gas cylinders – Welded steel pressure drums up to 3 000 litres capacity for the transport of gases – Design and construction – Part 1: Capacities up to 1 000 litres ***NOTE:*** *Irrespective of section 6.3.3.4 of this standard, welded steel gas pressure drums with dished ends convex to pressure may be used for the transport of corrosive substances provided all applicable requirements of these Regulations are met.*	Until 31 December 2026
ISO 21172-1:2015 + Amd 1:2018	Gas cylinders – Welded steel pressure drums up to 3 000 litres capacity for the transport of gases – Design and construction – Part 1: Capacities up to 1 000 litres;	Until further notice

Reference	Title	Applicable for manufacture
ISO 4706: 2008	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below;	Until further notice
ISO 18172-1:2007	Gas cylinders – Refillable welded stainless steel cylinders – Part 1: Test pressure 6 MPa and below	Until further notice

6.2.2.1.9 The following standards apply to the design, construction and initial inspection and test of non-refillable UN cylinders except that the inspection requirements related to the conformity assessment system and approval shall be in accordance with 6.2.2.5.

Reference	Title	Applicable for manufacture
ISO 11118:1999	Gas cylinders – Non-refillable metallic gas cylinders – Specification and test methods	Until 31 December 2020
ISO 13340:2001	Transportable gas cylinders – Cylinder valves for non-refillable cylinders – Specification and prototype testing	Until 31 December 2020
ISO 11118:2015	Gas cylinders – Non-refillable metallic gas cylinders – Specification and test methods	Until 31 December 2026
ISO 11118:2015 +Amd.1:2019	Gas cylinders - Non-refillable metallic gas cylinders - Specification and test methods	Until further notice

6.2.2.2 ***Materials***

In addition to the material requirements specified in the design and construction standards, and any restrictions specified in the applicable packing instruction for the gas(es) to be transported (e.g. packing instruction P200 or P205), the following standards apply to material compatibility:

Reference	Title
ISO 11114-1:2012 + A1:2017	Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 1: Metallic materials
ISO 11114-2:2013	Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials

6.2.2.3 ***Closures and their protection***

The following standards apply to the design, construction, and initial inspection and test of closures and their protection:

Reference	Title	Applicable for manufacture
ISO 11117:1998	Gas cylinders – Valve protection caps and valve guards for industrial and medical gas cylinders – Design, construction and tests	Until 31 December 2014
ISO 11117:2008 + Cor 1:2009	Gas cylinders − Valve protection caps and valve guards − Design, construction and tests	Until 31 December 2026
ISO 11117:2019	Gas cylinders – Valve protection caps and guards – Design, construction and tests	Until further notice
ISO 10297:1999	Gas cylinders – Refillable gas cylinder valves – Specification and type testing	Until 31 December 2008
ISO 10297:2006	Gas cylinders – Refillable gas cylinder valves – Specification and type testing	Until 31 December 2020

Reference	Title	Applicable for manufacture
ISO 10297:2014	Gas cylinders – Cylinder valves – Specification and type testing	Until 31 December 2022
ISO 10297:2014 + A1:2017	Gas cylinders – Cylinder valves – Specification and type testing;	Until further notice
ISO 14246:2014	Gas cylinders – Cylinder valves – Manufacturing tests and examination	Until 31 December 2024
ISO 14246:2014 + A1:2017	Gas cylinders – Cylinder valves – Manufacturing tests and examinations	Until further notice
ISO 17871:2015	Gas cylinders – Quick-release cylinders valves- Specification and type testing ***NOTE:*** *This standard shall not be used for flammable gases.*	Until 31 December 2026
ISO 17871:2020	Gas cylinders – Quick-release cylinder valves – Specification and type testing.	Until further notice
ISO 17879:2017	Gas cylinders – Self-closing cylinder valves – Specification and type testing ***NOTE:*** *This standard shall not be applied to self-closing valves in acetylene cylinders.*	Until further notice

For UN metal hydride storage systems, the requirements specified in the following standard apply to closures and their protection:

Reference	Title	Applicable for manufacture
ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride	Until 31 December 2026
ISO 16111:2018	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride	Until further notice

6.2.2.4 ***Periodic inspection and test***

The following standards apply to the periodic inspection and testing of UN pressure receptacles:

Reference	Title	Applicable
ISO 6406:2005	Seamless steel gas cylinders – Periodic inspection and testing	Until 31 December 2024
ISO 18119:2018	Gas cylinders – Seamless steel and seamless aluminium-alloy gas cylinders and tubes – Periodic inspection and testing	Until further notice
ISO 10460:2005	Gas cylinders – Welded carbon-steel gas cylinders – Periodic inspection and testing ***NOTE:*** *The repair of welds described in clause 12.1 of this standard shall not be permitted. Repairs described in clause 12.2 require the approval of the competent authority which approved the periodic inspection and test body in accordance with 6.2.2.6.*	Until 31 December 2024
ISO 10460:2018	Gas cylinders – Welded aluminium-alloy, carbon and stainless steel gas cylinders – Periodic inspection and testing.	Until further notice
ISO 10461:2005/ A1:2006	Seamless aluminium-alloy gas cylinders – Periodic inspection and testing	Until 31 December 2024

Reference	Title	Applicable
ISO 10462:2013	Gas cylinders – Acetylene cylinders – Periodic inspection and maintenance.	Until 31 December 2024
ISO 10462:2013 + Amd1:2019	Gas cylinders – Acetylene cylinders – Periodic inspection and maintenance	Until further notice
ISO 11513:2011	Gas cylinders – Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) – Design, construction, testing, use and periodic inspection	Until 31 December 2024
ISO 11513:2019	Gas cylinders – Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) – Design, construction, testing, use and periodic inspection	Until further notice
ISO 11623:2015	Gas cylinders – Composite construction – Periodic inspection and testing	Until further notice
ISO 22434:2006	Transportable gas cylinders – Inspection and maintenance of cylinder valves ***NOTE:*** *These requirements may be met at times other than at the periodic inspection and test of UN cylinders*	Until further notice
ISO 20475:2018	Gas cylinders – Cylinder bundles – Periodic inspection and testing	Until further notice
ISO 23088:2020	Gas cylinders – Periodic inspection and testing of welded steel pressure drums — Capacities up to 1 000 *l*	Until further notice

The following standards apply to the periodic inspection and testing of UN metal hydride storage systems:

Reference	Title	Applicable
ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride	Until 31 December 2024
ISO 16111:2018	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride	Until further notice

6.2.2.5 ***Conformity assessment system and approval for manufacture of pressure receptacles***

6.2.2.5.0 *Definitions*

For the purposes of this section:

Conformity assessment system means a system for competent authority approval of a manufacturer, by pressure receptacle design type approval, approval of manufacturer's quality system and approval of inspection bodies;

Design type means a pressure receptacle design as specified by a particular pressure receptacle standard;

Verify means confirm by examination or provision of objective evidence that specified requirements have been fulfilled;

NOTE: *In this subsection when separate assessment is used the term pressure receptacle shall refer to pressure receptacle, pressure receptacle shell, inner vessel of the closed cryogenic receptacle or closure, as appropriate.*

6.2.2.5.1 The requirements of 6.2.2.5 shall be used for the conformity assessments of pressure receptacles. Paragraph 6.2.1.4.3 gives details of which parts of pressure receptacles may be conformity

assessed separately. However, the requirements of 6.2.2.5 may be replaced by requirements specified by the competent authority in the following cases:

(a) conformity assessment of closures;

(b) conformity assessment of the complete assembly of bundles of cylinders provided the cylinder shells have been conformity assessed in accordance with the requirements of 6.2.2.5; and

(c) conformity assessment of the complete assembly of closed cryogenic receptacles provided the inner vessel has been conformity assessed in accordance with the requirements of 6.2.2.5.

6.2.2.5.2 *General requirements*

Competent Authority

6.2.2.5.2.1 The competent authority that approves the pressure receptacle shall approve the conformity assessment system for the purpose of ensuring that pressure receptacles conform to the requirements of these Regulations. In instances where the competent authority that approves a pressure receptacle is not the competent authority in the country of manufacture, the marks of the approval country and the country of manufacture shall be indicated in the pressure receptacle marks (see 6.2.2.7 and 6.2.2.8).

The competent authority of the country of approval shall supply, upon request, evidence demonstrating compliance to this conformity assessment system to its counterpart in a country of use.

6.2.2.5.2.2 The competent authority may delegate its functions in this conformity assessment system in whole or in part.

6.2.2.5.2.3 The competent authority shall ensure that a current list of approved inspection bodies and their identity marks and approved manufacturers and their identity marks is available.

Inspection body

6.2.2.5.2.4 The inspection body shall be approved by the competent authority for the inspection of pressure receptacles and shall:

(a) Have a staff with an organisational structure, capable, trained, competent, and skilled, to satisfactorily perform its technical functions;

(b) Have access to suitable and adequate facilities and equipment;

(c) Operate in an impartial manner and be free from any influence which could prevent it from doing so;

(d) Ensure commercial confidentiality of the commercial and proprietary activities of the manufacturer and other bodies;

(e) Maintain clear demarcation between actual inspection body functions and unrelated functions;

(f) Operate a documented quality system;

(g) Ensure that the tests and inspections specified in the relevant pressure receptacle standard and these Regulations are performed; and

(h) Maintain an effective and appropriate report and record system in accordance with 6.2.2.5.6.

6.2.2.5.2.5 The inspection body shall perform design type approval, pressure receptacle production testing and inspection, and certification to verify conformity with the relevant pressure receptacle standard (see 6.2.2.5.4 and 6.2.2.5.5).

Manufacturer

6.2.2.5.2.6 The manufacturer shall:

(a) Operate a documented quality system in accordance with 6.2.2.5.3;

(b) Apply for design type approvals in accordance with 6.2.2.5.4;

(c) Select an inspection body from the list of approved inspection bodies maintained by the competent authority in the country of approval; and

(d) Maintain records in accordance with 6.2.2.5.6.

Testing laboratory

6.2.2.5.2.7 The testing laboratory shall have:

(a) Staff with an organisational structure, sufficient in number, competence, and skill; and

(b) Suitable and adequate facilities and equipment to perform the tests required by the manufacturing standard to the satisfaction of the inspection body.

6.2.2.5.3 *Manufacturer's quality system*

6.2.2.5.3.1 The quality system shall contain all the elements, requirements, and provisions adopted by the manufacturer. It shall be documented in a systematic and orderly manner in the form of written policies, procedures and instructions.

The contents shall in particular include adequate descriptions of:

(a) The organisational structure and responsibilities of personnel with regard to design and product quality;

(b) The design control and design verification techniques, processes, and procedures that will be used when designing the pressure receptacles;

(c) the relevant pressure receptacle manufacturing, quality control, quality assurance and process operation instructions that will be used;

(d) Quality records, such as inspection reports, test data and calibration data;

(e) Management reviews to ensure the effective operation of the quality system arising from the audits in accordance with 6.2.2.5.3.2;

(f) The process describing how customer requirements are met;

(g) The process for control of documents and their revision;

(h) The means for control of non-conforming pressure receptacles, purchased components, in - process and final materials; and

(i) Training programmes and qualification procedures for relevant personnel.

6.2.2.5.3.2 Audit of the quality system

The quality system shall be initially assessed to determine whether it meets the requirements in 6.2.2.5.3.1 to the satisfaction of the competent authority.

The manufacturer shall be notified of the results of the audit. The notification shall contain the conclusions of the audit and any corrective actions required.

Periodic audits shall be carried out, to the satisfaction of the competent authority, to ensure that the manufacturer maintains and applies the quality system. Reports of the periodic audits shall be provided to the manufacturer.

6.2.2.5.3.3 Maintenance of the quality system

The manufacturer shall maintain the quality system as approved in order that it remains adequate and efficient. The manufacturer shall notify the competent authority that approved the quality system, of any intended changes. The proposed changes shall be evaluated in order to determine whether the amended quality system will still satisfy the requirements in 6.2.2.5.3.1.

6.2.2.5.4 *Approval process*

Initial design type approval

6.2.2.5.4.1 The initial design type approval shall consist of approval of the manufacturer's quality system and approval of the pressure receptacle design to be produced. An application for an initial design type approval shall meet the requirements of 6.2.2.5.4.2 to 6.2.2.5.4.6 and 6.2.2.5.4.9.

6.2.2.5.4.2 A manufacturer desiring to produce pressure receptacles in accordance with a pressure receptacle standard and these Regulations shall apply for, obtain, and retain a design type approval certificate issued by the competent authority in the country of approval for at least one pressure receptacle design type in accordance with the procedure given in 6.2.2.5.4.9. This certificate shall, on request, be submitted to the competent authority of the country of use.

6.2.2.5.4.3 An application shall be made for each manufacturing facility and shall include:

(a) The name and registered address of the manufacturer and in addition, if the application is submitted by an authorised representative, its name and address;

(b) The address of the manufacturing facility (if different from the above);

(c) The name and title of the person(s) responsible for the quality system;

(d) The designation of the pressure receptacle and the relevant pressure receptacle standard;

(e) Details of any refusal of approval of a similar application by any other competent authority;

(f) The identity of the inspection body for design type approval;

(g) Documentation on the manufacturing facility as specified under 6.2.2.5.3.1; and

(h) The technical documentation required for design type approval, which shall enable verification of the conformity of the pressure receptacles with the requirements of the relevant pressure receptacle design standard. The technical documentation shall cover the design and method of manufacture and shall contain, as far as is relevant for assessment, at least the following:

(i) pressure receptacle design standard, design and manufacturing drawings, showing components and subassemblies, if any;

(ii) descriptions and explanations necessary for the understanding of the drawings and intended use of the pressure receptacles;

(iii) a list of the standards necessary to fully define the manufacturing process;

(iv) design calculations and material specifications; and

(v) design type approval test reports, describing the results of examinations and tests carried out in accordance with 6.2.2.5.4.9.

6.2.2.5.4.4 An initial audit in accordance with 6.2.2.5.3.2 shall be performed to the satisfaction of the competent authority.

6.2.2.5.4.5 If the manufacturer is denied approval, the competent authority shall provide written detailed reasons for such denial.

6.2.2.5.4.6 Following approval, changes to the information submitted under 6.2.2.5.4.3 relating to the initial approval shall be provided to the competent authority.

Subsequent design type approvals

6.2.2.5.4.7 An application for a subsequent design type approval shall encompass the requirements of 6.2.2.5.4.8 and 6.2.2.5.4.9, provided a manufacturer is in the possession of an initial design type approval. In such a case, the manufacturer's quality system according to 6.2.2.5.3 shall have been approved during the initial design type approval and shall be applicable for the new design.

6.2.2.5.4.8 The application shall include:

(a) The name and address of the manufacturer and in addition, if the application is submitted by an authorised representative, its name and address;

(b) Details of any refusal of approval of a similar application by any other competent authority;

(c) Evidence that initial design type approval has been granted; and

(d) The technical documentation, as described in 6.2.2.5.4.3 (h).

Procedure for design type approval

6.2.2.5.4.9 The inspection body shall:

(a) Examine the technical documentation to verify that:

(i) the design is in accordance with the relevant provisions of the standard, and

(ii) the prototype lot has been manufactured in conformity with the technical documentation and is representative of the design;

(b) Verify that the production inspections have been carried out as required in accordance with 6.2.2.5.5;

(c) As required by the pressure receptacle standard or technical code, carry out or supervise the tests of pressure receptacles as required for design type approval;

(d) Perform or have performed the examinations and tests specified in the pressure receptacle standard to determine that:

(i) the standard has been applied and fulfilled, and

(ii) the procedures adopted by the manufacturer meet the requirements of the standard; and

(e) Ensure that the various type approval examinations and tests are correctly and competently carried out.

After prototype testing has been carried out with satisfactory results and all applicable requirements of 6.2.2.5.4 have been satisfied, a design type approval certificate shall be issued, which shall include the name and address of the manufacturer, results and conclusions of the examination, and the necessary data for identification of the design type. If it was not possible to evaluate exhaustively the compatibility of the materials of construction with the contents of the pressure receptacle when the certificate was issued, a statement that compatibility assessment was not completed shall be included in the design type approval certificate.

If the manufacturer is denied a design type approval, the competent authority shall provide written detailed reasons for such denial.

6.2.2.5.4.10 Modifications to approved design types

The manufacturer shall either:

(a) Inform the issuing competent authority of modifications to the approved design type, where such modifications do not constitute a new design, as specified in the pressure receptacle standard; or

(b) Request a subsequent design type approval where such modifications constitute a new design according to the relevant pressure receptacle standard. This additional approval shall be given in the form of an amendment to the original design type approval certificate.

6.2.2.5.4.11 Upon request, the competent authority shall communicate to any other competent authority, information concerning design type approval, modifications of approvals and withdrawn approvals.

6.2.2.5.5 *Production inspection and certification*

General requirements

An inspection body, or its delegate, shall carry out the inspection and certification of each pressure receptacle. The inspection body selected by the manufacturer for inspection and testing during production may be different from the inspection body used for the design type approval testing.

Where it can be demonstrated to the satisfaction of the inspection body that the manufacturer has trained competent inspectors, independent of the manufacturing operations, inspection may be performed by those inspectors. In such a case, the manufacturer shall maintain training records of the inspectors.

The inspection body shall verify that the inspections by the manufacturer, and tests performed on those pressure receptacles, fully conform to the standard and the requirements of these Regulations. Should non-conformance in conjunction with this inspection and testing be determined, the permission to have inspection performed by the manufacturer's inspectors may be withdrawn.

The manufacturer shall, after approval by the inspection body, make a declaration of conformity with the certified design type. The application of the pressure receptacle certification marks shall be considered a declaration that the pressure receptacle complies with the applicable pressure receptacle standards and the requirements of this conformity assessment system and these Regulations. The inspection body shall affix or delegate the manufacturer to affix the pressure receptacle certification marks and the registered mark of the inspection body to each approved pressure receptacle.

A certificate of compliance, signed by the inspection body and the manufacturer, shall be issued before the pressure receptacles are filled.

6.2.2.5.6 *Records*

Design type approval and certificate of compliance records shall be retained by the manufacturer and the inspection body for not less than 20 years.

6.2.2.6 *Approval system for periodic inspection and test of pressure receptacles*

6.2.2.6.1 *Definition*

For the purposes of this section:

Approval system means a system for competent authority approval of a body performing periodic inspection and test of pressure receptacles (hereinafter referred to as "periodic inspection and test body"), including approval of that body's quality system.

6.2.2.6.2 *General requirements*

Competent authority

6.2.2.6.2.1 The competent authority shall establish an approval system for the purpose of ensuring that the periodic inspection and test of pressure receptacles conform to the requirements of these Regulations. In instances where the competent authority that approves a body performing periodic inspection and test of a pressure receptacle is not the competent authority of the country approving the manufacture of the pressure receptacle, the marks of the approval country of periodic inspection and test shall be indicated in the pressure receptacle marks (see 6.2.2.7).

The competent authority of the country of approval for the periodic inspection and test shall supply, upon request, evidence demonstrating compliance to this approval system including the records of the periodic inspection and test to its counterpart in a country of use.

The competent authority of the country of approval may terminate the approval certificate referred to in 6.2.2.6.4.1, upon evidence demonstrating non-compliance with the approval system.

6.2.2.6.2.2 The competent authority may delegate its functions in this approval system, in whole or in part.

6.2.2.6.2.3 The competent authority shall ensure that a current list of approved periodic inspection and test bodies and their identity marks is available.

Periodic inspection and test body

6.2.2.6.2.4 The periodic inspection and test body shall be approved by the competent authority and shall:

(a) Have a staff with an organisational structure, capable, trained, competent, and skilled, to satisfactorily perform its technical functions;

(b) Have access to suitable and adequate facilities and equipment;

(c) Operate in an impartial manner and be free from any influence which could prevent it from doing so;

(d) Ensure commercial confidentiality;

(e) Maintain clear demarcation between actual periodic inspection and test body functions and unrelated functions;

(f) Operate a documented quality system accordance with 6.2.2.6.3;

(g) Apply for approval in accordance with 6.2.2.6.4;

(h) Ensure that the periodic inspections and tests are performed in accordance with 6.2.2.6.5; and

(i) Maintain an effective and appropriate report and record system in accordance with 6.2.2.6.6.

6.2.2.6.3 *Quality system and audit of the periodic inspection and test body*

6.2.2.6.3.1 Quality system

The quality system shall contain all the elements, requirements, and provisions adopted by the periodic inspection and test body. It shall be documented in a systematic and orderly manner in the form of written policies, procedures, and instructions.

The quality system shall include:

(a) A description of the organisational structure and responsibilities;

(b) The relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;

(c) Quality records, such as inspection reports, test data, calibration data and certificates;

(d) Management reviews to ensure the effective operation of the quality system arising from the audits performed in accordance with 6.2.2.6.3.2;

(e) A process for control of documents and their revision;

(f) A means for control of non-conforming pressure receptacles; and

(g) Training programmes and qualification procedures for relevant personnel.

6.2.2.6.3.2 Audit

The periodic inspection and test body and its quality system shall be audited in order to determine whether it meets the requirements of these Regulations to the satisfaction of the competent authority.

An audit shall be conducted as part of the initial approval process (see 6.2.2.6.4.3). An audit may be required as part of the process to modify an approval (see 6.2.2.6.4.6).

Periodic audits shall be conducted, to the satisfaction of the competent authority, to ensure that the periodic inspection and test body continues to meet the requirements of these Regulations.

The periodic inspection and test body shall be notified of the results of any audit. The notification shall contain the conclusions of the audit and any corrective actions required.

6.2.2.6.3.3 Maintenance of the quality system

The periodic inspection and test body shall maintain the quality system as approved in order that it remains adequate and efficient.

The periodic inspection and test body shall notify the competent authority that approved the quality system, of any intended changes, in accordance with the process for modification of an approval in 6.2.2.6.4.6.

6.2.2.6.4 *Approval process for periodic inspection and test bodies*

Initial approval

6.2.2.6.4.1 A body desiring to perform periodic inspection and test of pressure receptacles in accordance with a pressure receptacle standard and these Regulations shall apply for, obtain, and retain an approval certificate issued by the competent authority.

This written approval shall, on request, be submitted to the competent authority of a country of use.

6.2.2.6.4.2 An application shall be made for each periodic inspection and test body and shall include:

(a) The name and address of the periodic inspection and test body and, if the application is submitted by an authorised representative, its name and address;

(b) The address of each facility performing periodic inspection and test;

(c) The name and title of the person(s) responsible for the quality system;

(d) The designation of the pressure receptacles, the periodic inspection and test methods, and the relevant pressure receptacle standards met by the quality system;

(e) Documentation on each facility, the equipment, and the quality system as specified under 6.2.2.6.3.1;

(f) The qualifications and training records of the periodic inspection and test personnel; and

(g) Details of any refusal of approval of a similar application by any other competent authority.

6.2.2.6.4.3 The competent authority shall:

(a) Examine the documentation to verify that the procedures are in accordance with the requirements of the relevant pressure receptacle standards and these Regulations; and

(b) Conduct an audit in accordance with 6.2.2.6.3.2 to verify that the inspections and tests are carried out as required by the relevant pressure receptacle standards and these Regulations, to the satisfaction of the competent authority.

6.2.2.6.4.4 After the audit has been carried out with satisfactory results and all applicable requirements of 6.2.2.6.4 have been satisfied, an approval certificate shall be issued. It shall include the name of the periodic inspection and test body, the registered mark, the address of each facility, and the necessary data for identification of its approved activities (e.g. designation of pressure receptacles, periodic inspection and test method and pressure receptacle standards).

6.2.2.6.4.5 If the periodic inspection and test body is denied approval, the competent authority shall provide written detailed reasons for such denial.

Modifications to periodic inspection and test body approvals

6.2.2.6.4.6 Following approval, the periodic inspection and test body shall notify the issuing competent authority of any modifications to the information submitted under 6.2.2.6.4.2 relating to the initial approval.

The modifications shall be evaluated in order to determine whether the requirements of the relevant pressure receptacle standards and these Regulations will be satisfied. An audit in accordance with 6.2.2.6.3.2 may be required. The competent authority shall accept or reject these modifications in writing, and an amended approval certificate shall be issued as necessary.

6.2.2.6.4.7 Upon request, the competent authority shall communicate to any other competent authority, information concerning initial approvals, modifications of approvals, and withdrawn approvals.

6.2.2.6.5 *Periodic inspection and test and certification*

The application of the periodic inspection and test marks to a pressure receptacle shall be considered a declaration that the pressure receptacle complies with the applicable pressure receptacle standards and the requirements of these Regulations. The periodic inspection and test body shall affix the periodic inspection and test marks, including its registered mark, to each approved pressure receptacle (see 6.2.2.7.7).

A record certifying that a pressure receptacle has passed the periodic inspection and test shall be issued by the periodic inspection and test body, before the pressure receptacle is filled.

6.2.2.6.6 *Records*

The periodic inspection and test body shall retain records of pressure receptacle periodic inspection and tests (both passed and failed) including the location of the test facility, for not less than 15 years.

The owner of the pressure receptacle shall retain an identical record until the next periodic inspection and test unless the pressure receptacle is permanently removed from service.

6.2.2.7 *Marking of refillable UN pressure receptacles*

NOTE: *Marking requirements for UN metal hydride storage systems are given in 6.2.2.9, marking requirements for UN bundles of cylinders are given in 6.2.2.10 and marking requirements for closures are given in 6.2.2.11.*

6.2.2.7.1 Refillable UN pressure receptacle shells and closed cryogenic receptacles shall be marked clearly and legibly with certification, operational and manufacturing marks. These marks shall be permanently affixed (e.g. stamped, engraved, or etched). The marks shall be on the shoulder, top end or neck of the pressure receptacle shell or on a permanently affixed component of the pressure receptacle (e.g. welded collar or corrosion resistant plate welded on the outer jacket of a closed cryogenic receptacle). Except for the UN packaging symbol, the minimum size of the marks shall be 5 mm for pressure receptacles with a diameter greater than or equal to 140 mm and 2.5 mm for pressure receptacles with a diameter less than 140 mm. The minimum size of the UN packaging symbol shall be 10 mm for pressure receptacles with a diameter greater than or equal to 140 mm and 5 mm for pressure receptacles with a diameter less than 140 mm.

6.2.2.7.2 The following certification marks shall be applied:

(a) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8;

(b) The technical standard (e.g. ISO 9809-1) used for design, manufacture and testing;

NOTE: *For acetylene cylinders the standard ISO 3807 shall also be marked.*

(c) The character(s) identifying the country of approval as indicated by the distinguishing sign used on vehicles in international road traffic[2];

[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968*

NOTE: *For the purpose of this mark the country of approval means the country of the competent authority that authorized the initial inspection and test of the individual receptacle at the time of manufacture.*

(d) The identity mark or stamp of the inspection body that is registered with the competent authority of the country authorizing the marking;

(e) The date of the initial inspection, the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/");

NOTE: *When an acetylene cylinder is conformity assessed in accordance with 6.2.1.4.3 (b) and the inspection bodies for the cylinder shell and the acetylene cylinder are different, their respective marks (d) are required. Only the initial inspection date (e) of the completed acetylene cylinder is required. If the country of approval of the inspection body responsible for the initial inspection and test is different a second mark (c) shall be applied.*

6.2.2.7.3 The following operational marks shall be applied:

(f) The test pressure in bar, preceded by the letters "PH" and followed by the letters "BAR";

(g) The mass of the empty pressure receptacle including all permanently attached integral parts (e.g. neck ring, foot ring, etc.) in kilograms, followed by the letters "KG". This mass shall not include the mass of closure(s), valve protection cap or valve guard, any coating, or porous material for acetylene. The mass shall be expressed to three significant figures rounded up to the last digit. For cylinders of less than 1 kg, the mass shall be expressed to two significant figures rounded up to the last digit. In the case of pressure receptacles for UN 1001 acetylene, dissolved and UN 3374 acetylene, solvent free, at least one decimal shall be shown after the decimal point and two digits for pressure receptacles of less than 1 kg;

(h) The minimum guaranteed wall thickness of the pressure receptacle in millimetres followed by the letters "MM". This mark is not required for pressure receptacles with a water capacity less than or equal to 1 litre or for composite cylinders or for closed cryogenic receptacles;

(i) In the case of pressure receptacles for compressed gases, UN 1001 acetylene, dissolved, and UN 3374 acetylene, solvent free, the working pressure in bar, preceded by the letters "PW". In the case of closed cryogenic receptacles, the maximum allowable working pressure preceded by the letters "MAWP";

NOTE: *When a cylinder shell is intended for use as an acetylene cylinder (including the porous material), the working pressure mark is not required until the acetylene cylinder is completed.*

(j) In the case of pressure receptacles for liquefied gases, refrigerated liquefied gases and dissolved gases, the water capacity in litres expressed to three significant digits rounded down to the last digit, followed by the letter "L". If the value of the minimum or nominal water capacity is an integer, the figures after the decimal point may be neglected;

(k) In the case of cylinders for UN 1001 acetylene, dissolved:

(i) the tare in kilograms consisting of the total of the mass of the empty cylinder shell, the service equipment (including porous material) not removed during filling, any coating, the solvent and the saturation gas expressed to three significant figures rounded down to the last digit followed by the letters "KG". At least one decimal shall be shown after the decimal point. For pressure receptacles of less than 1 kg, the mass shall be expressed to two significant figures rounded down to the last digit;

(ii) the identity of the porous material (e.g.: name or trademark); and

(iii) the total mass of the filled acetylene cylinder in kilograms followed by the letters "KG";

(l) In the case of cylinders for UN 3374 acetylene, solvent free:

(i) the tare in kilograms consisting of the total of the mass of the empty cylinder shell, the service equipment (including porous material) not removed during filling and any coating expressed to three significant figures rounded down to the last digit followed by the letters "KG". At least one decimal shall be shown after the decimal point. For pressure receptacles of less than 1 kg, the mass shall be expressed to two significant figures rounded down to the last digit;

(ii) the identity of the porous material; and

(iii) the total mass of the filled acetylene cylinder in kilograms followed by the letters "KG";

6.2.2.7.4 The following manufacturing marks shall be applied:

(m) Identification of the cylinder thread (e.g. 25E). This mark is not required for closed cryogenic receptacles;

NOTE: *Information on marks that may be used for identifying threads for cylinders is given in ISO/TR 11364, Gas cylinders – Compilation of national and international valve stem/gas cylinder neck threads and their identification and marking system.*

(n) The manufacturer's mark registered by the competent authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark shall be preceded by the character(s) identifying the country of manufacture as indicated by the distinguishing sign used on vehicles in international road traffic[2]. The country mark and the manufacturer's mark shall be separated by a space or slash;

NOTE: *For acetylene cylinders, if the manufacturer of the acetylene cylinder and the manufacturer of the cylinder shell are different, only the mark of the manufacturer of the completed acetylene cylinder is required.*

(o) The serial number assigned by the manufacturer;

(p) In the case of steel pressure receptacles and composite pressure receptacles with steel liner intended for the transport of gases with a risk of hydrogen embrittlement, the letter "H" showing compatibility of the steel (see ISO 11114-1:2012);

(q) For composite cylinders and tubes having a limited design life, the letters "FINAL" followed by the design life shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

(r) For composite cylinders and tubes having a limited design life greater than 15 years and for composite cylinders and tubes having non-limited design life, the letters "SERVICE" followed by the date 15 years from the date of manufacture (initial inspection) shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

NOTE: *Once the initial design type has passed the service life test programme requirements in accordance with 6.2.2.1.1 NOTE 2 or 6.2.2.1.2 NOTE 2, future production no longer requires this initial service life mark. The initial service life mark shall be made unreadable on cylinders and tubes of a design type that has met the service life test programme requirements.*

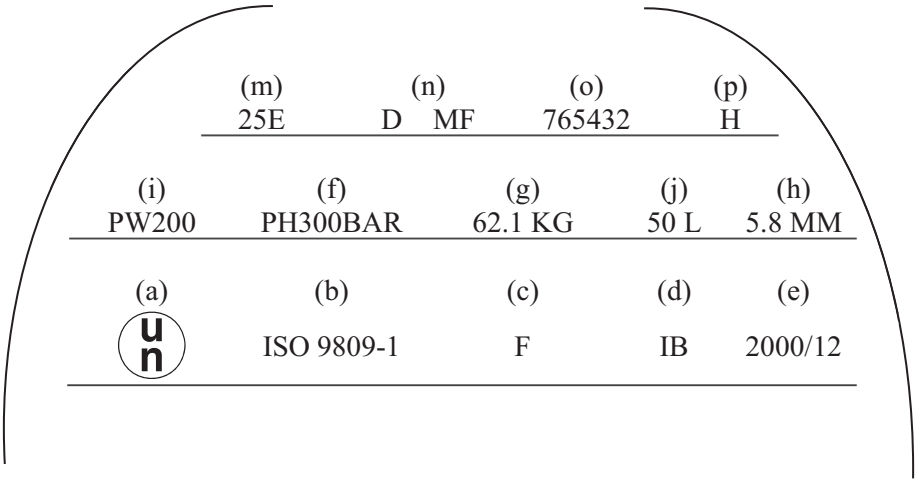
6.2.2.7.5 The above marks shall be placed in three groups:

- Manufacturing marks shall be the top grouping and shall appear consecutively in the sequence given in 6.2.2.7.4 except for the marks described in 6.2.2.7.4 (q) and (r) which shall be adjacent to the periodic inspection and test marks of 6.2.2.7.7.

- The operational marks in 6.2.2.7.3 shall be the middle grouping and the test pressure (f) shall be immediately preceded by the working pressure (i) when the latter is required.

- Certification marks shall be the bottom grouping and shall appear in the sequence given in 6.2.2.7.2.

The following is an example of marking a cylinder.



6.2.2.7.6 Other marks are allowed in areas other than the side wall, provided they are made in low stress areas and are not of a size and depth that will create harmful stress concentrations. In the case of closed cryogenic receptacles, such marks may be on a separate plate attached to the outer jacket. Such marks shall not conflict with required marks.

6.2.2.7.7 In addition to the preceding marks, each refillable pressure receptacle that meets the periodic inspection and test requirements of 6.2.2.4 shall be marked indicating:

(a) The character(s) identifying the country authorizing the body performing the periodic inspection and test as indicated by the distinguishing sign used on vehicles in international road traffic[2]. This mark is not required if this body is approved by the competent authority of the country approving manufacture;

(b) The registered mark of the body authorised by the competent authority for performing periodic inspection and test;

[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

(c) The date of the periodic inspection and test, the year (two digits) followed by the month (two digits) separated by a slash (i.e. "/"). Four digits may be used to indicate the year.

The above marks shall appear consecutively in the sequence given.

6.2.2.7.8 The marks in accordance with 6.2.2.7.7 may be engraved on a metallic ring affixed to the cylinder or pressure drum when the valve is installed, and which is removable only by disconnecting the valve from the cylinder or pressure drum.

6.2.2.7.9 *Deleted.*

6.2.2.8 ***Marking of non-refillable UN cylinders***

6.2.2.8.1 Non-refillable UN cylinders shall be marked clearly and legibly with certification and gas or cylinder specific marks. These marks shall be permanently affixed (e.g. stencilled, stamped, engraved, or etched) on the cylinder. Except when stencilled, the marks shall be on the shoulder, top end or neck of the cylinder shell or on a permanently affixed component of the cylinder (e.g. welded collar). Except for the UN packaging symbol and the "DO NOT REFILL" mark, the minimum size of the marks shall be 5 mm for cylinders with a diameter greater than or equal to 140 mm and 2.5 mm for cylinders with a diameter less than 140 mm. The minimum size of the UN packaging symbol shall be 10 mm for cylinders with a diameter greater than or equal to 140 mm and 5 mm for cylinders with a diameter less than 140 mm. The minimum size of the "DO NOT REFILL" mark shall be 5 mm.

6.2.2.8.2 The marks listed in 6.2.2.7.2 to 6.2.2.7.4 shall be applied with the exception of (g), (h), and (m). The serial number (o) may be replaced by the batch number. In addition, the words "DO NOT REFILL" in letters of at least 5 mm in height are required.

6.2.2.8.3 The requirements of 6.2.2.7.5 shall apply.

NOTE: *Non-refillable cylinders may, on account of their size, substitute a label for these permanent marks.*

6.2.2.8.4 Other marks are allowed provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks shall not conflict with required marks.

6.2.2.9 ***Marking of UN metal hydride storage systems***

6.2.2.9.1 UN metal hydride storage systems shall be marked clearly and legibly with the marks listed below. These marks shall be permanently affixed (e.g. stamped, engraved, or etched) on the metal hydride storage system. The marks shall be on the shoulder, top end or neck of the metal hydride storage system or on a permanently affixed component of the metal hydride storage system. Except for the United Nations packaging symbol, the minimum size of the marks shall be 5 mm for metal hydride storage systems with a smallest overall dimension greater than or equal to 140 mm and 2.5 mm for metal hydride storage systems with a smallest overall dimension less than 140 mm. The minimum size of the United Nations packaging symbol shall be 10 mm for metal hydride storage systems with a smallest overall dimension greater than or equal to 140 mm and 5 mm for metal hydride storage systems with a smallest overall dimension less than 140 mm.

6.2.2.9.2 The following marks shall be applied:

(a) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8;

(b) "ISO 16111" (the technical standard used for design, manufacture and testing);

(c) The character(s) identifying the country of approval as indicated by the distinguishing sign used on vehicles in international road traffic[2];

NOTE: *For the purpose of this mark the country of approval means the country of the competent authority that authorized the initial inspection and test of the individual system at the time of manufacture.*

(d) The identity mark or stamp of the inspection body that is registered with the competent authority of the country authorizing the marking;

(e) The date of the initial inspection, the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/");

(f) The test pressure of the receptacle in bar, preceded by the letters "PH" and followed by the letters "BAR";

(g) The rated charging pressure of the metal hydride storage system in bar, preceded by the letters "RCP" and followed by the letters "BAR";

(h) The manufacturer's mark registered by the competent authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark shall be preceded by the character(s) identifying the country of manufacture as indicated by the distinguishing sign used on vehicles in international road traffic[2]. The country mark and the manufacturer's mark shall be separated by a space or slash;

(i) The serial number assigned by the manufacturer;

(j) In the case of steel receptacles and composite receptacles with steel liner, the letter "H" showing compatibility of the steel (see 1SO 11114-1:2012); and,

(k) In the case of metal hydride storage systems having limited life, the date of expiry, denoted by the letters "FINAL" followed by the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

The certification marks specified in (a) to (e) above shall appear consecutively in the sequence given. The test pressure (f) shall be immediately preceded by the rated charging pressure (g). The manufacturing marks specified in (h) to (k) above shall appear consecutively in the sequence given.

6.2.2.9.3 Other marks are allowed in areas other than the side wall, provided they are made in low stress areas and are not of a size and depth that will create harmful stress concentrations. Such marks shall not conflict with required marks.

6.2.2.9.4 In addition to the preceding marks, each metal hydride storage system that meets the periodic inspection and test requirements of 6.2.2.4 shall be marked indicating:

(a) The character(s) identifying the country authorizing the body performing the periodic inspection and test, as indicated by the distinguishing sign used on vehicles in international road traffic[2]. This mark is not required if this body is approved by the competent authority of the country approving manufacture;

(b) The registered mark of the body authorised by the competent authority for performing periodic inspection and test;

[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968*

(c) The date of the periodic inspection and test, the year (two digits) followed by the month (two digits) separated by a slash (i.e. "/"). Four digits may be used to indicate the year.

The above marks shall appear consecutively in the sequence given.

6.2.2.10 ***Marking of bundles of cylinders***

6.2.2.10.1 Individual cylinder shells in a bundle of cylinders shall be marked in accordance with 6.2.2.7. Individual closures in a bundle of cylinders shall be marked in accordance with 6.2.2.11.

6.2.2.10.2 Refillable UN bundles of cylinders shall be marked clearly and legibly with certification, operational, and manufacturing marks. These marks shall be permanently affixed (e.g. stamped, engraved, or etched) on a plate permanently attached to the frame of the bundle of cylinders. Except for the UN packaging symbol, the minimum size of the marks shall be 5 mm. The minimum size of the UN packaging symbol shall be 10 mm.

6.2.2.10.3 The following marks shall be applied:

(a) The certification marks specified in 6.2.2.7.2 (a), (b), (c), (d) and (e);

(b) The operational marks specified in 6.2.2.7.3 (f), (i), (j) and the total of the mass of the frame of the bundle and all permanently attached parts (cylinder shells and service equipment). Bundles intended for the carriage of UN 1001 acetylene, dissolved and UN 3374 acetylene, solvent free shall bear the tare as specified in clause B.4.2 of ISO 10961:2010; and

(c) The manufacturing marks specified in 6.2.2.7.4 (n), (o) and, where applicable, (p).

6.2.2.10.4 The marks shall be placed in three groups:

(a) The manufacturing marks shall be the top grouping and shall appear consecutively in the sequence given in 6.2.2.10.3 (c);

(b) The operational marks in 6.2.2.10.3 (b) shall be the middle grouping and the operational mark specified in 6.2.2.7.3 (f) shall be immediately preceded by the operational mark specified in 6.2.2.7.3 (i) when the latter is required;

(c) Certification marks shall be the bottom grouping and shall appear in the sequence given in 6.2.2.10.3 (a).

6.2.2.11 ***Marking of closures for refillable UN pressure receptacles***

For closures the following permanent marks shall be applied clearly and legibly, (e.g. stamped, engraved or etched):

(a) Manufacturer's identification mark;

(b) Design standard or design standard designation;

(c) Date of manufacture (year and month or year and week) and

(d) The identity mark of the inspection body responsible for the initial inspection and test, if applicable.

The valve test pressure shall be marked when it is less than the test pressure which is indicated by the rating of the valve filling connection.

6.2.3 Requirements for non-UN pressure receptacles

6.2.3.1 Pressure receptacles not designed, constructed, inspected, tested and approved according to the requirements of 6.2.2 shall be designed, constructed, inspected, tested and approved in accordance with the provisions of a technical code recognised by the competent authority and the general requirements of 6.2.1.

6.2.3.2 Pressure receptacles designed, constructed, inspected, tested and approved under the provisions of this section shall not be marked with the UN packaging symbol.

6.2.3.3 For metallic cylinders, tubes, pressure drums, bundles of cylinders and salvage pressure receptacles, the construction shall be such that the minimum burst ratio (burst pressure divided by test pressure) is:

1.50 for refillable pressure receptacles,

2.00 for non-refillable pressure receptacles.

6.2.3.4 Marking shall be in accordance with the requirements of the competent authority of the country of use.

6.2.3.5 *Salvage pressure receptacles*

To permit the safe handling and disposal of the pressure receptacles transported within the salvage pressure receptacle, the design may include equipment not otherwise used for cylinders or pressure drums such as flat heads, quick opening devices and openings in the cylindrical part.

Instructions on the safe handling and use of the salvage pressure receptacle shall be clearly shown in the documentation for the application to the competent authority and shall form part of the approval certificate. In the approval certificate, the pressure receptacles authorized to be transported in a salvage pressure receptacle shall be indicated. A list of the materials of construction of all parts likely to be in contact with the dangerous goods shall also be included.

A copy of the approval certificate shall be delivered by the manufacturer to the owner of a salvage pressure receptacle.

The marking of salvage pressure receptacles according to 6.2.3 shall be determined by the competent authority taking into account suitable marking provisions of 6.2.2.7 as appropriate. The marking shall include the water capacity and test pressure of the salvage pressure receptacle.

NOTE: *These provisions for salvage pressure receptacles may be applied for new salvage pressure receptacles as from 1 January 2013, unless otherwise authorized, and shall be applied for all new salvage pressure receptacles as from 1 January 2014. Salvage pressure receptacles approved in accordance with national regulations may be used with the approval of the competent authorities of the countries of use.*

6.2.4 Requirements for aerosol dispensers, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas

6.2.4.1 The internal pressure of aerosol dispensers at 50 °C shall not exceed 1.2 MPa (12 bar) when using flammable liquefied gases, 1.32 MPa (13.2 bar) when using non-flammable liquefied gases, and 1.5 MPa (15 bar) when using non-flammable compressed or dissolved gases. In case of a mixture of several gases, the stricter limit shall apply.

6.2.4.2 Each filled aerosol dispenser or gas cartridge or fuel cell cartridge shall be subjected to a test in a hot water bath in accordance with 6.2.4.2.1 or an approved water bath alternative in accordance with 6.2.4.2.2.

6.2.4.2.1 *Hot water bath test*

6.2.4.2.1.1 The temperature of the water bath and the duration of the test shall be such that the internal pressure reaches that which would be reached at 55 °C (50 °C if the liquid phase does not exceed 95 % of the capacity of the aerosol dispenser, gas cartridge or the fuel cell cartridge at 50 °C). If the contents are sensitive to heat or if the aerosol dispensers, gas cartridges or the fuel cell cartridges are made of plastics material which softens at this test temperature, the temperature of the bath shall be set at between 20 °C and 30 °C but, in addition, one aerosol dispenser, gas cartridge or the fuel cell cartridge in 2 000 shall be tested at the higher temperature.

6.2.4.2.1.2 No leakage or permanent deformation of an aerosol dispenser, gas cartridge or the fuel cell cartridge may occur, except that a plastic aerosol dispenser, gas cartridge or the fuel cell cartridge may be deformed through softening provided that it does not leak.

6.2.4.2.2 *Alternative methods*

With the approval of the competent authority alternative methods that provide an equivalent level of safety may be used provided that the requirements of 6.2.4.2.2.1 and, as appropriate, 6.2.4.2.2.2 or 6.2.4.2.3 are met.

6.2.4.2.2.1 Quality system

Aerosol dispenser, gas cartridge or the fuel cell cartridge fillers and component manufacturers shall have a quality system. The quality system shall implement procedures to ensure that all aerosol dispensers, gas cartridges or the fuel cell cartridges that leak or that are deformed are rejected and not offered for transport.

The quality system shall include:

(a) A description of the organizational structure and responsibilities;

(b) The relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;

(c) Quality records, such as inspection reports, test data, calibration data and certificates;

(d) Management reviews to ensure the effective operation of the quality system;

(e) A process for control of documents and their revision;

(f) A means for control of non-conforming aerosol dispensers, gas cartridges or the fuel cell cartridges;

(g) Training programmes and qualification procedures for relevant personnel; and

(h) Procedures to ensure that there is no damage to the final product.

An initial audit and periodic audits shall be conducted to the satisfaction of the competent authority. These audits shall ensure the approved system is and remains adequate and efficient. Any proposed changes to the approved system shall be notified to the competent authority in advance.

6.2.4.2.2.2 Aerosol dispensers

6.2.4.2.2.2.1 Pressure and leak testing of aerosol dispensers before filling

Each empty aerosol dispenser shall be subjected to a pressure equal to or in excess of the maximum expected in the filled aerosol dispensers at 55 °C (50 °C if the liquid phase does not exceed 95 % of the capacity of the receptacle at 50 °C). This shall be at least two-thirds of the design pressure of the aerosol dispenser. If any aerosol dispenser shows evidence of leakage at a rate equal to or greater than 3.3×10^{-2} $mbar \cdot l \cdot s^{-1}$ at the test pressure, distortion or other defect, it shall be rejected.

6.2.4.2.2.2.2 Testing of the aerosol dispensers after filling

Prior to filling the filler shall ensure that the crimping equipment is set appropriately and the specified propellant is used.

Each filled aerosol dispenser shall be weighed and leak tested. The leak detection equipment shall be sufficiently sensitive to detect at least a leak rate of 2.0×10^{-3} mbar·l·s^{-1} at 20 °C.

Any filled aerosol dispenser that shows evidence of leakage, deformation or excessive mass shall be rejected.

6.2.4.2.2.3 Gas cartridges and fuel cell cartridges

6.2.4.2.2.3.1 Pressure testing of gas cartridges and fuel cell cartridges

Each gas cartridge or fuel cell cartridge shall be subjected to a test pressure equal to or in excess of the maximum expected in the filled receptacle at 55 °C (50 °C if the liquid phase does not exceed 95 % of the capacity of the receptacle at 50 °C). This test pressure shall be that specified for the gas cartridge or fuel cell cartridge and shall not be less than two thirds the design pressure of the gas cartridge or fuel cell cartridge. If any gas cartridge or fuel cell cartridge shows evidence of leakage at a rate equal to or greater than 3.3×10^{-2} mbar·l·s^{-1} at the test pressure or distortion or any other defect, it shall be rejected.

6.2.4.2.2.3.2 Leak testing gas cartridges and fuel cell cartridges

Prior to filling and sealing, the filler shall ensure that the closures (if any), and the associated sealing equipment are closed appropriately and the specified gas is used.

Each filled gas cartridge or fuel cell cartridge shall be checked for the correct mass of gas and shall be leak tested. The leak detection equipment shall be sufficiently sensitive to detect at least a leak rate of 2.0×10^{-3} mbar·l·s^{-1} at 20 °C.

Any gas cartridge or fuel cell cartridge that has gas masses not in conformity with the declared mass limits or shows evidence of leakage or deformation, shall be rejected.

6.2.4.2.3 With the approval of the competent authority, aerosols and receptacles, small, are not subject to 6.2.4.2.1 and 6.2.4.2.2, if they are required to be sterile but may be adversely affected by water bath testing, provided:

(a) They contain a non-flammable gas and either

(i) contain other substances that are constituent parts of pharmaceutical products for medical, veterinary or similar purposes;

(ii) contain other substances used in the production process for pharmaceutical products; or

(iii) are used in medical, veterinary or similar applications;

(b) An equivalent level of safety is achieved by the manufacturer's use of alternative methods for leak detection and pressure resistance, such as helium detection and water bathing a statistical sample of at least 1 in 2000 from each production batch; and

(c) For pharmaceutical products according to (a) (i) and (iii) above, they are manufactured under the authority of a national health administration. If required by the competent

authority, the principles of Good Manufacturing Practice (GMP) established by the World Health Organization (WHO)[3] shall be followed.

[3] *WHO Publication: "Quality assurance of pharmaceuticals. A compendium of guidelines and related materials. Volume 2: Good manufacturing practices and inspection".*

CHAPTER 6.3

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PACKAGINGS FOR DIVISION 6.2 INFECTIOUS SUBSTANCES OF CATEGORY A (UN 2814 AND UN 2900)

6.3.1 General

6.3.1.1 The requirements of this Chapter apply to packagings intended for the transport of infectious substances of Category A, UN 2814 and UN 2900.

6.3.2 Requirements for packagings

6.3.2.1 The requirements for packagings in this section are based on packagings, as specified in 6.1.4, currently used. In order to take into account progress in science and technology, there is no objection to the use of packagings having specifications different from those in this Chapter provided that they are equally effective, acceptable to the competent authority and able to successfully fulfil the requirements described in 6.3.5. Methods of testing other than those described in these Regulations are acceptable provided they are equivalent.

6.3.2.2 Packagings shall be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each packaging meets the requirements of this Chapter.

NOTE: *ISO 16106:2020 "Transport packages for dangerous goods – Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings – Guidelines for the application of ISO 9001" provides acceptable guidance on procedures which may be followed.*

6.3.2.3 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for transport are capable of passing the applicable performance tests of this Chapter.

6.3.3 Code for designating types of packagings

6.3.3.1 The codes for designating types of packagings are set out in 6.1.2.7.

6.3.3.2 The letters "U" or "W" may follow the packaging code. The letter "U" signifies a special packaging conforming to the requirements of 6.3.5.1.6. The letter "W" signifies that the packaging, although, of the same type indicated by the code is manufactured to a specification different from that in 6.1.4 and is considered equivalent under the requirements of 6.3.2.1.

6.3.4 Marking

NOTE 1: *The* marks *indicate that the packaging which bears them corresponds to a successfully tested design type and that it complies with the requirements of this Chapter which are related to the manufacture, but not to the use, of the packaging.*

NOTE 2: *The* marks *are intended to be of assistance to packaging manufacturers, reconditioners, packaging users, carriers and regulatory authorities.*

NOTE 3: *The* marks *do not always provide full details of the test levels, etc., and these may need to be taken further into account, e.g. by reference to a test certificate, to test reports or to a register of successfully tested packagings.*

6.3.4.1 Each packaging intended for use according to these Regulations shall bear marks which are durable, legible and placed in a location and of such a size relative to the packaging as to be readily visible. For packages with a gross mass of more than 30 kg, the marks or a duplicate thereof shall appear on the top or

on a side of the packaging. Letters, numerals and symbols shall be at least 12 mm high, except for packagings of 30 *l* capacity or less or 30 kg maximum net mass, when they shall be at least 6 mm in height and for packagings of 5 *l* capacity or less or 5 kg maximum net mass when they shall be of an appropriate size.

6.3.4.2 A packaging that meets the requirements of this section and of 6.3.5 shall be marked with:

(a) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8.;

(b) The code designating the type of packaging according to the requirements of 6.1.2;

(c) The text “CLASS 6.2”;

(d) The last two digits of the year of manufacture of the packaging;

(e) The state authorizing the allocation of the mark, indicated by the distinguishing sign used on vehicles in international road traffic[1];

(f) The name of the manufacturer or other identification of the packaging specified by the competent authority;

(g) For packagings meeting the requirements of 6.3.5.1.6, the letter “U”, inserted immediately following the mark required in (b) above.

6.3.4.3 Marks shall be applied in the sequence shown in 6.3.4.2 (a) to (g); each mark required in these sub-paragraphs shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable. For example, see 6.3.4.4.

Any additional marks authorized by a competent authority shall still enable the marks required in 6.3.4.1 to be correctly identified.

6.3.4.4 ***Example of marking***

	4G/CLASS 6.2/06	as in 6.3.4.2 (a), (b), (c) and (d)
	S/SP-9989-ERIKSSON	as in 6.3.4.2 (e) and (f)

6.3.5 Test requirements for packagings

6.3.5.1 ***Performance and frequency of tests***

6.3.5.1.1 The design type of each packaging shall be tested as provided in this section in accordance with procedures established by the competent authority.

6.3.5.1.2 Each packaging design type shall successfully pass the tests prescribed in this Chapter before being used. A packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes packagings which differ from the design type only in their lesser design height.

6.3.5.1.3 Tests shall be repeated on production samples at intervals established by the competent authority.

[1] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

6.3.5.1.4 Tests shall also be repeated after each modification which alters the design, material or manner of construction of a packaging.

6.3.5.1.5 The competent authority may permit the selective testing of packagings that differ only in minor respects from a tested type, e.g. smaller sizes or lower net mass of primary receptacles; and packagings such as drums and boxes which are produced with small reductions in external dimension(s).

6.3.5.1.6 Primary receptacles of any type may be assembled within a secondary packaging and transported without testing in the rigid outer packaging under the following conditions:

(a) The rigid outer packaging shall have been successfully tested in accordance with 6.3.5.2.2 with fragile (e.g., glass) primary receptacles;

(b) The total combined gross mass of primary receptacles shall not exceed one half the gross mass of primary receptacles used for the drop test in (a) above;

(c) The thickness of cushioning between primary receptacles and between primary receptacles and the outside of the secondary packaging shall not be reduced below the corresponding thicknesses in the originally tested packaging; and if a single primary receptacle was used in the original test, the thickness of cushioning between primary receptacles shall not be less than the thickness of cushioning between the outside of the secondary packaging and the primary receptacle in the original test. When either fewer or smaller primary receptacles are used (as compared to the primary receptacles used in the drop test), sufficient additional cushioning material shall be used to take up the void spaces;

(d) The rigid outer packaging shall have successfully passed the stacking test in 6.1.5.6 while empty. The total mass of identical packages shall be based on the combined mass of the packagings used in the drop test in (a) above;

(e) For primary receptacles containing liquids, an adequate quantity of absorbent material to absorb the entire liquid content of the primary receptacles shall be present;

(f) If the rigid outer packaging is intended to contain primary receptacles for liquids and is not leakproof, or is intended to contain primary receptacles for solids and is not siftproof, a means of containing any liquid or solid contents in the event of leakage shall be provided in the form of a leakproof liner, plastics bag or other equally effective means of containment;

(g) In addition to the marks prescribed in 6.3.4.2 (a) to (f), packagings shall be marked in accordance with 6.3.4.2 (g).

6.3.5.1.7 The competent authority may at any time require proof, by tests in accordance with this section, that serially-produced packagings meet the requirements of the design type tests.

6.3.5.1.8 Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one sample.

6.3.5.2 *Preparation of packagings for testing*

6.3.5.2.1 Samples of each packaging shall be prepared as for transport except that a liquid or solid infectious substance shall be replaced by water or, where conditioning at – 18 °C is specified, by water/antifreeze. Each primary receptacle shall be filled to not less than 98 % of its capacity.

NOTE: *The term water includes water/antifreeze solution with a minimum specific gravity of 0.95 for testing at – 18 °C.*

6.3.5.2.2 *Tests and number of samples required*

Tests required for packaging types

Type of packaging [a]			Tests required					
Rigid outer packaging	**Primary receptacle**		**Water spray 6.3.5.3.5.1**	**Cold conditioning 6.3.5.3.5.2**	**Drop 6.3.5.3**	**Additional drop 6.3.5.3.5.3**	**Puncture 6.3.5.4**	**Stack 6.1.5.6**
	Plastics	**Other**	**No. of samples**	**No. of samples**	**No. of samples**	**No. of samples**	**No. of samples**	
Fibreboard box	x		5	5	10	Required on one sample when the packaging is intended to contain dry ice.	2	Required on three samples when testing a "U"-marked packaging as defined in 6.3.5.1.6 for specific provisions.
		x	5	0	5		2	
Fibreboard drum	x		3	3	6		2	
		x	3	0	3		2	
Plastics box	x		0	5	5		2	
		x	0	5	5		2	
Plastics drum/ jerrican	x		0	3	3		2	
		x	0	3	3		2	
Boxes of other material	x		0	5	5		2	
		x	0	0	5		2	
Drums/ jerricans of other material	x		0	3	3		2	
		x	0	0	3		2	

"Type of packaging" categorizes packagings for test purposes according to the kind of packaging and its material characteristics.

NOTE 1: *In instances where a primary receptacle is made of two or more materials, the material most liable to damage determines the appropriate test.*

NOTE 2: *The material of the secondary packagings are not taken into consideration when selecting the test or conditioning for the test.*

Explanation for use of the table:

If the packaging to be tested consists of a fibreboard outer box with a plastics primary receptacle, five samples must undergo the water spray test (see 6.3.5.3.5.1) prior to dropping and another five must be conditioned to – 18 °C (see 6.3.5.3.5.2) prior to dropping. If the packaging is to contain dry ice then one further single sample shall be dropped in accordance with 6.3.5.3.5.3.

Packagings prepared as for transport shall be subjected to the tests in 6.3.5.3 and 6.3.5.4. For outer packagings, the headings in the table relate to fibreboard or similar materials whose performance may be rapidly affected by moisture; plastics which may embrittle at low temperature; and other materials such as metal whose performance is not affected by moisture or temperature.

6.3.5.3 ***Drop test***

6.3.5.3.1 *Drop height and target*

Samples shall be subjected to free-fall drops from a height of 9 m onto a non-resilient, horizontal, flat, massive and rigid surface in conformity with 6.1.5.3.4.

6.3.5.3.2 *Number of test samples and drop orientation*

6.3.5.3.2.1 Where the samples are in the shape of a box; five shall be dropped one in each of the following orientations:

(a) flat on the base;

(b) flat on the top;

(c) flat on the longest side;

(d) flat on the shortest side;

(e) on a corner.

6.3.5.3.2.2 Where the samples are in the shape of a drum or a jerrican, three shall be dropped one in each of the following orientations:

(a) diagonally on the top edge, with the centre of gravity directly above the point of impact;

(b) diagonally on the base edge;

(c) flat on the body or side.

6.3.5.3.3 While the sample shall be released in the required orientation, it is accepted that for aerodynamic reasons the impact may not take place in that orientation.

6.3.5.3.4 Following the appropriate drop sequence, there shall be no leakage from the primary receptacle(s) which shall remain protected by cushioning/absorbent material in the secondary packaging.

6.3.5.3.5 *Special preparation of test sample for the drop test*

6.3.5.3.5.1 Fibreboard - Water spray test

Fibreboard outer packagings: The sample shall be subjected to a water spray that simulates exposure to rainfall of approximately 5 cm per hour for at least one hour. It shall then be subjected to the test described in 6.3.5.3.1.

6.3.5.3.5.2 Plastics material – Cold conditioning

Plastics primary receptacles or outer packagings: The temperature of the test sample and its contents shall be reduced to -18 °C or lower for a period of at least 24 hours and within 15 minutes of removal from that atmosphere the test sample shall be subjected to the test described in 6.3.5.3.1. Where the sample contains dry ice, the conditioning period shall be reduced to 4 hours.

6.3.5.3.5.3 Packagings intended to contain dry ice – Additional drop test

Where the packaging is intended to contain dry ice, a test additional to that specified in 6.3.5.3.1 and, when appropriate, in 6.3.5.3.5.1 or 6.3.5.3.5.2 shall be carried out. One sample shall be stored so that all the dry ice dissipates and then that sample shall be dropped in one of the orientations described in 6.3.5.3.2.1 or in 6.3.5.3.2.2, as appropriate; which shall be that most likely to result in failure of the packaging.

6.3.5.4 *Puncture test*

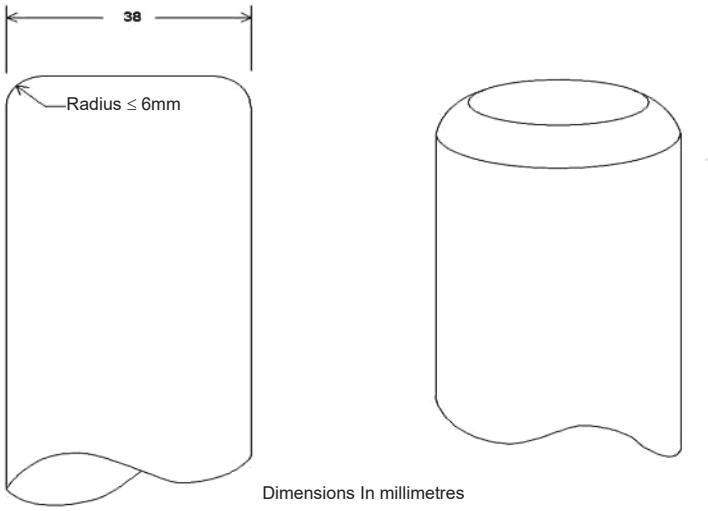
6.3.5.4.1 *Packagings with a gross mass of 7 kg or less*

Samples shall be placed on a level hard surface. A cylindrical steel rod with a mass of at least 7 kg, a diameter of 38 mm and the impact end edges a radius not exceeding 6 mm (see Figure 6.3.1), shall be dropped in a vertical free fall from a height of 1 m, measured from the impact end to the impact surface of the sample. One sample shall be placed on its base. A second sample shall be placed in an orientation perpendicular to that used for the first. In each instance the steel rod shall be aimed to impact the primary receptacle. Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s);

6.3.5.4.2 *Packagings with a gross mass exceeding 7 kg*

Samples shall be dropped on to the end of a cylindrical steel rod. The rod shall be set vertically in a level hard surface. It shall have a diameter of 38 mm and the edges of its upper end shall have a radius not exceeding 6 mm (see Figure 6.3.1). The rod shall protrude from the surface a distance at least equal to that between the centre of the primary receptacle(s) and the outer surface of the outer packaging with a minimum of 200 mm. One sample shall be dropped with its top face lowermost in a vertical free fall from a height of 1 m, measured from the top of the steel rod. A second sample shall be dropped from the same height in an orientation perpendicular to that used for the first. In each instance the packaging shall be so orientated that the steel rod would be capable of penetrating the primary receptacle(s). Following each impact, penetration of the secondary packaging is acceptable provided that there is no leakage from the primary receptacle(s).

Figure 6.3.1



6.3.5.5 ***Test report***

6.3.5.5.1 A written test report containing at least the following particulars shall be drawn up and shall be available to the users of the packaging:

1. Name and address of the test facility;
2. Name and address of applicant (where appropriate);
3. A unique test report identification;
4. Date of the test and of the report;
5. Manufacturer of the packaging;
6. Description of the packaging design type (e.g. dimensions, materials, closures, thickness, etc.), including method of manufacture (e.g. blow moulding) and which may include drawing(s) and/or photograph(s);
7. Maximum capacity;
8. Test contents;
9. Test descriptions and results;
10. The test report shall be signed with the name and status of the signatory.

6.3.5.5.2 The test report shall contain statements that the packaging prepared as for transport was tested in accordance with the appropriate requirements of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority.

CHAPTER 6.4

REQUIREMENTS FOR THE CONSTRUCTION, TESTING AND APPROVAL OF PACKAGES FOR RADIOACTIVE MATERIAL AND FOR THE APPROVAL OF SUCH MATERIAL

6.4.1 ***Reserved.***

6.4.2 General requirements

6.4.2.1 The package shall be so designed in relation to its mass, volume and shape that it can be easily and safely transported. In addition, the package shall be so designed that it can be properly secured in or on the conveyance during transport.

6.4.2.2 The design shall be such that any lifting attachments on the package will not fail when used in the intended manner and that, if failure of the attachments should occur, the ability of the package to meet other requirements of these Regulations would not be impaired. The design shall take account of appropriate safety factors to cover snatch lifting.

6.4.2.3 Attachments and any other features on the outer surface of the package which could be used to lift it shall be designed either to support its mass in accordance with the requirements of 6.4.2.2 or shall be removable or otherwise rendered incapable of being used during transport.

6.4.2.4 As far as practicable, the packaging shall be so designed that the external surfaces are free from protruding features and can be easily decontaminated.

6.4.2.5 As far as practicable, the outer layer of the package shall be so designed as to prevent the collection and the retention of water.

6.4.2.6 Any features added to the package at the time of transport which are not part of the package shall not reduce its safety.

6.4.2.7 The package shall be capable of withstanding the effects of any acceleration, vibration or vibration resonance which may arise under routine conditions of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole. In particular, nuts, bolts and other securing devices shall be so designed as to prevent them from becoming loose or being released unintentionally, even after repeated use.

6.4.2.8 The design of the package shall take into account ageing mechanisms.

6.4.2.9 The materials of the packaging and any components or structures shall be physically and chemically compatible with each other and with the radioactive contents. Account shall be taken of their behaviour under irradiation.

6.4.2.10 All valves through which the radioactive contents could escape shall be protected against unauthorized operation.

6.4.2.11 The design of the package shall take into account ambient temperatures and pressures that are likely to be encountered in routine conditions of transport.

6.4.2.12 A package shall be so designed that it provides sufficient shielding to ensure that, under routine conditions of transport and with the maximum radioactive contents that the package is designed to contain, the dose rate at any point on the external surface of the package would not exceed the values specified in 2.7.2.4.1.2, 4.1.9.1.11 and 4.1.9.1.12, as applicable, with account taken of 7.1.8.3.3 (b) and 7.2.3.1.2.

6.4.2.13 For radioactive material having other dangerous properties the package design shall take into account those properties; see 2.0.3.1, 2.0.3.2 and 4.1.9.1.5.

6.4.2.14 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for transport are capable of passing the applicable performance tests of this Chapter.

6.4.3 Additional requirements for packages transported by air

6.4.3.1 For packages to be transported by air, the temperature of the accessible surfaces shall not exceed 50 °C at an ambient temperature of 38 °C with no account taken for insolation.

6.4.3.2 Packages to be transported by air shall be so designed that, if they were exposed to ambient temperatures ranging from -40 °C to +55 °C, the integrity of containment would not be impaired.

6.4.3.3 Packages containing radioactive material, to be transported by air, shall be capable of withstanding, without loss or dispersal of radioactive contents from the containment system, an internal pressure which produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa.

6.4.4 Requirements for excepted packages

An excepted package shall be designed to meet the requirements specified in 6.4.2.1-6.4.2.13 and in addition, the requirements of 6.4.7.2 if it contains fissile material allowed by one of the provisions of 2.7.2.3.5 (a) to (f), and the requirements of 6.4.3 if carried by air.

6.4.5 Requirements for industrial packages

6.4.5.1 Type IP-1, IP-2, and IP-3 packages shall meet the requirements specified in 6.4.2 and 6.4.7.2, and, if appropriate, the additional requirements for packages transported by air specified in 6.4.3.

6.4.5.2 A Type IP-2 package shall, if it were subjected to the tests specified in 6.4.15.4 and 6.4.15.5, prevent:

(a) Loss or dispersal of the radioactive contents; and

(b) More than a 20 % increase in the maximum dose rate at any external surface of the package.

6.4.5.3 A Type IP-3 package shall meet all the requirements specified in 6.4.7.2 to 6.4.7.15.

6.4.5.4 *Alternative requirements for Type IP-2 and IP-3 packages*

6.4.5.4.1 Packages may be used as Type IP-2 package provided that:

(a) They satisfy the requirements of 6.4.5.1;

(b) They are designed to satisfy the requirements prescribed for packing group I or II in Chapter 6.1 of these Regulations; and

(c) When subjected to the tests required for packing group I or II in Chapter 6.1, they would prevent:

(i) loss or dispersal of the radioactive contents; and

(ii) more than a 20 % increase in the maximum dose rate at any external surface of the package.

6.4.5.4.2 Portable tanks may also be used as Type IP-2 or IP-3 packages, provided that:

(a) They satisfy the requirements of 6.4.5.1;

(b) They are designed to satisfy the requirements prescribed in Chapter 6.7 of these Regulations and are capable of withstanding a test pressure of 265 kPa; and

(c) They are designed so that any additional shielding which is provided shall be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing more than a 20 % increase in the maximum dose rate at any external surface of the portable tanks.

6.4.5.4.3 Tanks, other than portable tanks, may also be used as Type IP-2 or IP-3 package for transporting LSA-I and LSA-II as prescribed in Table 4.1.9.2.5, provided that:

(a) They satisfy the requirements of 6.4.5.1;

(b) They are designed to satisfy the requirements prescribed in regional or national regulations for the transport of dangerous goods and are capable of withstanding a test pressure of 265 kPa; and

(c) They are designed so that any additional shielding which is provided shall be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing more than a 20 % increase in the maximum dose rate at any external surface of the tanks.

6.4.5.4.4 Freight containers with the characteristics of a permanent enclosure may also be used as Type IP-2 or IP-3 package, provided that:

(a) The radioactive contents are restricted to solid materials;

(b) They satisfy the requirements of 6.4.5.1; and

(c) They are designed to conform to ISO 1496-1:1990 “Series 1 Freight Containers – Specifications and Testing – Part 1: General Cargo Containers” and subsequent amendments 1:1993, 2:1998, 3:2005, 4:2006 and 5:2006, excluding dimensions and ratings. They shall be designed such that if subjected to the tests prescribed in that document and the accelerations occurring during routine conditions of transport they would prevent:

(i) loss or dispersal of the radioactive contents; and

(ii) more than a 20 % increase in the maximum dose rate at any external surface of the freight containers.

6.4.5.4.5 Metal intermediate bulk containers may also be used as Type IP-2 or IP-3 package provided that:

(a) They satisfy the requirements of 6.4.5.1; and

(b) They are designed to satisfy the requirements prescribed in Chapter 6.5 of these Regulations for packing group I or II, and if they were subjected to the tests prescribed in that Chapter, but with the drop test conducted in the most damaging orientation, they would prevent:

(i) loss or dispersal of the radioactive contents; and

(ii) more than a 20 % increase in the maximum dose rate at any external surface of the intermediate bulk container.

6.4.6 Requirements for packages containing uranium hexafluoride

6.4.6.1 Packages designed to contain uranium hexafluoride shall meet the requirements which pertain to the radioactive and fissile properties of the material prescribed elsewhere in these Regulations. Except as allowed in 6.4.6.4, uranium hexafluoride in quantities of 0.1 kg or more shall also be packaged and transported in accordance with the provisions of ISO 7195:2005 "Nuclear Energy – Packaging of uranium hexafluoride (UF_6) for transport", and the requirements of 6.4.6.2 and 6.4.6.3.

6.4.6.2 Each package designed to contain 0.1 kg or more of uranium hexafluoride shall be designed so that the package would meet the following requirements:

(a) Withstand without leakage and without unacceptable stress, as specified in ISO 7195:2005, the structural test as specified in 6.4.21 except as allowed in 6.4.6.4;

(b) Withstand without loss or dispersal of the uranium hexafluoride the free drop test specified in 6.4.15.4; and

(c) Withstand without rupture of the containment system the thermal test specified in 6.4.17.3 except as allowed in 6.4.6.4.

6.4.6.3 Packages designed to contain 0.1 kg or more of uranium hexafluoride shall not be provided with pressure relief devices.

6.4.6.4 Subject to multilateral approval, packages designed to contain 0.1 kg or more of uranium hexafluoride may be transported if the packages are designed:

(a) to international or national standards other than ISO 7195:2005 provided an equivalent level of safety is maintained;

(b) to withstand without leakage and without unacceptable stress a test pressure of less than 2.76 MPa as specified in 6.4.21; and/or

(c) to contain 9 000 kg or more of uranium hexafluoride and the packages do not meet the requirement of 6.4.6.2 (c).

In all other respects the requirements specified in 6.4.6.1 to 6.4.6.3 shall be satisfied.

6.4.7 Requirements for Type A packages

6.4.7.1 Type A packages shall be designed to meet the general requirements of 6.4.2, the requirements of 6.4.3 if transported by air, and of 6.4.7.2 to 6.4.7.17.

6.4.7.2 The smallest overall external dimension of the package shall not be less than 10 cm.

6.4.7.3 The outside of the package shall incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evidence that it has not been opened.

6.4.7.4 Any tie-down attachments on the package shall be so designed that, under normal and accident conditions of transport, the forces in those attachments shall not impair the ability of the package to meet the requirements of these Regulations.

6.4.7.5 The design of the package shall take into account temperatures ranging from -40 °C to +70 °C for the components of the packaging. Attention shall be given to freezing temperatures for liquids and to the potential degradation of packaging materials within the given temperature range.

6.4.7.6 The design and manufacturing techniques shall be in accordance with national or international standards, or other requirements, acceptable to the competent authority.

6.4.7.7 The design shall include a containment system securely closed by a positive fastening device which cannot be opened unintentionally or by a pressure which may arise within the package.

6.4.7.8 Special form radioactive material may be considered as a component of the containment system.

6.4.7.9 If the containment system forms a separate unit of the package, the containment system shall be capable of being securely closed by a positive fastening device which is independent of any other part of the packaging.

6.4.7.10 The design of any component of the containment system shall take into account, where applicable, the radiolytic decomposition of liquids and other vulnerable materials and the generation of gas by chemical reaction and radiolysis.

6.4.7.11 The containment system shall retain its radioactive contents under a reduction of ambient pressure to 60 kPa.

6.4.7.12 All valves, other than pressure relief valves, shall be provided with an enclosure to retain any leakage from the valve.

6.4.7.13 A radiation shield which encloses a component of the package specified as a part of the containment system shall be so designed as to prevent the unintentional release of that component from the shield. Where the radiation shield and such component within it form a separate unit, the radiation shield shall be capable of being securely closed by a positive fastening device which is independent of any other packaging structure.

6.4.7.14 A package shall be so designed that if it were subjected to the tests specified in 6.4.15, it would prevent:

(a) Loss or dispersal of the radioactive contents; and

(b) More than a 20 % increase in the maximum dose rate at any external surface of the package.

6.4.7.15 The design of a package intended for liquid radioactive material shall make provision for ullage to accommodate variations in the temperature of the contents, dynamic effects and filling dynamics.

Type A packages to contain liquids

6.4.7.16 A Type A package designed to contain liquid radioactive material shall, in addition:

(a) Be adequate to meet the conditions specified in 6.4.7.14 (a) above if the package is subjected to the tests specified in 6.4.16; and

(b) Either

(i) be provided with sufficient absorbent material to absorb twice the volume of the liquid contents. Such absorbent material shall be suitably positioned so as to contact the liquid in the event of leakage; or

(ii) be provided with a containment system composed of primary inner and secondary outer containment components designed to enclose the liquid contents completely and ensure their retention, within the secondary outer containment components, even if the primary inner components leak.

Type A packages to contain gas

6.4.7.17 A Type A package designed for gases shall prevent loss or dispersal of the radioactive contents if the package were subjected to the tests specified in 6.4.16, except for a Type A package designed for tritium gas or for noble gases.

6.4.8 Requirements for Type B(U) packages

6.4.8.1 Type B(U) packages shall be designed to meet the requirements specified in 6.4.2, the requirements specified in 6.4.3 if carried by air, and of 6.4.7.2 to 6.4.7.15, except as specified in 6.4.7.14 (a), and, in addition, the requirements specified in 6.4.8.2 to 6.4.8.15.

6.4.8.2 A package shall be so designed that, under the ambient conditions specified in 6.4.8.5 and 6.4.8.6 heat generated within the package by the radioactive contents shall not, under normal conditions of transport, as demonstrated by the tests in 6.4.15, adversely affect the package in such a way that it would fail to meet the applicable requirements for containment and shielding if left unattended for a period of one week. Particular attention shall be paid to the effects of heat, which may cause one or more of the following:

(a) Alter the arrangement, the geometrical form or the physical state of the radioactive contents or, if the radioactive material is enclosed in a can or receptacle (for example, clad fuel elements), cause the can, receptacle or radioactive material to deform or melt;

(b) Lessening of the efficiency of the packaging through differential thermal expansion or cracking or melting of the radiation shielding material;

(c) In combination with moisture, accelerate corrosion.

6.4.8.3 A package shall be so designed that, under the ambient condition specified in 6.4.8.5 and in the absence of insolation, the temperature of the accessible surfaces of a package shall not exceed 50 °C, unless the package is transported under exclusive use.

6.4.8.4 Except as required in 6.4.3.1 for a package transported by air, the maximum temperature of any surface readily accessible during transport of a package under exclusive use shall not exceed 85 °C in the absence of insolation under the ambient conditions specified in 6.4.8.5. Account may be taken of barriers or screens intended to give protection to persons without the need for the barriers or screens being subject to any test.

6.4.8.5 The ambient temperature shall be assumed to be 38 °C.

6.4.8.6 The solar insolation conditions shall be assumed to be as specified in Table 6.4.8.6.

Table 6.4.8.6: Insolation data

Case	Form and location of surface	Insolation for 12 hours per day (W/m^2)
1	Flat surfaces transported horizontally-downward facing	0
2	Flat surfaces transported horizontally-upward facing	800
3	Surfaces transported vertically	200[a]
4	Other downward facing (not horizontal) surfaces	200[a]
5	All other surfaces	400[a]

[a] *Alternatively, a sine function may be used, with an absorption coefficient adopted and the effects of possible reflection from neighbouring objects neglected.*

6.4.8.7 A package which includes thermal protection for the purpose of satisfying the requirements of the thermal test specified in 6.4.17.3 shall be so designed that such protection will remain effective if the package is subjected to the tests specified in 6.4.15 and 6.4.17.2 (a) and (b) or 6.4.17.2 (b) and (c), as appropriate. Any such protection on the exterior of the package shall not be rendered ineffective by ripping, cutting, skidding, abrasion or rough handling.

6.4.8.8 A package shall be so designed that, if it were subjected to:

(a) The tests specified in 6.4.15, it would restrict the loss of radioactive contents to not more than 10^{-6} A_2 per hour; and

(b) The tests specified in 6.4.17.1, 6.4.17.2 (b), 6.4.17.3, and 6.4.17.4 and either the test in:

(i) 6.4.17.2 (c), when the package has a mass not greater than 500 kg, an overall density not greater than 1 000 kg/m^3 based on the external dimensions, and radioactive contents greater than 1 000 A_2 not as special form radioactive material; or

(ii) 6.4.17.2 (a), for all other packages;

it would meet the following requirements:

- Retain sufficient shielding to ensure that the dose rate at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents which the package is designed to contain; and

- Restrict the accumulated loss of radioactive contents in a period of one week to not more than 10 A_2 for krypton-85 and not more than A_2 for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of 2.7.2.2.4 to 2.7.2.2.6 shall apply except that for krypton-85 an effective A_2(i) value equal to 10 A_2 may be used. For case (a) above, the assessment shall take into account the external non-fixed contamination limits of 4.1.9.1.2.

6.4.8.9 A package for radioactive contents with activity greater than 10^5 A_2 shall be so designed that if it were subjected to the enhanced water immersion test specified in 6.4.18, there would be no rupture of the containment system.

6.4.8.10 Compliance with the permitted activity release limits shall depend neither upon filters nor upon a mechanical cooling system.

6.4.8.11 A package shall not include a pressure relief system from the containment system which would allow the release of radioactive material to the environment under the conditions of the tests specified in 6.4.15 and 6.4.17.

6.4.8.12 A package shall be so designed that if it were at the maximum normal operating pressure and it were subjected to the tests specified in 6.4.15 and 6.4.17, the level of strains in the containment system would not attain values which would adversely affect the package in such a way that it would fail to meet the applicable requirements.

6.4.8.13 A package shall not have a maximum normal operating pressure in excess of a gauge pressure of 700 kPa.

6.4.8.14 A package containing low dispersible radioactive material shall be so designed that any features added to the low dispersible radioactive material that are not part of it, or any internal components of the packaging shall not adversely affect the performance of the low dispersible radioactive material.

6.4.8.15 A package shall be designed for an ambient temperature range from -40 °C to +38 °C.

6.4.9 Requirements for Type B(M) packages

6.4.9.1 Type B(M) packages shall meet the requirements for Type B(U) packages specified in 6.4.8.1, except that for packages to be transported solely within a specified country or solely between specified countries, conditions other than those given in 6.4.7.5, 6.4.8.4 to 6.4.8.6, and 6.4.8.9 to 6.4.8.15 above may be assumed with the approval of the competent authorities of these countries. The requirements for Type B(U) packages specified in 6.4.8.4, 6.4.8.9 to 6.4.8.15 shall be met as far as practicable.

6.4.9.2 Intermittent venting of Type B(M) packages may be permitted during transport, provided that the operational controls for venting are acceptable to the relevant competent authorities.

6.4.10 Requirements for Type C packages

6.4.10.1 Type C packages shall be designed to meet the requirements specified in 6.4.2 and 6.4.3, and of 6.4.7.2 to 6.4.7.15, except as specified in 6.4.7.14 (a), and of the requirements specified in 6.4.8.2 to 6.4.8.6, 6.4.8.10 to 6.4.8.15, and, in addition, of 6.4.10.2 to 6.4.10.4.

6.4.10.2 A package shall be capable of meeting the assessment criteria prescribed for tests in 6.4.8.8 (b) and 6.4.8.12 after burial in an environment defined by a thermal conductivity of 0.33 W/(m·K) and a temperature of 38 °C in the steady state. Initial conditions for the assessment shall assume that any thermal insulation of the package remains intact, the package is at the maximum normal operating pressure and the ambient temperature is 38 °C.

6.4.10.3 A package shall be so designed that, if it were at the maximum normal operating pressure and subjected to:

(a) The tests specified in 6.4.15, it would restrict the loss of radioactive contents to not more than 10^{-6} A_2 per hour; and

(b) The test sequences in 6.4.20.1,

(i) it would retain sufficient shielding to ensure that the dose rate at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents which the package is designed to contain; and

(ii) it would restrict the accumulated loss of radioactive contents in a period of 1 week to not more than 10 A_2 for krypton-85 and not more than A_2 for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of 2.7.2.2.4 to 2.7.2.2.6 shall apply except that for krypton-85 an effective A_2(i) value equal to 10 A_2 may be used. For case (a) above, the assessment shall take into account the external contamination limits of 4.1.9.1.2.

6.4.10.4 A package shall be so designed that there will be no rupture of the containment system following performance of the enhanced water immersion test specified in 6.4.18.

6.4.11 Requirements for packages containing fissile material

6.4.11.1 Fissile material shall be transported so as to;

(a) Maintain subcriticality during routine, normal and accident conditions of transport; in particular, the following contingencies shall be considered:

(i) water leaking into or out of packages;

(ii) the loss of efficiency of built-in neutron absorbers or moderators;

(iii) rearrangement of the contents either within the package or as a result of loss from the package;

(iv) reduction of spaces within or between packages;

(v) packages becoming immersed in water or buried in snow; and

(vi) temperature changes; and

(b) Meet the requirements:

(i) of 6.4.7.2 except for unpackaged material when specifically allowed by 2.7.2.3.5 (e);

(ii) prescribed elsewhere in these Regulations which pertain to the radioactive properties of the material;

(iii) of 6.4.7.3 unless the material is excepted by 2.7.2.3.5;

(iv) of 6.4.11.4 to 6.4.11.14, unless the material is excepted by 2.7.2.3.5, 6.4.11.2 or 6.4.11.3.

6.4.11.2 Packages containing fissile material that meet the provisions of subparagraph (d) and one of the provisions of (a) to (c) below are excepted from the requirements of 6.4.11.4 to 6.4.11.14.

(a) Packages containing fissile material in any form provided that:

(i) The smallest external dimension of the package is not less than 10 cm;

(ii) The criticality safety index of the package is calculated using the following formula:

$$CSI = 50 \times 5 \times \left(\frac{\textit{Mass of U-235 in package (g)}}{Z} + \frac{\textit{Mass of other fissile nuclides * in package (g)}}{280} \right)$$

* Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package

where the values of Z are taken from Table 6.4.11.2.

(iii) The CSI of any package does not exceed 10;

(b) Packages containing fissile material in any form provided that:

(i) The smallest external dimension of the package is not less than 30 cm;

(ii) The package, after being subjected to the tests specified in 6.4.15.1 to 6.4.15.6;

- Retains its fissile material contents;
- Preserves the minimum overall outside dimensions of the package to at least 30 cm;
- Prevents the entry of a 10 cm cube.

(iii) The criticality safety index of the package is calculated using the following formula:

$$CSI = 50 \times 2 \times \left(\frac{\textit{Mass of U-235 in package (g)}}{Z} + \frac{\textit{Mass of other fissile nuclides * in package (g)}}{280} \right)$$

* Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package

where the values of Z are taken from Table 6.4.11.2.

(iv) The criticality safety index of any package does not exceed 10;

(c) Packages containing fissile material in any form provided that:

(i) The smallest external dimension of the package is not less than 10 cm;

(ii) The package, after being subjected to the tests specified in 6.4.15.1 to 6.4.15.6;

- Retains its fissile material contents;
- Preserves the minimum overall outside dimensions of the package to at least 10 cm;
- Prevents the entry of a 10 cm cube.

(iii) The CSI of the package is calculated using the following formula:

$$CSI = 50 \times 2 \times \left(\frac{Mass \text{ of U - 235 in package (g)}}{450} + \frac{Mass \text{ of other fissile nuclides * in package (g)}}{280} \right)$$

* Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package

(iv) The total mass of fissile nuclides in any package does not exceed 15 g;

(d) The total mass of beryllium, hydrogenous material enriched in deuterium, graphite and other allotropic forms of carbon in an individual package shall not be greater than the mass of fissile nuclides in the package except where the total concentration of these materials does not exceed 1 g in any 1 000 g of material. Beryllium incorporated in copper alloys up to 4 % in weight of the alloy does not need to be considered.

Table 6.4.11.2: Values of Z for calculation of criticality safety index in accordance with 6.4.11.2

Enrichement[a]	Z
Uranium enriched up to 1.5 %	2200
Uranium enriched up to 5 %	850
Uranium enriched up to 10 %	660
Uranium enriched up to 20 %	580
Uranium enriched up to 100 %	450

[a] *If a package contains uranium with varying enrichments ofU-235, then the value corresponding to the highest enrichment shall be used for Z.*

6.4.11.3 Packages containing not more than 1 000 g of plutonium are excepted from the application of 6.4.11.4 to 6.4.11.14 provided that:

(a) Not more than 20 % of the plutonium by mass is fissile nuclides;

(b) The criticality safety index of the package is calculated using the following formula:

$$CSI = 50 \times 2 \times \frac{\text{mass of plutonium (g)}}{1000}$$

(c) If uranium is present with the plutonium, the mass of uranium shall be no more than 1 % of the mass of the plutonium.

6.4.11.4 Where the chemical or physical form, isotopic composition, mass or concentration, moderation ratio or density, or geometric configuration is not known, the assessments of 6.4.11.8 to 6.4.11.13 shall be performed assuming that each parameter that is not known has the value which gives the maximum neutron multiplication consistent with the known conditions and parameters in these assessments.

6.4.11.5 For irradiated nuclear fuel the assessments of 6.4.11.8 to 6.4.11.13 shall be based on an isotopic composition demonstrated to provide either:

(a) The maximum neutron multiplication during the irradiation history; or

(b) A conservative estimate of the neutron multiplication for the package assessments. After irradiation but prior to shipment, a measurement shall be performed to confirm the conservatism of the isotopic composition.

6.4.11.6 The package, after being subjected to the tests specified in 6.4.15, shall:

(a) Preserve the minimum overall outside dimensions of the package to at least 10 cm; and

(b) Prevent the entry of a 10 cm cube.

6.4.11.7 The package shall be designed for an ambient temperature range of -40 °C to +38 °C unless the competent authority specifies otherwise in the certificate of approval for the package design.

6.4.11.8 For a package in isolation, it shall be assumed that water can leak into or out of all void spaces of the package, including those within the containment system. However, if the design incorporates special features to prevent such leakage of water into or out of certain void spaces, even as a result of error, absence of leakage may be assumed in respect of those void spaces. Special features shall include either of the following:

(a) Multiple high standard water barriers, not less than two of which would remain watertight if the package were subject to the tests prescribed in 6.4.11.13 (b), a high degree of quality control in the manufacture, maintenance and repair of packagings and tests to demonstrate the closure of each package before each shipment; or

(b) For packages containing uranium hexafluoride only, with maximum enrichment of 5 mass percent uranium-235:

(i) packages where, following the tests prescribed in 6.4.11.13 (b), there is no physical contact between the valve or the plug and any other component of the packaging other than at its original point of attachment and where, in addition, following the test prescribed in 6.4.17.3 the valves and the plug remain leaktight; and

(ii) a high degree of quality control in the manufacture, maintenance and repair of packagings coupled with tests to demonstrate closure of each package before each shipment.

6.4.11.9 It shall be assumed that the confinement system is closely reflected by at least 20 cm of water or such greater reflection as may additionally be provided by the surrounding material of the packaging. However, when it can be demonstrated that the confinement system remains within the packaging following the tests prescribed in 6.4.11.13 (b), close reflection of the package by at least 20 cm of water may be assumed in 6.4.11.10 (c).

6.4.11.10 The package shall be subcritical under the conditions of 6.4.11.8 and 6.4.11.9 with the package conditions that result in the maximum neutron multiplication consistent with:

(a) Routine conditions of transport (incident free);

(b) The tests specified in 6.4.11.12 (b);

(c) The tests specified in 6.4.11.13 (b).

6.4.11.11 For packages to be transported by air:

(a) The package shall be subcritical under conditions consistent with the Type C package tests specified in 6.4.20.1 assuming reflection by at least 20 cm of water but no water inleakage; and

(b) In the assessment of 6.4.11.10, use of special features as specified in 6.4.11.8 is allowed provided that leakage of water into or out of the void spaces is prevented when the package is submitted to the Type C package tests specified in 6.4.20.1 followed by the water leakage test specified in 6.4.19.3.

6.4.11.12 A number "N" shall be derived, such that five times "N" packages shall be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:

(a) There shall not be anything between the packages, and the package arrangement shall be reflected on all sides by at least 20 cm of water; and

(b) The state of the packages shall be their assessed or demonstrated condition if they had been subjected to the tests specified in 6.4.15.

6.4.11.13 A number "N" shall be derived, such that two times "N" packages shall be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:

(a) Hydrogenous moderation between packages, and the package arrangement reflected on all sides by at least 20 cm of water; and

(b) The tests specified in 6.4.15 followed by whichever of the following is the more limiting:

(i) the tests specified in 6.4.17.2 (b) and, either 6.4.17.2 (c) for packages having a mass not greater than 500 kg and an overall density not greater than 1 000 kg/m^3 based on the external dimensions, or 6.4.17.2 (a) for all other packages; followed by the test specified in 6.4.17.3 and completed by the tests specified in 6.4.19.1 to 6.4.19.3; or

(ii) the test specified in 6.4.17.4; and

(c) Where any part of the fissile material escapes from the containment system following the tests specified in 6.4.11.13 (b), it shall be assumed that fissile material escapes from each package in the array and all of the fissile material shall be arranged in the configuration and moderation that results in the maximum neutron multiplication with close reflection by at least 20 cm of water.

6.4.11.14 The criticality safety index (CSI) for packages containing fissile material shall be obtained by dividing the number 50 by the smaller of the two values of N derived in 6.4.11.12 and 6.4.11.13 (i.e. CSI = 50/N). The value of the criticality safety index may be zero, provided that an unlimited number of packages is subcritical (i.e. N is effectively equal to infinity in both cases).

6.4.12 Test procedures and demonstration of compliance

6.4.12.1 Demonstration of compliance with the performance standards required in 2.7.2.3.3.1, 2.7.2.3.3.2, 2.7.2.3.4.1, 2.7.2.3.4.2, 2.7.2.3.4.3 and 6.4.2 to 6.4.11 must be accomplished by any of the methods listed below or by a combination thereof.

(a) Performance of tests with specimens representing special form radioactive material, or low dispersible radioactive material or with prototypes or samples of the packaging, where the contents of the specimen or the packaging for the tests shall simulate as

closely as practicable the expected range of radioactive contents and the specimen or packaging to be tested shall be prepared as presented for transport;

(b) Reference to previous satisfactory demonstrations of a sufficiently similar nature;

(c) Performance of tests with models of appropriate scale incorporating those features which are significant with respect to the item under investigation when engineering experience has shown results of such tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as penetrator diameter or compressive load, shall be taken into account;

(d) Calculation, or reasoned argument, when the calculation procedures and parameters are generally agreed to be reliable or conservative.

6.4.12.2 After the specimen, prototype or sample has been subjected to the tests, appropriate methods of assessment shall be used to assure that the requirements for the test procedures have been fulfilled in compliance with the performance and acceptance standards prescribed in 2.7.2.3.3.1, 2.7.2.3.3.2, 2.7.2.3.4.1, 2.7.2.3.4.2, 2.7.2.3.4.3 and 6.4.2 to 6.4.11.

6.4.12.3 All specimens shall be inspected before testing in order to identify and record faults or damage including the following:

(a) Divergence from the design;

(b) Defects in manufacture;

(c) Corrosion or other deterioration; and

(d) Distortion of features.

The containment system of the package shall be clearly specified. The external features of the specimen shall be clearly identified so that reference may be made simply and clearly to any part of such specimen.

6.4.13 Testing the integrity of the containment system and shielding and evaluating criticality safety

After each test or group of tests or sequence of the applicable tests, as appropriate, specified in 6.4.15 to 6.4.21:

(a) Faults and damage shall be identified and recorded;

(b) It shall be determined whether the integrity of the containment system and shielding has been retained to the extent required in 6.4.2 to 6.4.11 for the package under test; and

(c) For packages containing fissile material, it shall be determined whether the assumptions and conditions used in the assessments required by 6.4.11.1 to 6.4.11.14 for one or more packages are valid.

6.4.14 Target for drop tests

The target for the drop tests specified in 2.7.2.3.3.5 (a), 6.4.15.4, 6.4.16 (a), 6.4.17.2 and 6.4.20.2 shall be a flat, horizontal surface of such a character that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase the damage to the specimen.

6.4.15 Test for demonstrating ability to withstand normal conditions of transport

6.4.15.1 The tests are: the water spray test, the free drop test, the stacking test and the penetration test. Specimens of the package shall be subjected to the free drop test, the stacking test and the penetration test,

preceded in each case by the water spray test. One specimen may be used for all the tests, provided that the requirements of 6.4.15.2 are fulfilled.

6.4.15.2 The time interval between the conclusion of the water spray test and the succeeding test shall be such that the water has soaked in to the maximum extent, without appreciable drying of the exterior of the specimen. In the absence of any evidence to the contrary, this interval shall be taken to be two hours if the water spray is applied from four directions simultaneously. No time interval shall elapse, however, if the water spray is applied from each of the four directions consecutively.

6.4.15.3 Water spray test: The specimen shall be subjected to a water spray test that simulates exposure to rainfall of approximately 5 cm per hour for at least one hour.

6.4.15.4 Free drop test: The specimen shall drop onto the target so as to suffer maximum damage in respect of the safety features to be tested.

(a) The height of the drop measured from the lowest point of the specimen to the upper surface of the target, shall be not less than the distance specified in Table 6.4.15.4 for the applicable mass. The target shall be as defined in 6.4.14;

(b) For rectangular fibreboard or wood packages not exceeding a mass of 50 kg, a separate specimen shall be subjected to a free drop onto each corner from a height of 0.3 m;

(c) For cylindrical fibreboard packages not exceeding a mass of 100 kg, a separate specimen shall be subjected to a free drop onto each of the quarters of each rim from a height of 0.3 m.

Table 6.4.15.4: Free drop distance for testing packages to normal conditions of transport

Package Mass (kg)	Free drop distance (m)
Package mass < 5 000	1.2
5 000 ≤ Package mass < 10 000	0.9
10 000 ≤ Package mass < 15 000	0.6
15 000 ≤ Package mass	0.3

6.4.15.5 Stacking test: Unless the shape of the packaging effectively prevents stacking, the specimen shall be subjected, for a period of 24 h, to a compressive load equal to the greater of the following:

(a) The equivalent of 5 times the maximum weight of the package; and

(b) The equivalent of 13 kPa multiplied by the vertically projected area of the package.

The load shall be applied uniformly to two opposite sides of the specimen, one of which shall be the base on which the package would typically rest.

6.4.15.6 Penetration test: The specimen shall be placed on a rigid, flat, horizontal surface which will not move significantly while the test is being carried out.

(a) A bar of 3.2 cm in diameter with a hemispherical end and a mass of 6 kg shall be dropped and directed to fall, with its longitudinal axis vertical, onto the centre of the weakest part of the specimen, so that, if it penetrates sufficiently far, it will hit the containment system. The bar shall not be significantly deformed by the test performance;

(b) The height of the drop of the bar, measured from its lower end to the intended point of impact on the upper surface of the specimen, shall be 1 m.

6.4.16 Additional tests for Type A packages designed for liquids and gases

A specimen or separate specimens shall be subjected to each of the following tests unless it can be demonstrated that one test is more severe for the specimen in question than the other, in which case one specimen shall be subjected to the more severe test.

(a) Free drop test: The specimen shall drop onto the target so as to suffer the maximum damage in respect of containment. The height of the drop measured from the lowest part of the specimen to the upper surface of the target shall be 9 m. The target shall be as defined in 6.4.14;

(b) Penetration test: The specimen shall be subjected to the test specified in 6.4.15.6 except that the height of drop shall be increased to 1.7 m from the 1 m specified in 6.4.15.6 (b).

6.4.17 Tests for demonstrating ability to withstand accident conditions in transport

6.4.17.1 The specimen shall be subjected to the cumulative effects of the tests specified in 6.4.17.2 and 6.4.17.3, in that order. Following these tests, either this specimen or a separate specimen shall be subjected to the effect(s) of the water immersion test(s) as specified in 6.4.17.4 and, if applicable, 6.4.18.

6.4.17.2 *Mechanical test:* The mechanical test consists of three different drop tests. Each specimen shall be subjected to the applicable drops as specified in 6.4.8.8 or 6.4.11.13. The order in which the specimen is subjected to the drops shall be such that, on completion of the mechanical test, the specimen shall have suffered such damage as will lead to the maximum damage in the thermal test which follows.

(a) For drop I, the specimen shall drop onto the target so as to suffer the maximum damage, and the height of the drop measured from the lowest point of the specimen to the upper surface of the target shall be 9 m. The target shall be as defined in 6.4.14;

(b) For drop II, the specimen shall drop onto a bar rigidly mounted perpendicularly on the target so as to suffer the maximum damage. The height of the drop measured from the intended point of impact of the specimen to the upper surface of the bar shall be 1 m. The bar shall be of solid mild steel of circular cross-section, (15.0 ± 0.5) cm in diameter and 20 cm long unless a longer bar would cause greater damage, in which case a bar of sufficient length to cause maximum damage shall be used. The upper end of the bar shall be flat and horizontal with its edge rounded off to a radius of not more than 6 mm. The target on which the bar is mounted shall be as described in 6.4.14;

(c) For drop III, the specimen shall be subjected to a dynamic crush test by positioning the specimen on the target so as to suffer maximum damage by the drop of a 500 kg mass from 9 m onto the specimen. The mass shall consist of a solid mild steel plate 1 m by 1 m and shall fall in a horizontal attitude. The height of the drop shall be measured from the underside of the plate to the highest point of the specimen. The target on which the specimen rests shall be as defined in 6.4.14. The lower face of the steel plate shall have its edges and corners rounded off to a radius of not more than 6 mm.

6.4.17.3 *Thermal test:* The specimen shall be in thermal equilibrium under conditions of an ambient temperature of 38 °C, subject to the solar insolation conditions specified in Table 6.4.8.6 and subject to the design maximum rate of internal heat generation within the package from the radioactive contents. Alternatively, any of these parameters are allowed to have different values prior to and during the test, providing due account is taken of them in the subsequent assessment of package response.

The thermal test shall then consist of:

(a) Exposure of a specimen for a period of 30 minutes to a thermal environment which provides a heat flux at least equivalent to that of a hydrocarbon fuel/air fire in sufficiently quiescent ambient conditions to give a minimum average flame emissivity coefficient of 0.9 and an average temperature of at least 800 °C, fully engulfing the

specimen, with a surface absorbtivity coefficient of 0.8 or that value which the package may be demonstrated to possess if exposed to the fire specified, followed by;

(b) Exposure of the specimen to an ambient temperature of 38 °C, subject to the solar insolation conditions specified in Table 6.4.8.6 and subject to the design maximum rate of internal heat generation within the package by the radioactive contents for a sufficient period to ensure that temperatures in the specimen are decreasing in all parts of the specimen and/or are approaching initial steady state conditions. Alternatively, any of these parameters are allowed to have different values following cessation of heating, providing due account is taken of them in the subsequent assessment of package response.

During and following the test the specimen shall not be artificially cooled and any combustion of materials of the specimen shall be permitted to proceed naturally.

6.4.17.4 *Water immersion test:* The specimen shall be immersed under a head of water of at least 15 m for a period of not less than eight hours in the attitude which will lead to maximum damage. For demonstration purposes, an external gauge pressure of at least 150 kPa shall be considered to meet these conditions.

6.4.18 Enhanced water immersion test for Type B(U) and Type B(M) packages containing more than 10^5 A_2 and Type C packages

Enhanced water immersion test: The specimen shall be immersed under a head of water of at least 200 m for a period of not less than one hour. For demonstration purposes, an external gauge pressure of at least 2 MPa shall be considered to meet these conditions.

6.4.19 Water leakage test for packages containing fissile material

6.4.19.1 Packages for which water in-leakage or out-leakage to the extent which results in greatest reactivity has been assumed for purposes of assessment under 6.4.11.8 to 6.4.11.13 shall be excepted from the test.

6.4.19.2 Before the specimen is subjected to the water leakage test specified below, it shall be subjected to the tests in 6.4.17.2 (b), and either 6.4.17.2 (a) or (c) as required by 6.4.11.13, and the test specified in 6.4.17.3.

6.4.19.3 The specimen shall be immersed under a head of water of at least 0.9 m for a period of not less than eight hours and in the attitude for which maximum leakage is expected.

6.4.20 Tests for Type C packages

6.4.20.1 Specimens shall be subjected to the effects of each of the following test sequences in the orders specified:

(a) The tests specified in 6.4.17.2 (a), 6.4.17.2 (c), 6.4.20.2 and 6.4.20.3; and

(b) The test specified in 6.4.20.4.

Separate specimens are allowed to be used for each of the sequences (a) and (b).

6.4.20.2 *Puncture/tearing test:* The specimen shall be subjected to the damaging effects of a vertical solid probe made of mild steel. The orientation of the package specimen and the impact point on the package surface shall be such as to cause maximum damage at the conclusion of the test sequence specified in 6.4.20.1 (a).

(a) The specimen, representing a package having a mass less than 250 kg, shall be placed on a target and subjected to a probe having a mass of 250 kg falling from a height of 3 m above the intended impact point. For this test the probe shall be a 20 cm diameter cylindrical bar with the striking end forming a frustum of a right circular cone with the

following dimensions: 30 cm height and 2.5 cm in diameter at the top with its edge rounded off to a radius of not more than 6 mm. The target on which the specimen is placed shall be as specified in 6.4.14;

(b) For packages having a mass of 250 kg or more, the base of the probe shall be placed on a target and the specimen dropped onto the probe. The height of the drop, measured from the point of impact with the specimen to the upper surface of the probe shall be 3 m. For this test the probe shall have the same properties and dimensions as specified in (a) above, except that the length and mass of the probe shall be such as to incur maximum damage to the specimen. The target on which the base of the probe is placed shall be as specified in 6.4.14.

6.4.20.3 *Enhanced thermal test:* The conditions for this test shall be as specified in 6.4.17.3, except that the exposure to the thermal environment shall be for a period of 60 minutes.

6.4.20.4 *Impact test:* The specimen shall be subject to an impact on a target at a velocity of not less than 90 m/s, at such an orientation as to suffer maximum damage. The target shall be as defined in 6.4.14, except that the target surface may be at any orientation as long as the surface is normal to the specimen path.

6.4.21 Tests for packagings designed to contain uranium hexafluoride

Specimens that comprise or simulate packagings designed to contain 0.1 kg or more of uranium hexafluoride shall be tested hydraulically at an internal pressure of at least 1.38 MPa but, when the test pressure is less than 2.76 MPa, the design shall require multilateral approval. For retesting packagings, any other equivalent non-destructive testing may be applied subject to multilateral approval.

6.4.22 Approvals of package designs and materials

6.4.22.1 The approval of designs for packages containing 0.1 kg or more of uranium hexafluoride requires that:

(a) Each design that meets the requirements of 6.4.6.4 shall require multilateral approval;

(b) Each design that meets the requirements of 6.4.6.1 to 6.4.6.3 shall require unilateral approval by the competent authority of the country of origin of the design, unless multilateral approval is otherwise required by these Regulations.

6.4.22.2 Each Type B(U) and Type C package design shall require unilateral approval, except that:

(a) A package design for fissile material, which is also subject to 6.4.22.4, 6.4.23.7, and 5.1.5.2.1 shall require multilateral approval; and

(b) A Type B(U) package design for low dispersible radioactive material shall require multilateral approval.

6.4.22.3 Each Type B(M) package design, including those for fissile material which are also subject to 6.4.22.4, 6.4.23.7 and 5.1.5.2.1 and those for low dispersible radioactive material, shall require multilateral approval.

6.4.22.4 Each package design for fissile material which is not excepted by any of the paragraphs 2.7.2.3.5 (a) to (f), 6.4.11.2 and 6.4.11.3 shall require multilateral approval.

6.4.22.5 The design for special form radioactive material shall require unilateral approval. The design for low dispersible radioactive material shall require multilateral approval (see also 6.4.23.8).

6.4.22.6 The design for a fissile material excepted from “FISSILE” classification in accordance with 2.7.2.3.5 (f) shall require multilateral approval.

6.4.22.7 Alternative activity limits for an exempt consignment of instruments or articles in accordance with 2.7.2.2.2(b) shall require multilateral approval.

6.4.23 Applications and approvals for radioactive material transport

6.4.23.1 *Reserved.*

6.4.23.2 An application for approval of shipment shall include:

(a) The period of time, related to the shipment, for which the approval is sought;

(b) The actual radioactive contents, the expected modes of transport, the type of conveyance, and the probable or proposed route; and

(c) The details of how the precautions and administrative or operational controls, referred to in the certificate of approval for the package design, if applicable, issued under 5.1.5.2.1 (a) (iii), (vi) or (vii), are to be put into effect.

6.4.23.2.1 An application for approval of SCO-III shipments shall include:

(a) A statement of the respects in which, and of the reasons why, the consignment is considered SCO-III;

(b) Justification for choosing SCO-III by demonstrating that:

(i) No suitable packaging currently exists;

(ii) Designing and/or constructing a packaging or segmenting the object is not practically, technically or economically feasible;

(iii) No other viable alternative exists;

(c) A detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted;

(d) A detailed statement of the design of the SCO-III, including complete engineering drawings and schedules of materials and methods of manufacture;

(e) All information necessary to satisfy the competent authority that the requirements of 4.1.9.2.4 (e) and the requirements of 7.1.8.2, if applicable, are satisfied;

(f) A transport plan;

(g) A specification of the applicable management system as required in 1.5.3.1.

6.4.23.3 An application for approval of shipments under special arrangement shall include all the information necessary to satisfy the competent authority that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of these Regulations had been met.

The application shall also include:

(a) A statement of the respects in which, and of the reasons why, the shipment cannot be made in full accordance with the applicable requirements; and

(b) A statement of any special precautions or special administrative or operational controls which are to be employed during transport to compensate for the failure to meet the applicable requirements.

6.4.23.4 An application for approval of Type B(U) or Type C package design shall include:

(a) A detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted;

(b) A detailed statement of the design, including complete engineering drawings and schedules of materials and methods of manufacture;

(c) A statement of the tests which have been done and their results, or evidence based on calculative methods or other evidence that the design is adequate to meet the applicable requirements;

(d) The proposed operating and maintenance instructions for the use of the packaging;

(e) If the package is designed to have a maximum normal operating pressure in excess of 100 kPa gauge, a specification of the materials of manufacture of the containment system, the samples to be taken, and the tests to be made;

(f) If the package is to be used for shipment after storage, a justification of considerations to ageing mechanisms in the safety analysis and within the proposed operating and maintenance instructions;

(g) Where the proposed radioactive contents are irradiated nuclear fuel, a statement and a justification of any assumption in the safety analysis relating to the characteristics of the fuel and a description of any pre-shipment measurement as required by 6.4.11.5 (b);

(h) Any special stowage provisions necessary to ensure the safe dissipation of heat from the package considering the various modes of transport to be used and type of conveyance or freight container;

(i) A reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package;

(j) A specification of the applicable management system as required by 1.5.3.1; and

(k) For packages which are to be used for shipment after storage, a gap analysis programme describing a systematic procedure for a periodic evaluation of changes of Regulations, changes in technical knowledge and changes of the state of the package design during storage.

6.4.23.5 An application for approval of a Type B(M) package design shall include, in addition to the general information required in 6.4.23.4 for Type B(U) packages:

(a) A list of the requirements specified in 6.4.7.5, 6.4.8.4 to 6.4.8.6 and 6.4.8.9 to 6.4.8.15 with which the package does not conform;

(b) Any proposed supplementary operational controls to be applied during transport not regularly provided for in these Regulations, but which are necessary to ensure the safety of the package or to compensate for the deficiencies listed in (a) above;

(c) A statement relative to any restrictions on the mode of transport and to any special loading, carriage, unloading or handling procedures; and

(d) A statement of the range of ambient conditions (temperature, solar radiation) which are expected to be encountered during transport and which have been taken into account in the design.

6.4.23.6 The application for approval of designs for packages containing 0.1 kg or more of uranium hexafluoride shall include all information necessary to satisfy the competent authority that the design meets

the applicable requirements 6.4.6.1, and a specification of the applicable management system as required in 1.5.3.1.

6.4.23.7 An application for a fissile package approval shall include all information necessary to satisfy the competent authority that the design meets the applicable requirements of 6.4.11.1, and a specification of the applicable management system as required by 1.5.3.1.

6.4.23.8 An application for approval of design for special form radioactive material and design for low dispersible radioactive material shall include:

(a) A detailed description of the radioactive material or, if a capsule, the contents; particular reference shall be made to both physical and chemical states;

(b) A detailed statement of the design of any capsule to be used;

(c) A statement of the tests which have been done and their results, or evidence based on calculations to show that the radioactive material is capable of meeting the performance standards, or other evidence that the special form radioactive material or low dispersible radioactive material meets the applicable requirements of these Regulations;

(d) A specification of the applicable management system as required in 1.5.3.1; and

(e) Any proposed pre-shipment actions for use in the consignment of special form radioactive material or low dispersible radioactive material.

6.4.23.9 An application for approval of design for fissile material excepted from "FISSILE" classification in accordance with Table 2.7.2.1.1, under 2.7.2.3.5 (f) shall include:

(a) A detailed description of the material; particular reference shall be made to both physical and chemical states;

(b) A statement of the tests that have been carried out and their results, or evidence based on calculation methods to show that the material is capable of meeting the requirements specified in 2.7.2.3.6;

(c) A specification of the applicable management system as required in 1.5.3.1;

(d) A statement of specific actions to be taken prior to shipment.

6.4.23.10 An application for approval of alternative activity limits for an exempt consignment of instruments or articles shall include:

(a) An identification and detailed description of the instrument or article, its intended uses and the radionuclide(s) incorporated;

(b) The maximum activity of the radionuclide(s) in the instrument or article;

(c) Maximum external dose rates arising from the instrument or article;

(d) The chemical and physical forms of the radionuclide(s) contained in the instrument or article;

(e) Details of the construction and design of the instrument or article, particularly as related to the containment and shielding of the radionuclide in routine, normal and accident conditions of transport;

(f) The applicable management system, including the quality testing and verification procedures to be applied to radioactive sources, components and finished products to ensure that the maximum specified activity of radioactive material or the maximum dose

rates specified for the instrument or article are not exceeded, and that the instruments or articles are constructed according to the design specifications;

(g) The maximum number of instruments or articles expected to be shipped per consignment and annually;

(h) Dose assessments in accordance with the principles and methodologies set out in the Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014), including individual doses to transport workers and members of the public and, if appropriate, collective doses arising from routine, normal and accident conditions of transport, based on representative transport scenarios the consignments are subject to.

6.4.23.11 Each certificate of approval issued by a competent authority shall be assigned an identification mark. The mark shall be of the following generalized type:

VRI/Number/Type Code

(a) Except as provided in 6.4.23.12 (b), VRI represents the distinguishing sign used on vehicles in international road traffic[1];

(b) The number shall be assigned by the competent authority, and shall be unique and specific with regard to the particular design or shipment or alternative activity limit for exempt consignment. The identification mark of the approval of shipment shall be clearly related to the identification mark of the approval of design;

(c) The following type codes shall be used in the order listed to indicate the types of certificate of approval issued:

AF Type A package design for fissile material
B(U) Type B(U) package design (B(U)F if for fissile material)
B(M) Type B(M) package design (B(M)F if for fissile material)
C Type C package design (CF if for fissile material)
IF Industrial package design for fissile material
S Special form radioactive material
LD Low dispersible radioactive material
FE Fissile material complying with the requirements of 2.7.2.3.6
T Shipment
X Special arrangement
AL Alternative activity limits for an exempt consignment of instruments or articles

In the case of package designs for non-fissile or fissile excepted uranium hexafluoride, where none of the above codes apply, then the following type codes shall be used:

H(U) Unilateral approval
H(M) Multilateral approval;

6.4.23.12 These identification marks shall be applied as follows:

(a) Each certificate and each package shall bear the appropriate identification mark, comprising the symbols prescribed in 6.4.23.11 (a), (b) and (c) above, except that, for packages, only the applicable design type codes shall appear following the second stroke, that is, the “T” or “X” shall not appear in the identification mark on the package.

[1] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

Where the approval of design and the approval of shipment are combined, the applicable type codes do not need to be repeated. For example:

A/132/B(M)F: A Type B(M) package design approved for fissile material, requiring multilateral approval, for which the competent authority of Austria has assigned the design number 132 (to be marked on both the package and on the certificate of approval for the package design);

A/132/B(M)FT: The approval of shipment issued for a package bearing the identification mark elaborated above (to be marked on the certificate only);

A/137/X: An approval of special arrangement approval issued by the competent authority of Austria, to which the number 137 has been assigned (to be marked on the certificate only);

A/139/IF: An Industrial package design for fissile material approved by the competent authority of Austria, to which package design number 139 has been assigned (to be marked on both the package and on the certificate of approval for the package design); and

A/145/H(U): A package design for fissile excepted uranium hexafluoride approved by the competent authority of Austria, to which package design number 145 has been assigned (to be marked on both the package and on the certificate of approval for the package design);

(b) Where multilateral approval is effected by validation in accordance with 6.4.23.20, only the identification mark issued by the country of origin of the design or shipment shall be used. Where multilateral approval is effected by issue of certificates by successive countries, each certificate shall bear the appropriate identification mark and the package whose design was so approved shall bear all appropriate identification marks.

For example:

A/132/B(M)F
CH/28/B(M)F

would be the identification mark of a package which was originally approved by Austria and was subsequently approved, by separate certificate, by Switzerland. Additional identification marks would be tabulated in a similar manner on the package;

(c) The revision of a certificate shall be indicated by a parenthetical expression following the identification mark on the certificate. For example, A/132/B(M)F (Rev.2) would indicate revision 2 of the Austrian certificate of approval for the package design; or A/132/B(M)F (Rev.0) would indicate the original issuance of the Austrian certificate of approval for the package design. For original issuances, the parenthetical entry is optional and other words such as “original issuance” may also be used in place of “Rev.0”. Certificate revision numbers may only be issued by the country issuing the original certificate of approval;

(d) Additional symbols (as may be necessitated by national requirements) may be added in brackets to the end of the identification mark; for example, A/132/B(M)F (SP503);

(e) It is not necessary to alter the identification mark on the packaging each time that a revision to the design certificate is made. Such re-marking shall be required only in those cases where the revision to the package design certificate involves a change in the letter type codes for the package design following the second stroke.

6.4.23.13 Each certificate of approval issued by a competent authority for special form radioactive material or low dispersible radioactive material shall include the following information:

(a) Type of certificate;

(b) The competent authority identification mark;

(c) The issue date and an expiry date;

(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special form radioactive material or low dispersible radioactive material is approved;

(e) The identification of the special form radioactive material or low dispersible radioactive material;

(f) A description of the special form radioactive material or low dispersible radioactive material;

(g) Design specifications for the special form radioactive material or low dispersible radioactive material which may include references to drawings;

(h) A specification of the radioactive contents which includes the activities involved and which may include the physical and chemical form;

(i) A specification of the applicable management system as required in 1.5.3.1;

(j) Reference to information provided by the applicant relating to specific actions to be taken prior to shipment;

(k) If deemed appropriate by the competent authority, reference to the identity of the applicant;

(l) Signature and identification of the certifying official.

6.4.23.14 Each certificate of approval issued by a competent authority for material excepted from classification as “FISSILE” shall include the following information:

(a) Type of certificate;

(b) The competent authority identification mark;

(c) The issue date and an expiry date;

(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the exception is approved;

(e) A description of the excepted material;

(f) Limiting specifications for the excepted material;

(g) A specification of the applicable management system as required in 1.5.3.1;

(h) Reference to information provided by the applicant relating to specific actions to be taken prior to shipment;

(i) If deemed appropriate by the competent authority, reference to the identity of the applicant;

(j) Signature and identification of the certifying official;

(k) Reference to documentation that demonstrates compliance with 2.7.2.3.6.

6.4.23.15 Each certificate of approval issued by a competent authority for a special arrangement shall include the following information:

(a) Type of certificate;

(b) The competent authority identification mark;

(c) The issue date and an expiry date;

(d) Mode(s) of transport;

(e) Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routeing instructions;

(f) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special arrangement is approved;

(g) The following statement: “This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.”;

(h) References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority;

(i) Description of the packaging by a reference to the drawings or a specification of the design. If deemed appropriate by the competent authority, a reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package shall also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general outside dimensions and appearance;

(j) A specification of the authorized radioactive contents, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material or for each fissile nuclide when appropriate), and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under 2.7.2.3.5 (f) if applicable;

(k) Additionally, for packages containing fissile material:

(i) a detailed description of the authorized radioactive contents;

(ii) the value of the criticality safety index;

(iii) reference to the documentation that demonstrates the criticality safety of the package;

(iv) any special features, on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;

(v) any allowance (based on 6.4.11.5 (b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and

(vi) the ambient temperature range for which the special arrangement has been approved;

(l) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat;

(m) If deemed appropriate by the competent authority, reasons for the special arrangement;

(n) Description of the compensatory measures to be applied as a result of the shipment being under special arrangement;

(o) Reference to information provided by the applicant relating to the use of the packaging or specific actions to be taken prior to the shipment;

(p) A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in 6.4.8.5, 6.4.8.6, and 6.4.8.15, as applicable;

(q) Any emergency arrangements deemed necessary by the competent authority;

(r) A specification of the applicable management system as required in 1.5.3.1;

(s) If deemed appropriate by the competent authority, reference to the identity of the applicant and to the identity of the carrier;

(t) Signature and identification of the certifying official.

6.4.23.16 Each certificate of approval for a shipment issued by a competent authority shall include the following information:

(a) Type of certificate;

(b) The competent authority identification mark(s);

(c) The issue date and an expiry date;

(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the shipment is approved;

(e) Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routeing instructions;

(f) The following statement: “This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.”;

(g) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat or maintenance of criticality safety;

(h) Reference to information provided by the applicant relating to specific actions to be taken prior to the shipment;

(i) Reference to the applicable certificate(s) of approval of design;

(j) A specification of the actual radioactive contents, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the total activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material or for

each fissile nuclide when appropriate), and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under 2.7.2.3.5 (f) if applicable;

(k) Any emergency arrangements deemed necessary by the competent authority;

(l) A specification of the applicable management system as required in 1.5.3.1;

(m) If deemed appropriate by the competent authority, reference to the identity of the applicant;

(n) Signature and identification of the certifying official.

6.4.23.17 Each certificate of approval of the design of a package issued by a competent authority shall include the following information:

(a) Type of certificate;

(b) The competent authority identification mark;

(c) The issue date and an expiry date;

(d) Any restriction on the modes of transport, if appropriate;

(e) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the design is approved;

(f) The following statement: “This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.”;

(g) References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority;

(h) A statement authorizing shipment where approval of shipment is required under 5.1.5.1.2, if deemed appropriate;

(i) Identification of the packaging;

(j) Description of the packaging by a reference to the drawings or specification of the design. If deemed appropriate by the competent authority, a reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package shall also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general outside dimensions and appearance;

(k) Specification of the design by reference to the drawings;

(l) A specification of the authorized radioactive content, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This shall include the physical and chemical forms, the activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material the total mass of fissile nuclides or the mass for each fissile nuclide, when appropriate) and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under 2.7.2.3.5 (f), if applicable;

(m) A description of the containment system;

(n) For package designs containing fissile material which require multilateral approval of the package design in accordance with 6.4.22.4:

(i) a detailed description of the authorized radioactive contents;

(ii) a description of the confinement system;

(iii) the value of the criticality safety index;

(iv) reference to the documentation that demonstrates the criticality safety of the package;

(v) any special features, on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;

(vi) any allowance (based on 6.4.11.5 (b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and

(vii) the ambient temperature range for which the package design has been approved;

(o) For Type B(M) packages, a statement specifying those prescriptions of 6.4.7.5, 6.4.8.4, 6.4.8.5, 6.4.8.6 and 6.4.8.9 to 6.4.8.15 with which the package does not conform and any amplifying information which may be useful to other competent authorities;

(p) For package designs subject to 6.4.24.2, a statement specifying those requirements of the current regulations with which the package does not conform;

(q) For packages containing more than 0.1 kg of uranium hexafluoride, a statement specifying those prescriptions of 6.4.6.4 which apply if any and any amplifying information which may be useful to other competent authorities;

(r) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat;

(s) Reference to information provided by the applicant relating to the use of the packaging or specific actions to be taken prior to shipment;

(t) A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in 6.4.8.5, 6.4.8.6 and 6.4.8.15, as applicable;

(u) A specification of the applicable management system as required in 1.5.3.1;

(v) Any emergency arrangements deemed necessary by the competent authority;

(w) If deemed appropriate by the competent authority, reference to the identity of the applicant;

(x) Signature and identification of the certifying official.

6.4.23.18 Each certificate issued by a competent authority for alternative activity limits for an exempt consignment of instruments or articles according to 5.1.5.2.1 (d) shall include the following information:

(a) Type of certificate;

(b) The competent authority identification mark;

(c) The issue date and an expiry date;

(d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the exemption is approved;

(e) The identification of the instrument or article;

(f) A description of the instrument or article;

(g) Design specifications for the instrument or article;

(h) A specification of the radionuclide(s), the approved alternative activity limit(s) for the exempt consignment(s) of the instrument(s) or article(s);

(i) Reference to documentation that demonstrates compliance with 2.7.2.2.2 (b);

(j) If deemed appropriate by the competent authority, reference to the identity of the applicant;

(k) Signature and identification of the certifying official.

6.4.23.19 The competent authority shall be informed of the serial number of each packaging manufactured to a design approved by them under 6.4.22.2, 6.4.22.3, 6.4.22.4 and 6.4.24.2.

6.4.23.20 Multilateral approval may be by validation of the original certificate issued by the competent authority of the country of origin of the design or shipment. Such validation may take the form of an endorsement on the original certificate or the issuance of a separate endorsement, annex, supplement, etc., by the competent authority of the country through or into which the shipment is made.

6.4.24 Transitional measures for Class 7

Packages not requiring competent authority approval of design under the 1985, 1985 (as amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 and 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material

6.4.24.1 Packages not requiring competent authority approval of design (excepted packages, Type IP-1, Type IP-2, Type IP-3 and Type A packages) shall meet these Regulations in full, except that:

(a) Packages that meet the requirements of the 1985 or 1985 (as amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material:

(i) May continue in transport provided that they were prepared for transport prior to 31 December 2003 and subject to the requirements of 6.4.24.5, if applicable; or

(ii) May continue to be used, provided that all the following conditions are met:

- They were not designed to contain uranium hexafluoride;
- The applicable requirements of 1.5.3.1 of these Regulations are applied;
- The activity limits and classification in Chapter 2.7 of these Regulations are applied;
- The requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Regulations are applied; and
- The packaging was not manufactured or modified after 31 December 2003;

(b) Packages that meet the requirements of the 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material:

(i) May continue in transport provided that they were prepared for transport prior to 31 December 2025 and are subject to the requirements of 6.4.24.5, if applicable; or

(ii) May continue to be used, provided that all the following conditions are met:

- The applicable requirements of 1.5.3.1 of these Regulations are applied;
- The activity limits and classification in Chapter 2.7 of these Regulations are applied;
- The requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Regulations are applied; and
- The packaging was not manufactured or modified after 31 December 2025.

Package designs approved under the 1985, 1985 (as amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 and 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material

6.4.24.2 Packages requiring competent authority approval of the design shall meet these Regulations in full except that:

(a) Packagings that were manufactured to a package design approved by the competent authority under the provisions of the 1985 or 1985 (as amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material may continue to be used provided that all of the following conditions are met:

(i) The package design is subject to multilateral approval;

(ii) The applicable requirements of 1.5.3.1 of these Regulations are applied;

(iii) The activity limits and classification in Chapter 2.7 of these Regulations are applied;

(iv) The requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Regulations are applied;

(v) For a package containing fissile material and transported by air, the requirement of 6.4.11.11 is met;

(b) Packagings that were manufactured to a package design approved by the competent authority under the provisions of the 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material may continue to be used provided that all of the following conditions are met:

(i) The package design is subject to multilateral approval after 31 December 2025;

(ii) The applicable requirements of 1.5.3.1 of these Regulations are applied;

(iii) The activity limits and material restrictions of Chapter 2.7 of these Regulations are applied;

(iv) The requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Regulations are applied.

6.4.24.3 No new manufacture of packagings to a package design meeting the provisions of the 1985, and 1985 (as amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material shall be permitted to commence.

6.4.24.4 No new manufacture of packagings of a package design meeting the provisions of the 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material shall be permitted to commence after 31 December 2028.

Packages excepted from the requirements for fissile materials under the Regulations annexed to the 16th revised edition or the seventeenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods (2009 edition of the IAEA Regulations for the Safe Transport of Radioactive Material)

6.4.24.5 Packages containing fissile material that is excepted from classification as "FISSILE" according to 2.7.2.3.5 (a)(i) or (iii) of the Regulations annexed to the sixteenth revised edition or the seventeenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods (paras. 417 (a) (i) or (iii) of the 2009 edition of the IAEA Regulations for the Safe Transport of Radioactive Material) prepared for transport before 31 December 2014 may continue in transport and may continue to be classified as non-fissile or fissile-excepted except that the consignment limits in Table 2.7.2.3.5 of these editions shall apply to the conveyance. The consignment shall be transported under exclusive use.

Special form radioactive material approved under the 1985, 1985 (as amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 and 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material

6.4.24.6 Special form radioactive material manufactured to a design which had received unilateral approval by the competent authority under the 1985, 1985 (as amended 1990) , 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material may continue to be used when in compliance with the mandatory management system in accordance with the applicable requirements of 1.5.3.1. There shall be no new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1985 or 1985 (as amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material. No new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material shall be permitted to commence after 31 December 2025.

CHAPTER 6.5

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF INTERMEDIATE BULK CONTAINERS

6.5.1 General requirements

6.5.1.1 *Scope*

6.5.1.1.1 The requirements of this Chapter apply to IBCs intended for the transport of certain dangerous goods. The provisions set out general requirements for multimodal transport and do not establish special requirements that may be required for a particular mode.

6.5.1.1.2 The requirements for IBCs in 6.5.3 are based on IBCs currently in use. In order to take into account progress in science and technology, there is no objection to the use of IBCs having specifications different from those in 6.5.3 and 6.5.5, provided that they are equally effective, acceptable to the competent authority and able to successfully fulfil the requirements described in 6.5.4 and 6.5.6. Methods of inspection and testing other than those described in these Regulations are acceptable, provided they are equivalent.

6.5.1.1.3 The construction, equipment, testing, marking and operation of IBCs shall be subject to acceptance by the competent authority of the country in which the IBCs are approved.

6.5.1.1.4 Manufacturers and subsequent distributors of IBCs shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that IBCs as presented for transport are capable of passing the applicable performance tests of this Chapter.

6.5.1.2 *Definitions*

Body (for all categories of IBCs other than composite IBCs) means the receptacle proper, including openings and their closures, but does not include service equipment;

Handling device (for flexible IBCs) means any sling, loop, eye or frame attached to the body of the IBC or formed from a continuation of the IBC body material;

Maximum permissible gross mass means the mass of the IBC and any service or structural equipment together with the maximum net mass;

Plastics material, when used in connection with inner receptacles for composite IBCs, is taken to include other polymeric materials such as rubber;

Protected (for metal IBCs) means being provided with additional protection against impact, the protection taking the form of, for example, a multi-layer (sandwich) or double wall construction or a frame with a metal lattice-work casing;

Service equipment means filling and discharge devices and, according to the category of IBC, pressure-relief or venting, safety, heating and heat-insulating devices and measuring instruments;

Structural equipment (for all categories of IBCs other than flexible IBCs) means the reinforcing, fastening, handling, protective or stabilizing members of the body, including the base pallet for composite IBCs with plastics inner receptacle, fibreboard and wooden IBCs;

Woven plastics (for flexible IBCs) means a material made from stretched tapes or monofilaments of a suitable plastics material.

6.5.1.3 ***Categories of IBCs***

6.5.1.3.1 *Metal IBCs* consist of a metal body together with appropriate service and structural equipment.

6.5.1.3.2 *Flexible IBCs* consist of a body constituted of film, woven fabric or any other flexible material or combinations thereof, and if necessary an inner coating or liner, together with any appropriate service equipment and handling devices.

6.5.1.3.3 *Rigid plastics IBCs* consist of a rigid plastics body, which may have structural equipment together with appropriate service equipment.

6.5.1.3.4 *Composite IBCs* consist of structural equipment in the form of a rigid outer casing enclosing a plastics inner receptacle together with any service or other structural equipment. They are so constructed that the inner receptacle and outer casing once assembled, form and are used as, an integrated single unit to be filled, stored, transported or emptied as such.

6.5.1.3.5 *Fibreboard IBCs* consist of a fibreboard body with or without separate top and bottom caps, if necessary an inner liner (but no inner packagings), appropriate service and structural equipment.

6.5.1.3.6 *Wooden IBCs* consist of a rigid or collapsible wooden body together with an inner liner (but no inner packagings) and appropriate service and structural equipment.

6.5.1.4 ***Designatory code system for IBCs***

6.5.1.4.1 The code shall consist of two Arabic numerals as specified in (a); followed by a capital letter(s) specified in (b); followed, when specified in an individual section, by an Arabic numeral indicating the category of IBC.

(a)

Type	**For solids filled or discharged**		**For liquids**
	by gravity	under pressure of more than 10 kPa (0.1 bar)	
Rigid	11	21	31
Flexible	13	-	-

(b) Materials

A. Steel (all types and surface treatments)
B. Aluminium
C. Natural wood
D. Plywood
F. Reconstituted wood
G. Fibreboard
H. Plastics material
L. Textile
M. Paper, multiwall
N. Metal (other than steel or aluminium).

6.5.1.4.2 For composite IBCs, two capital letters in Latin characters shall be used in sequence in the second position of the code. The first shall indicate the material of the inner receptacle of the IBC and the second that of the outer packaging of the IBC.

6.5.1.4.3 The following types and codes of IBC are assigned:

Material	Category	Code	Paragraph
Metal			6.5.5.1
A. Steel	for solids, filled or discharged by gravity	11A	
	for solids, filled or discharged under pressure	21A	
	for liquids	31A	
B. Aluminium	for solids, filled or discharged by gravity	11B	
	for solids, filled or discharged under pressure	21B	
	for liquids	31B	
N. Other than steel or aluminium	for solids, filled or discharged by gravity	11N	
	for solids, filled or discharged under pressure	21N	
	for liquids	31N	
Flexible			6.5.5.2
H. Plastics	woven plastics without coating or liner	13H1	
	woven plastics, coated	13H2	
	woven plastics with liner	13H3	
	woven plastics, coated and with liner	13H4	
	plastics film	13H5	
L. Textile	without coating or liner	13L1	
	coated	13L2	
	with liner	13L3	
	coated and with liner	13L4	
M. Paper	multiwall	13M1	
	multiwall, water-resistant	13M2	
H. Rigid Plastics	for solids, filled or discharged by gravity, fitted with structural equipment	11H1	6.5.5.3
	for solids, filled or discharged by gravity, freestanding	11H2	
	for solids, filled or discharged under pressure, fitted with structural equipment	21H1	
	for solids, filled or discharged under pressure, freestanding	21H2	
	for liquids, fitted with structural equipment	31H1	
	for liquids, freestanding	31H2	
HZ. Composite with plastic inner receptacle[a]	for solids, filled or discharged by gravity, with rigid plastics inner receptacle	11HZ1	6.5.5.4
	for solids, filled or discharged by gravity, with flexible plastics inner receptacle	11HZ2	
	for solids, filled or discharged under pressure, with rigid plastics inner receptacle	21HZ1	
	for solids, filled or discharged under pressure, with flexible plastics inner receptacle	21HZ2	
	for liquids, with rigid plastics inner receptacle	31HZ1	
	for liquids, with flexible plastics inner receptacle	31HZ2	
G. Fibreboard	for solids, filled or discharged by gravity	11G	6.5.5.5
Wooden			6.5.5.6
C. Natural wood	for solids, filled or discharged by gravity with inner liner	11C	
D. Plywood	for solids, filled or discharged by gravity, with inner liner	11D	
F. Reconstituted wood	for solids, filled or discharged by gravity, with inner liner	11F	

[a] *The code shall be completed by replacing the letter Z with a capital letter in accordance with 6.5.1.4.1 (b) to indicate the nature of the material used for the outer casing.*

6.5.1.4.4 The letter "W" may follow the IBC code. The letter "W" signifies that the IBC, although of the same type indicated by the code, is manufactured to a specification different from those in section 6.5.5 and is considered equivalent in accordance with the requirements in 6.5.1.1.2.

6.5.2 Marking

6.5.2.1 *Primary marking*

6.5.2.1.1 Each IBC manufactured and intended for use according to these Regulations shall bear marks which are durable, legible and placed in a location so as to be readily visible. Letters, numerals and symbols shall be at least 12 mm high and shall show:

(a) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8.

For metal IBCs on which the marks are stamped or embossed, the capital letters "UN" may be applied instead of the symbol;

(b) The code designating the type of IBC according to 6.5.1.4;

(c) A capital letter designating the packing group(s) for which the design type has been approved:

(i) X for packing groups I, II and III (IBCs for solids only);

(ii) Y for packing groups II and III;

(iii) Z for packing group III only;

(d) The month and year (last two digits) of manufacture;

(e) The State authorizing the allocation of the mark; indicated by the distinguishing sign used on vehicles in international road traffic[1];

(f) The name or symbol of the manufacturer and other identification of the IBC as specified by the competent authority;

(g) The stacking test load in kg. For IBCs not designed for stacking, the figure "0" shall be shown;

(h) The maximum permissible gross mass in kg.

The primary marks required above shall be applied in the sequence of the subparagraphs above. The marks required by 6.5.2.2 and any further mark authorized by a competent authority shall still enable the primary marks to be correctly identified.

Each mark applied in accordance with (a) to (h) and with 6.5.2.2 shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable.

6.5.2.1.2 IBCs manufactured from recycled plastics material as defined in 1.2.1 shall be marked "REC". For rigid IBCs this mark shall be placed near the marks prescribed in 6.5.2.1.1. For the inner receptacle of composite IBCs, this mark shall be placed near the marks prescribed in 6.5.2.2.4.

[1] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

6.5.2.1.3 *Examples of marking for various types of IBC in accordance with (a) to (h) above*

11A/Y/02 99
NL/Mulder 007
5500/1500

For a metal IBC for solids discharged by gravity and made from steel/for packing groups II and III/ manufactured in February 1999/authorized by the Netherlands/manufactured by Mulder and of a design type to which the competent authority has allocated serial number 007/the stacking test load in kg/the maximum permissible gross mass in kg.

13H3/Z/03 01
F/Meunier 1713
0/1500

For a flexible IBC for solids discharged for instance by gravity and made from woven plastics with a liner/not designed to be stacked.

31H1/Y/04 99
GB/9099
10800/1200

For a rigid plastics IBC for liquids made from plastics with structural equipment withstanding the stack load.

31HA1/Y/05 01
D/Muller 1683
10800/1200

For a composite IBC for liquids with a rigid plastics inner receptacle and a steel outer casing.

11C/X/01 02
S/Aurigny 9876
3000/910

For a wooden IBC for solids with an inner liner and authorized for packing groups I, II and III solids.

6.5.2.1.4 Where an IBC conforms to one or more than one tested IBC design type, including one or more than one tested packaging or large packaging design type, the IBC may bear more than one mark to indicate the relevant performance test requirements that have been met. Where more than one mark appears on an IBC, the marks shall appear in close proximity to one another and each mark shall appear in its entirety.

6.5.2.2 ***Additional marking***

6.5.2.2.1 Each IBC shall bear the marks required in 6.5.2.1 and, in addition, the following information which may appear on a corrosion-resistant plate permanently attached in a place readily accessible for inspection:

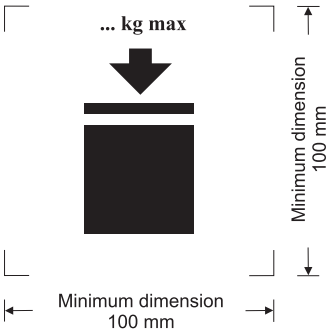
Additional marks	Category of IBC				
	Metal	**Rigid Plastics**	**Composite**	**Fibreboard**	**Wooden**
Capacity in litres[a] at 20 °C	X	X	X		
Tare mass in kg[a]	X	X	X	X	X
Test (gauge) pressure, in kPa or bar[a], if applicable		X	X		
Maximum filling/discharge pressure in kPa or bar[a], if applicable	X	X	X		
Body material and its minimum thickness in mm	X				
Date of last leakproofness test, if applicable (month and year)	X	X	X		
Date of last inspection (month and year)	X	X	X		
Serial number of the manufacturer	X				

[a] *The unit used shall be indicated.*

[b] *See 6.5.2.2.2. This additional mark shall apply to all IBCs manufactured, repaired or remanufactured as from 1 January 2011.*

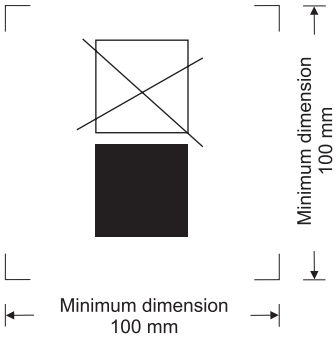
6.5.2.2.2 The maximum permitted stacking load applicable shall be displayed on a symbol as shown in Figure 6.5.1 or Figure 6.5.2. The symbol shall be durable and clearly visible.

Figure 6.5.1



IBCs capable of being stacked

Figure 6.5.2



IBCs NOT capable of being stacked

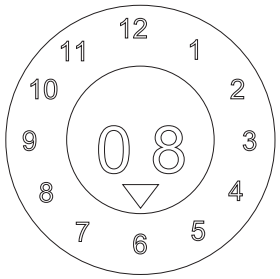
The minimum dimensions shall be 100 mm × 100 mm. The letters and numbers indicating the mass shall be at least 12 mm high. The area within the printer's marks indicated by the dimensional arrows shall be square. Where dimensions are not specified, all features shall be in approximate proportion to those shown. The mass marked above the symbol shall not exceed the load imposed during the design type test (see 6.5.6.6.4) divided by 1.8.

NOTE: *The provisions of 6.5.2.2.2 shall apply to all IBCs manufactured, repaired or remanufactured as from 1 January 2011. The provisions of 6.5.2.2.2 of the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied to all IBCs manufactured, repaired or remanufactured between 1 January 2011 and 31 December 2016.*

6.5.2.2.3 In addition to the marks required in 6.5.2.1, flexible IBCs may bear a pictogram indicating recommended lifting methods.

6.5.2.2.4 Inner receptacles that are of composite IBC design type shall be identified by the application of the marks indicated in 6.5.2.1.1 (b), (c), (d) where this date is that of the manufacture of the plastics inner receptacle, (e) and (f). The UN packaging symbol shall not be applied. The marks shall be applied in the sequence shown in 6.5.2.1.1. They shall be durable, legible and placed in a location so as to be readily accessible for inspection after assembling the inner receptacle in the outer casing. When the marks on the inner receptacle are not readily accessible for inspection due to the design of the outer casing, a duplicate of the required marks on the inner receptacle shall be placed on the outer casing preceded by the wording "Inner receptacle". This duplicate shall be durable, legible and placed in a location so as to be readily accessible for inspection.

The date of the manufacture of the plastics inner receptacle may alternatively be marked on the inner receptacle adjacent to the remainder of the marks. In such a case, the date may be waived from the remainder of the marks. An example of an appropriate marking method is:



NOTE 1*: Other methods that provide the minimum required information in a durable, visible and legible form are also acceptable.*

NOTE 2: *The date of manufacture of the inner receptacle may be different from the marked date of manufacture (see 6.5.2.1), repair (see 6.5.4.5.3) or remanufacture (see 6.5.2.4) of the composite IBC.*

6.5.2.2.5 Where a composite IBC is designed in such a manner that the outer casing is intended to be dismantled for transport when empty (such as for return of the IBC for reuse to the original consignor), each of the parts intended to be detached when so dismantled shall be marked with the month and year of manufacture and the name or symbol of the manufacturer and other identification of the IBC as specified by the competent authority (6.5.2.1.1(f)).

6.5.2.3 *Conformity to design type:* The marks indicate that IBCs correspond to a successfully tested design type and that the requirements referred to in the certificate have been met.

6.5.2.4 ***Marking of remanufactured composite IBCs (31HZ1)***

The marks specified in 6.5.2.1.1 and 6.5.2.2 shall be removed from the original IBC or made permanently illegible and new marks shall be applied to an IBC remanufactured in accordance with these Regulations.

6.5.3 Construction requirements

6.5.3.1 ***General requirements***

6.5.3.1.1 IBCs shall be resistant to or adequately protected from deterioration due to the external environment.

6.5.3.1.2 IBCs shall be so constructed and closed that none of the contents can escape under normal conditions of transport including the effect of vibration, or by changes in temperature, humidity or pressure.

6.5.3.1.3 IBCs and their closures shall be constructed of materials compatible with their contents, or be protected internally, so that they are not liable:

(a) To be attacked by the contents so as to make their use dangerous;

(b) To cause the contents to react or decompose, or form harmful or dangerous compounds with the IBCs.

6.5.3.1.4 Gaskets, where used, shall be made of materials not subject to attack by the contents of the IBCs.

6.5.3.1.5 All service equipment shall be so positioned or protected as to minimize the risk of escape of the contents owing to damage during handling and transport.

6.5.3.1.6 IBCs, their attachments and their service and structural equipment shall be designed to withstand, without loss of contents, the internal pressure of the contents and the stresses of normal handling and transport. IBCs intended for stacking shall be designed for stacking. Any lifting or securing features of IBCs shall be of sufficient strength to withstand the normal conditions of handling and transport without gross distortion or failure and shall be so positioned that no undue stress is caused in any part of the IBC.

6.5.3.1.7 Where an IBC consists of a body within a framework it shall be so constructed that:

(a) The body does not chafe or rub against the framework so as to cause material damage to the body;

(b) The body is retained within the framework at all times;

(c) The items of equipment are fixed in such a way that they cannot be damaged if the connections between body and frame allow relative expansion or movement.

6.5.3.1.8 Where a bottom discharge valve is fitted, it shall be capable of being made secure in the closed position and the whole discharge system shall be suitably protected from damage. Valves having lever closures

shall be able to be secured against accidental opening and the open or closed position shall be readily apparent. For IBCs containing liquids, a secondary means of sealing the discharge aperture shall also be provided, e.g. by a blank flange or equivalent device.

6.5.4 Testing, certification and inspection

6.5.4.1 *Quality assurance*: the IBCs shall be manufactured, remanufactured, repaired and tested under a quality assurance programme which satisfies the competent authority, in order to ensure that each manufactured, remanufactured or repaired IBC meets the requirements of this Chapter.

NOTE: *ISO 16106:2020 "Transport packages for dangerous goods – Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings – Guidelines for the application of ISO 9001" provides acceptable guidance on procedures which may be followed.*

6.5.4.2 *Test requirements*: IBCs shall be subject to design type tests and, if applicable, to initial and periodic inspections and tests in accordance with 6.5.4.4.

6.5.4.3 *Certification*: in respect of each design type of IBC a certificate and mark (as in 6.5.2) shall be issued attesting that the design type including its equipment meets the test requirements.

6.5.4.4 *Inspection and testing*

NOTE: *See also 6.5.4.5 for tests and inspections on repaired IBCs.*

6.5.4.4.1 Every metal, rigid plastics and composite IBC shall be inspected to the satisfaction of the competent authority:

(a) Before it is put into service (including after remanufacture), and thereafter at intervals not exceeding five years, with regard to:

(i) conformity to design type including marks;

(ii) internal and external condition;

(iii) proper functioning of service equipment;

Thermal insulation, if any, need be removed only to the extent necessary for a proper examination of the body of the IBC;

(b) At intervals of not more than two and a half years, with regard to:

(i) external condition;

(ii) proper functioning of service equipment;

Thermal insulation, if any, need be removed only to the extent necessary for a proper examination of the body of the IBC.

Each IBC shall correspond in all respects to its design type.

6.5.4.4.2 Every metal, rigid plastics and composite IBC for liquids, or for solids which are filled or discharged under pressure, shall undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.5.4.1 which shows the capability of meeting the appropriate test level indicated in 6.5.6.7.3:

(a) Before it is first used for transport;

(b) At intervals of not more than two and a half years.

For this test the IBC shall be fitted with the primary bottom closure. The inner receptacle of a composite IBC may be tested without the outer casing, provided that the test results are not affected.

6.5.4.4.3 A report of each inspection and test shall be kept by the owner of the IBC at least until the next inspection or test. The report shall include the results of the inspection and test and shall identify the party performing the inspection and test (see also the marking requirements in 6.5.2.2.1).

6.5.4.4.4 The competent authority may at any time require proof, by tests in accordance with this Chapter, that IBCs meet the requirements of the design type tests.

6.5.4.5 ***Repaired IBCs***

6.5.4.5.1 When an IBC is impaired as a result of impact (e.g. accident) or any other cause, it shall be repaired or otherwise maintained (see definition of *"Routine maintenance of IBCs"* in 1.2.1), so as to conform to the design type. The bodies of rigid plastics IBCs and the inner receptacles of composite IBCs that are impaired shall be replaced.

6.5.4.5.2 In addition to any other testing and inspection requirements in these Regulations, an IBC shall be subjected to the full testing and inspection requirements set out in 6.5.4.4, and the required reports shall be prepared, whenever it is repaired.

6.5.4.5.3 The Party performing the tests and inspections after the repair shall durably mark the IBC near the manufacturer's UN design type marks to show:

(a) The State in which the tests and inspections were carried out;

(b) The name or authorized symbol of the party performing the tests and inspections; and

(c) The date (month and year) of the tests and inspections.

6.5.4.5.4 Test and inspections performed in accordance with 6.5.4.5.2 may be considered to satisfy the requirements for the two and a half and five-year periodic tests and inspections.

6.5.5 Specific requirements for IBCs

6.5.5.1 ***Specific requirements for metal IBCs***

6.5.5.1.1 These requirements apply to metal IBCs intended for the transport of solids and liquids. There are three categories of metal IBCs:

(a) Those for solids which are filled or discharged by gravity (11A, 11B, 11N);

(b) Those for solids which are filled or discharged at a gauge pressure greater than 10 kPa (0.1 bar) (21A, 21B, 21N); and

(c) Those for liquids (31A, 31B, 31N).

6.5.5.1.2 Bodies shall be made of suitable ductile metal in which the weldability has been fully demonstrated. Welds shall be skilfully made and afford complete safety. Low-temperature performance shall be taken into account when appropriate.

6.5.5.1.3 Care shall be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.

6.5.5.1.4 Aluminium IBCs intended for the carriage of flammable liquids shall have no movable parts, such as covers, closures, etc., made of unprotected steel liable to rust, which might cause a dangerous reaction by coming into frictional or percussive contact with the aluminium.

6.5.5.1.5 Metal IBCs shall be made of metals which meet the following requirements:

(a) For steel the elongation at fracture, in %, shall not be less than $\frac{10000}{Rm}$ with an absolute minimum of 20 %, where Rm = guaranteed minimum tensile strength of the steel to be used, in N/mm^2;

(b) For aluminium the elongation at fracture, in %, shall not be less than $\frac{10000}{6Rm}$ with an absolute minimum of 8 % where Rm = guaranteed minimum tensile strength of the aluminium to be used, in N/mm^2.

Specimens used to determine the elongation at fracture shall be taken transversely to the direction of rolling and be so secured that:

$$L_0 = 5d \quad \text{or}$$

$$L_0 = 5.65\sqrt{A}$$

where: L_0 = gauge length of the specimen before the test

d = diameter

A = cross-sectional area of test specimen.

6.5.5.1.6 *Minimum wall thickness*

Metal IBCs with a capacity of more than 1500 *l* shall comply with the following minimum wall thickness requirement:

(a) For a reference steel having a product of $Rm \times A_o = 10\,000$, the wall thickness shall not be less than:

Wall thickness (T) in mm			
Types 11A, 11B, 11N		**Types 21A, 21B, 21N, 31A, 31B, 31N**	
Unprotected	**Protected**	**Unprotected**	**Protected**
T = C/2 000 + 1.5	T = C/2 000 + 1.0	T = C/1 000 + 1.0	T = C/2 000 + 1.5

where: A_0 = minimum elongation (as a percentage) of the reference steel to be used on fracture under tensile stress (see 6.5.5.1.5);

(b) For metals other than the reference steel described in (a), the minimum wall thickness is given by the following equivalence formula:

$$e_1 = \frac{21.4 \times e_0}{\sqrt[3]{Rm_1\ A_1}}$$

where: e_1 = required equivalent wall thickness of the metal to be used (in mm);

e_0 = required minimum wall thickness for the reference steel (in mm);

Rm_1 = guaranteed minimum tensile strength of the metal to be used (in N/mm^2) (see (c));

A_1 = minimum elongation (as a percentage) of the metal to be used on fracture under tensile stress (see 6.5.5.1.5);

However, in no case shall the wall thickness be less than 1.5 mm;

(c) For purposes of the calculation described in (b), the guaranteed minimum tensile strength of the metal to be used (Rm_1) shall be the minimum value according to national or international material standards. However, for austenitic steels, the specified minimum value for Rm according to the material standards may be increased by up to 15 % when a greater value is attested in the material inspection certificate. When no material standard exists for the material in question, the value of Rm shall be the minimum value attested in the material inspection certificate.

6.5.5.1.7 Pressure relief requirements: IBCs for liquids shall be capable of releasing a sufficient amount of vapour in the event of fire engulfment to ensure that no rupture of the body will occur. This can be achieved by conventional pressure-relief devices or by other constructional means. The start-to-discharge pressure shall not be higher than 65 kPa (0.65 bar) and no lower than the total gauge pressure experienced in the IBC (i.e. the vapour pressure of the filling substance plus the partial pressure of the air or other inert gases, minus 100 kPa (1 bar)) at 55 °C, determined on the basis of a maximum degree of filling as defined in 4.1.1.4. The required relief devices shall be fitted in the vapour space.

6.5.5.2 ***Specific requirements for flexible IBCs***

6.5.5.2.1 These requirements apply to flexible IBCs of the following types:

13H1	woven plastics without coating or liner
13H2	woven plastics, coated
13H3	woven plastics with liner
13H4	woven plastics, coated and with liner
13H5	plastics film
13L1	textile without coating or liner
13L2	textile, coated
13L3	textile with liner
13L4	textile, coated and with liner
13M1	paper, multiwall
13M2	paper, multiwall, water-resistant

Flexible IBCs are intended for the transport of solids only.

6.5.5.2.2 Bodies shall be manufactured from suitable materials. The strength of the material and the construction of the flexible IBC shall be appropriate to its capacity and its intended use.

6.5.5.2.3 All materials used in the construction of flexible IBCs of types 13M1 and 13M2 shall, after complete immersion in water for not less than 24 hours, retain at least 85 % of the tensile strength as measured originally on the material conditioned to equilibrium at 67 % relative humidity or less.

6.5.5.2.4 Seams shall be formed by stitching, heat sealing, gluing or any equivalent method. All stitched seam-ends shall be secured.

6.5.5.2.5 Flexible IBCs shall provide adequate resistance to ageing and to degradation caused by ultraviolet radiation or the climatic conditions, or by the substance contained, thereby rendering them appropriate to their intended use.

6.5.5.2.6 For flexible plastics IBCs where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the body. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.5.5.2.7 Additives may be incorporated into the material of the body to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.5.5.2.8 No material recovered from used receptacles shall be used in the manufacture of IBC bodies. Production residues or scrap from the same manufacturing process may, however, be used. Component parts such as fittings and pallet bases may also be used provided such components have not in any way been damaged in previous use.

6.5.5.2.9 When filled, the ratio of height to width shall be not more than 2:1.

6.5.5.2.10 The liner shall be made of a suitable material. The strength of the material used and the construction of the liner shall be appropriate to the capacity of the IBC and the intended use. Joins and closures shall be sift proof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and transport.

6.5.5.3 ***Specific requirements for rigid plastics IBCs***

6.5.5.3.1 These requirements apply to rigid plastics IBCs for the transport of solids or liquids. Rigid plastics IBCs are of the following types:

11H1	fitted with structural equipment designed to withstand the whole load when IBCs are stacked, for solids which are filled or discharged by gravity
11H2	freestanding, for solids which are filled or discharged by gravity
21H1	fitted with structural equipment designed to withstand the whole load when IBCs are stacked, for solids which are filled or discharged under pressure
21H2	freestanding, for solids which are filled or discharged under pressure
31H1	fitted with structural equipment designed to withstand the whole load when IBCs are stacked, for liquids
31H2	freestanding, for liquids.

6.5.5.3.2 The body shall be manufactured from suitable plastics material of known specifications and be of adequate strength in relation to its capacity and its intended use. Except for recycled plastics material as defined in 1.2.1, no used material other than production residues or regrind from the same manufacturing process may be used. The material shall be adequately resistant to ageing and to degradation caused by the substance contained or, where relevant, by ultraviolet radiation. Low temperature performance shall be taken into account when appropriate. Any permeation of the substance contained shall not constitute a danger under normal conditions of transport.

6.5.5.3.3 Where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the body. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.5.5.3.4 Additives may be incorporated in the material of the body to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.5.5.4 ***Specific requirements for composite IBCs with plastics inner receptacles***

6.5.5.4.1 These requirements apply to composite IBCs for the transport of solids and liquids of the following types:

11HZ1	composite IBCs with a rigid plastics inner receptacle, for solids filled or discharged by gravity
11HZ2	composite IBCs with a flexible plastics inner receptacle, for solids filled or discharged by gravity
21HZ1	composite IBCs with a rigid plastics inner receptacle, for solids filled or discharged under pressure
21HZ2	composite IBCs with a flexible plastics inner receptacle, for solids filled or discharged under pressure

31HZ1 composite IBCs with a rigid plastics inner receptacle, for liquids
31HZ2 composite IBCs with a flexible plastics inner receptacle, for liquids.

This code shall be completed by replacing the letter Z by a capital letter in accordance with 6.5.1.4.1 (b) to indicate the nature of the material used for the outer casing.

6.5.5.4.2 The inner receptacle is not intended to perform a containment function without its outer casing. A “rigid” inner receptacle is a receptacle which retains its general shape when empty without closures in place and without benefit of the outer casing. Any inner receptacle that is not “rigid” is considered to be “flexible”.

6.5.5.4.3 The outer casing normally consists of rigid material formed so as to protect the inner receptacle from physical damage during handling and transport but is not intended to perform the containment function. It includes the base pallet where appropriate.

6.5.5.4.4 A composite IBC with a fully enclosing outer casing shall be so designed that the integrity of the inner container may be readily assessed following the leakproofness and hydraulic tests.

6.5.5.4.5 IBCs of type 31HZ2 shall be limited to a capacity of not more than 1250 litres.

6.5.5.4.6 The inner receptacle shall be manufactured from suitable plastics material of known specifications and be of adequate strength in relation to its capacity and its intended use. Except for recycled plastics material as defined in 1.2.1, no used material other than production residues or regrind from the same manufacturing process may be used. The material shall be adequately resistant to ageing and to degradation caused by the substance contained or, where relevant, by ultraviolet radiation. Low temperature performance shall be taken into account when appropriate. Any permeation of the substance contained shall not constitute a danger under normal conditions of transport.

6.5.5.4.7 Where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the inner receptacle. Where use is made of carbon black, pigments or inhibitors, other than those used in the manufacture of the tested design type, retesting may be waived if changes in carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.5.5.4.8 Additives may be incorporated in the material of the inner receptacle to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.5.5.4.9 The inner receptacle of IBCs type 31HZ2 shall consist of at least three plies of film.

6.5.5.4.10 The strength of the material and the construction of the outer casing shall be appropriate to the capacity of the composite IBC and its intended use.

6.5.5.4.11 The outer casing shall be free of any projection that might damage the inner receptacle.

6.5.5.4.12 Outer casings of steel or aluminium shall be constructed of a suitable metal of adequate thickness.

6.5.5.4.13 Outer casings of natural wood shall be of well-seasoned wood, commercially dry and free from defects that would materially lessen the strength of any part of the casing. The tops and bottoms may be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

6.5.5.4.14 Outer casings of plywood shall be made of well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the casing. All adjacent plies shall be glued with water-resistant adhesive. Other suitable materials may be used with plywood for the construction of casings. Casings shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

6.5.5.4.15 The walls of outer casings of reconstituted wood shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type. Other parts of the casings may be made of other suitable material.

6.5.5.4.16 For fibreboard outer casings, strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used appropriate to the capacity of the casing and to its intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m2 - see ISO 535:1991. It shall have proper bending qualities. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting of corrugated fibreboard shall be firmly glued to the facings.

6.5.5.4.17 The ends of fibreboard outer casings may have a wooden frame or be entirely of wood. Reinforcements of wooden battens may be used.

6.5.5.4.18 Manufacturing joins in the fibreboard outer casing shall be taped, lapped and glued, or lapped and stitched with metal staples. Lapped joins shall have an appropriate overlap. Where closing is effected by gluing or taping, a water-resistant adhesive shall be used.

6.5.5.4.19 Where the outer casing is of plastics material, the relevant requirements of 6.5.5.4.6 to 6.5.5.4.8 apply.

6.5.5.4.20 The outer casing of a 31HZ2 shall enclose the inner receptacle on all sides.

6.5.5.4.21 Any integral pallet base forming part of an IBC or any detachable pallet shall be suitable for mechanical handling with the IBC filled to its maximum permissible gross mass.

6.5.5.4.22 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the IBC that might be liable to damage in handling.

6.5.5.4.23 The outer casing shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the IBC.

6.5.5.4.24 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the inner receptacle.

6.5.5.4.25 Where IBCs are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner. Such IBCs shall be designed so that the load is not supported by the inner receptacle.

6.5.5.5 *Specific requirements for fibreboard IBCs*

6.5.5.5.1 These requirements apply to fibreboard IBCs for the transport of solids which are filled or discharged by gravity. Fibreboard IBCs are of the following type: 11G.

6.5.5.5.2 Fibreboard IBCs shall not incorporate top lifting devices.

6.5.5.5.3 The body shall be made of strong and good quality solid or double-faced corrugated fibreboard (single or multiwall), appropriate to the capacity of the IBC and to its intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m2 - see ISO 535:1991. It shall have proper bending qualities. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting or corrugated fibreboard shall be firmly glued to the facings.

6.5.5.5.4 The walls, including top and bottom, shall have a minimum puncture resistance of 15 J measured according to ISO 3036:1975.

6.5.5.5.5 Manufacturing joins in the body of IBCs shall be made with an appropriate overlap and shall be taped, glued, stitched with metal staples or fastened by other means at least equally effective. Where joins are effected by gluing or taping, a water-resistant adhesive shall be used. Metal staples shall pass completely through all pieces to be fastened and be formed or protected so that any inner liner cannot be abraded or punctured by them.

6.5.5.5.6 The liner shall be made of a suitable material. The strength of the material used and the construction of the liner shall be appropriate to the capacity of the IBC and the intended use. Joins and closures shall be sift-proof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and transport.

6.5.5.5.7 Any integral pallet base forming part of an IBC or any detachable pallet shall be suitable for mechanical handling with the IBC filled to its maximum permissible gross mass.

6.5.5.5.8 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the IBC that might be liable to damage in handling.

6.5.5.5.9 The body shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the IBC.

6.5.5.5.10 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

6.5.5.5.11 Where IBCs are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

6.5.5.6 ***Specific requirements for wooden IBCs***

6.5.5.6.1 These requirements apply to wooden IBCs for the transport of solids which are filled or discharged by gravity. Wooden IBCs are of the following types:

11C natural wood with inner liner
11D plywood with inner liner
11F reconstituted wood with inner liner.

6.5.5.6.2 Wooden IBCs shall not incorporate top lifting devices.

6.5.5.6.3 The strength of the materials used and the method of construction of the body shall be appropriate to the capacity and intended use of the IBC.

6.5.5.6.4 Natural wood shall be well-seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the IBC. Each part of the IBC shall consist of one piece or be equivalent thereto. Parts are considered equivalent to one piece when a suitable method of glued assembly is used as for instance Lindermann joint, tongue and groove joint, ship lap or rabbet joint; or butt joint with at least two corrugated metal fasteners at each joint, or when other methods at least equally effective are used.

6.5.5.6.5 Bodies of plywood shall be at least 3-ply. It shall be made of well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the body. All adjacent plies shall be glued with water-resistant adhesive. Other suitable materials may be used with plywood for the construction of the body.

6.5.5.6.6 Bodies of reconstituted wood shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

6.5.5.6.7 IBCs shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

6.5.5.6.8 The liner shall be made of a suitable material. The strength of the material used and the construction of the liner shall be appropriate to the capacity of the IBC and the intended use. Joins and closures shall be sift-proof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and transport.

6.5.5.6.9 Any integral pallet base forming part of an IBC or any detachable pallet shall be suitable for mechanical handling with the IBC filled to its maximum permissible gross mass.

6.5.5.6.10 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the IBC that might be liable to damage in handling.

6.5.5.6.11 The body shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the IBC.

6.5.5.6.12 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

6.5.5.6.13 Where IBCs are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

6.5.6 Test requirements for IBCs

6.5.6.1 *Performance and frequency of tests*

6.5.6.1.1 Each IBC design type shall successfully pass the tests prescribed in this chapter before being used. An IBC design type is defined by the design, size, material and thickness, manner of construction and means of filling and discharging but may include various surface treatments. It also includes IBCs which differ from the design type only in their lesser external dimensions.

6.5.6.1.2 Tests shall be carried out on IBCs prepared for transport. IBCs shall be filled as indicated in the relevant sections. The substances to be transported in the IBCs may be replaced by other substances except where this would invalidate the results of the tests. For solids, when another substance is used it shall have the same physical characteristics (mass, grain size, etc.) as the substance to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected.

6.5.6.2 *Design type tests*

6.5.6.2.1 One IBC of each design type, size, wall thickness and manner of construction shall be submitted to the tests listed in the order shown in 6.5.6.3.5 and as set out in 6.5.6.4 to 6.5.6.13. These design type tests shall be carried out as required by the competent authority.

6.5.6.2.2 The competent authority may permit the selective testing of IBCs which differ only in minor respects from a tested type, e.g. with small reductions in external dimensions.

6.5.6.2.3 If detachable pallets are used in the tests, the test report issued in accordance with 6.5.6.14 shall include a technical description of the pallets used.

6.5.6.3 *Preparation of IBCs for testing*

6.5.6.3.1 Paper and fibreboard IBCs and composite IBCs with fibreboard outer casings shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h.). There are three options, one of which shall be chosen. The preferred atmosphere is 23 ± 2 °C and 50 % ± 2 % r.h. The two other options are 20 ± 2 °C and 65 % ± 2 % r.h.; or 27 ± 2 °C and 65 % ± 2 % r.h.

NOTE: *Average values shall fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to vary by up to ±5 % relative humidity without significant impairment of test reproducibility.*

6.5.6.3.2 Additional steps shall be taken to ascertain that the plastics material used in the manufacture of rigid plastics IBCs (Types 31H1 and 31H2) and composite IBCs (Types 31HZ1 and 31HZ2) complies respectively with the requirements in 6.5.5.3.2 to 6.5.5.3.4 and 6.5.5.4.6 to 6.5.5.4.9.

6.5.6.3.3 This may be done, for example, by submitting sample IBCs to a preliminary test extending over a long period, for example six months, during which the samples would remain filled with the substances they are intended to contain or with substances which are known to have at least as severe a stress-cracking, weakening or molecular degradation influence on the plastics materials in question, and after which the samples shall be submitted to the applicable tests listed on the table in 6.5.6.3.5.

6.5.6.3.4 Where the behaviour of the plastics material has been established by other means, the above compatibility test may be dispensed with.

6.5.6.3.5 *Design type tests required and sequential order*

Type of IBC	Vibration [f]	Bottom lift	Top lift [a]	Stacking [b]	Leak-proofness	Hydraulic pressure	Drop	Tear	Topple	Righting [c]
Metal:										
11A, 11B, 11N	-	1st [a]	2nd	3rd	-	-	4th [e]	-	-	-
21A, 21B, 21N	-	1st [a]	2nd	3rd	4th	5th	6th [e]	-	-	-
31A, 31B, 31N	1st	2nd [a]	3rd	4th	5th	6th	7th [e]	-	-	-
Flexible [d]	-	-	x [c]	x	-	-	x	x	x	x
Rigid plastics:										
11H1, 11H2	-	1st [a]	2nd	3rd	-	-	4th	-	-	-
21H1, 21H2	-	1st [a]	2nd	3rd	4th	5th	6th	-	-	-
31H1, 31H2	1st	2nd [a]	3rd	4th	5th	6th	7th	-	-	-
Composite:										
11HZ1, 11HZ2	-	1st [a]	2nd	3rd	-	-	4th [e]	-	-	-
21HZ1, 21HZ2	-	1st [a]	2nd	3rd	4th	5th	6th [e]	-	-	-
31HZ1, 31HZ2	1st	2nd [a]	3rd	4th	5th	6th	7th [e]	-	-	-
Fibreboard	-	1st	-	2nd	-	-	3rd	-	-	-
Wooden	-	1st	-	2nd	-	-	3rd	-	-	-

[a] *When IBCs are designed for this method of handling.*
[b] *When IBCs are designed to be stacked.*
[c] *When IBCs are designated to be lifted from the top or the side.*
[d] *Required test indicated by x; an IBC which has passed one test may be used for other tests, in any order.*
[e] *Another IBC of the same design may be used for the drop test.*
[f] *Another IBC of the same design may be used for the vibration test.*

6.5.6.4 *Bottom lift test*

6.5.6.4.1 *Applicability*

For all fibreboard and wooden IBCs, and for all types of IBC which are fitted with means of lifting from the base, as a design type test.

6.5.6.4.2 *Preparation of the IBC for test*

The IBC shall be filled. A load shall be added and evenly distributed. The mass of the filled IBC and the load shall be 1.25 times the maximum permissible gross mass.

6.5.6.4.3 *Method of testing*

The IBC shall be raised and lowered twice by a lift truck with the forks centrally positioned and spaced at three quarters of the dimension of the side of entry (unless the points of entry are fixed). The forks

shall penetrate to three quarters of the direction of entry. The test shall be repeated from each possible direction of entry.

6.5.6.4.4 *Criteria for passing the test*

No permanent deformation which renders the IBC, including the base pallet, if any, unsafe for transport and no loss of contents.

6.5.6.5 *Top lift test*

6.5.6.5.1 *Applicability*

For all types of IBC which are designed to be lifted from the top and for flexible IBCs designed to be lifted from the top or the side, as a design type test.

6.5.6.5.2 *Preparation of the IBC for test*

Metal, rigid plastics and composite IBCs shall be filled. A load shall be added and evenly distributed. The mass of the filled IBC and the load shall be twice the maximum permissible gross mass.

Flexible IBCs shall be filled with a representative material and then shall be loaded to six times their maximum permissible gross mass, the load being evenly distributed.

6.5.6.5.3 *Methods of testing*

Metal and flexible IBCs shall be lifted in the manner for which they are designed until clear of the floor and maintained in that position for a period of five minutes.

Rigid plastics and composite IBCs shall be lifted:

(a) By each pair of diagonally opposite lifting devices, so that the hoisting forces are applied vertically, for a period of five minutes; and

(b) By each pair of diagonally opposite lifting devices, so that the hoisting forces are applied toward the centre at 45° to the vertical, for a period of five minutes.

6.5.6.5.4 Other methods of top lift testing and preparation at least equally effective may be used for flexible IBCs.

6.5.6.5.5 *Criteria for passing the test*

(a) Metal, rigid plastics and composite IBCs: the IBC remains safe for normal conditions of transport, there is no observable permanent deformation of the IBC, including the base pallet, if any, and no loss of contents;

(b) Flexible IBCs: no damage to the IBC or its lifting devices which renders the IBC unsafe for transport or handling and no loss of contents;

6.5.6.6 *Stacking test*

6.5.6.6.1 *Applicability*

For all types of IBC which are designed to be stacked on each other, as a design type test.

6.5.6.6.2 *Preparation of the IBC for test*

The IBC shall be filled to its maximum permissible gross mass. If the specific gravity of the product being used for testing makes this impracticable, the IBC shall be additionally loaded so that it is tested at its maximum permissible gross mass, the load being evenly distributed.

6.5.6.6.3 *Methods of testing*

(a) The IBC shall be placed on its base on level hard ground and subjected to a uniformly distributed superimposed test load (see 6.5.6.6.4). IBCs shall be subjected to the test load for a period of at least:

(i) 5 minutes, for metal IBCs;

(ii) 28 days at 40 °C, for rigid plastics IBCs of types 11H2, 21H2 and 31H2 and for composite IBCs with outer casings of plastics material which bear the stacking load (i.e., types 11HH1, 11HH2, 21HH1, 21HH2, 31HH1 and 31HH2);

(iii) 24 hours, for all other types of IBCs;

(b) The load shall be applied by one of the following methods:

(i) one or more IBCs of the same type filled to the maximum permissible gross mass stacked on the test IBC;

(ii) appropriate masses loaded onto either a flat plate or a reproduction of the base of the IBC, which is stacked on the test IBC.

6.5.6.6.4 *Calculation of superimposed test load*

The load to be placed on the IBC shall be 1.8 times the combined maximum permissible gross mass of the number of similar IBCs that may be stacked on top of the IBC during transport.

6.5.6.6.5 *Criteria for passing the test*

(a) All types of IBCs other than flexible IBCs: no permanent deformation which renders the IBC including the base pallet, if any, unsafe for transport and no loss of contents;

(b) Flexible IBCs: no deterioration of the body which renders the IBC unsafe for transport and no loss of contents.

6.5.6.7 *Leakproofness test*

6.5.6.7.1 *Applicability*

For those types of IBCs used for liquids or for solids filled or discharged under pressure, as a design type test and periodic test.

6.5.6.7.2 *Preparation of the IBC for test*

The test shall be carried out before the fitting of any thermal insulation equipment. Vented closures shall either be replaced by similar non-vented closures or the vent shall be sealed.

6.5.6.7.3 *Method of testing and pressure to be applied*

The test shall be carried out for a period of at least 10 minutes using air at a gauge pressure of not less than 20 kPa (0.2 bar). The air tightness of the IBC shall be determined by a suitable method such as by air-pressure differential test or by immersing the IBC in water or, for metal IBCs, by coating the seams and joints with a soap solution. In the latter case a correction factor shall be applied for the hydrostatic pressure.

6.5.6.7.4 *Criterion for passing the test*

No leakage of air.

6.5.6.8 ***Hydraulic pressure test***

6.5.6.8.1 *Applicability*

For those types of IBCs used for liquids or for solids filled or discharged under pressure, as a design type test.

6.5.6.8.2 *Preparation of the IBC for test*

The test shall be carried out before the fitting of any thermal insulation equipment. Pressure-relief devices shall be removed and their apertures plugged, or shall be rendered inoperative.

6.5.6.8.3 *Method of testing*

The test shall be carried out for a period of at least 10 minutes applying a hydraulic pressure not less than that indicated in 6.5.6.8.4. The IBCs shall not be mechanically restrained during the test.

6.5.6.8.4 *Pressures to be applied*

6.5.6.8.4.1 Metal IBCs

(a) For IBCs of types 21A, 21B and 21N, for packing group I solids, a 250 kPa (2.5 bar) gauge pressure;

(b) For IBCs of types 21A, 21B, 21N, 31A, 31B and 31N, for packing groups II or III substances, a 200 kPa (2 bar) gauge pressure;

(c) In addition, for IBCs of types 31A, 31B and 31N, a 65 kPa (0.65 bar) gauge pressure. This test shall be performed before the 200 kPa test.

6.5.6.8.4.2 Rigid plastics and composite IBCs

(a) For IBCs of types 21H1, 2lH2, 21HZ1 and 21HZ2: 75 kPa (0.75 bar) (gauge);

(b) For IBCs of types 31H1, 31H2, 31HZ1 and 31HZ2: whichever is the greater of two values, the first as determined by one of the following methods:

(i) the total gauge pressure measured in the IBC (i.e. the vapour pressure of the filling substance and the partial pressure of the air or other inert gases, minus 100 kPa) at 55 °C multiplied by a safety factor of 1.5; this total gauge pressure shall be determined on the basis of a maximum degree of filling in accordance with 4.1.1.4 and a filling temperature of 15 °C;

(ii) 1.75 times the vapour pressure at 50 °C of the substance to be transported minus 100 kPa, but with a minimum test pressure of 100 kPa;

(iii) 1.5 times the vapour pressure at 55 °C of the substance to be transported minus 100 kPa, but with a minimum test pressure of 100 kPa;

and the second as determined by the following method:

(iv) twice the static pressure of the substance to be transported, with a minimum of twice the static pressure of water.

6.5.6.8.5 *Criteria for passing the test(s)*

(a) For IBCs of types 21A, 21B, 21N, 31A, 31B and 31N, when subjected to the test pressure specified in 6.5.6.8.4.1 (a) or (b): no leakage;

(b) For IBCs of types 31A, 31B and 31N, when subjected to the test pressure specified in 6.5.6.8.4.1 (c): neither permanent deformation which would render the IBC unsafe for transport, nor leakage;

(c) For rigid plastics and composite IBCs: no permanent deformation which would render the IBC unsafe for transport and no leakage.

6.5.6.9 ***Drop test***

6.5.6.9.1 *Applicability*

For all types of IBCs, as a design type test.

6.5.6.9.2 *Preparation of the IBC for test*

(a) Metal IBCs: the IBC shall be filled to not less than 95 % of its maximum capacity for solids or 98 % of its maximum capacity for liquids. Pressure-relief devices shall be removed and their apertures plugged, or shall be rendered inoperative;

(b) Flexible IBCs: the IBC shall be filled to the maximum permissible gross mass, the contents being evenly distributed;

(c) Rigid plastics and composite IBCs: the IBC shall be filled to not less than 95 % of its maximum capacity for solids or 98 % of its maximum capacity for liquids. Arrangements provided for pressure-relief may be removed and plugged or rendered inoperative. Testing of IBCs shall be carried out when the temperature of the test sample and its contents has been reduced to minus 18 °C or lower. Where test samples of composite IBCs are prepared in this way the conditioning specified in 6.5.6.3.1 may be waived. Test liquids shall be kept in the liquid state, if necessary by the addition of anti-freeze. This conditioning may be disregarded if the materials in question are of sufficient ductility and tensile strength at low temperatures;

(d) Fibreboard and wooden IBCs: The IBC shall be filled to not less than 95 % of its maximum capacity.

6.5.6.9.3 *Method of testing*

The IBC shall be dropped on its base onto a non-resilient, horizontal, flat, massive and rigid surface in conformity with the requirements of 6.1.5.3.4, in such a manner as to ensure that the point of impact is that part of the base of the IBC considered to be the most vulnerable. IBCs of 0.45 m^3 or less capacity shall also be dropped:

(a) Metal IBCs: on the most vulnerable part other than the part of the base tested in the first drop;

(b) Flexible IBCs: on the most vulnerable side;

(c) Rigid plastics, composite, fibreboard and wooden IBCs: flat on a side, flat on the top and on a corner.

The same IBC or a different IBC of the same design may be used for each drop.

6.5.6.9.4 *Drop height*

For solids and liquids, if the test is performed with the solid or liquid to be transported or with another substance having essentially the same physical characteristics:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

For liquids if the test is performed with water:

(a) Where the substances to be transported have a relative density not exceeding 1.2:

Packing group II	Packing group III
1.2 m	0.8 m

(b) Where the substances to be transported have a relative density exceeding 1.2, the drop heights shall be calculated on the basis of the relative density (d) of the substance to be transported rounded up to the first decimal as follows:

Packing group II	Packing group III
d × 1.0 m	d × 0.67 m

6.5.6.9.5 *Criteria for passing the test(s)*

(a) Metal IBCs: no loss of contents;

(b) Flexible IBCs: no loss of contents. A slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of the IBC provided that no further leakage occurs after the IBC has been raised clear of the ground;

(c) Rigid plastics, composite, fibreboard and wooden IBCs: no loss of contents. A slight discharge from a closure upon impact shall not be considered to be a failure of the IBC provided that no further leakage occurs;

(d) All IBCs: no damage which renders the IBC unsafe to be transported for salvage or for disposal, and no loss of contents. In addition, the IBC shall be capable of being lifted by an appropriate means until clear of the floor for five minutes.

NOTE: *The criteria in (d) apply to design types for IBCs manufactured as from 1 January 2011.*

6.5.6.10 *Tear test*

6.5.6.10.1 *Applicability*

For all types of flexible IBCs, as a design type test.

6.5.6.10.2 *Preparation of the IBC for test*

The IBC shall be filled to not less than 95 % of its capacity and to its maximum permissible gross mass, the contents being evenly distributed.

6.5.6.10.3 *Method of testing*

Once the IBC is placed on the ground, a 100 mm knife score, completely penetrating the wall of a wide face, is made at a 45° angle to the principal axis of the IBC, halfway between the bottom surface and the top level of the contents. The IBC shall then be subjected to a uniformly distributed superimposed load equivalent to twice the maximum permissible gross mass. The load shall be applied for at least five minutes. An IBC which is designed to be lifted from the top or the side shall then, after removal of the superimposed load, be lifted clear of the floor and maintained in that position for a period of five minutes.

6.5.6.10.4 *Criterion for passing the test*

The cut shall not propagate more than 25 % of its original length.

6.5.6.11 ***Topple test***

6.5.6.11.1 *Applicability*

For all types of flexible IBCs, as a design type test.

6.5.6.11.2 *Preparation of the IBC for test*

The IBC shall be filled to not less than 95 % of its capacity and to its maximum permissible gross mass, the contents being evenly distributed.

6.5.6.11.3 *Method of testing*

The IBC shall be caused to topple on to any part of its top on to a rigid, non-resilient, smooth, flat and horizontal surface.

6.5.6.11.4 *Topple height*

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

6.5.6.11.5 *Criterion for passing the test*

No loss of contents. A slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of the IBC provided that no further leakage occurs.

6.5.6.12 ***Righting test***

6.5.6.12.1 *Applicability*

For all flexible IBCs designed to be lifted from the top or side, as a design type test.

6.5.6.12.2 *Preparation of the IBC for test*

The IBC shall be filled to not less than 95 % of its capacity and to its maximum permissible gross mass, the contents being evenly distributed.

6.5.6.12.3 *Method of testing*

The IBC, lying on its side, shall be lifted at a speed of at least 0.1 m/s to upright position, clear of the floor, by one lifting device or by two lifting devices when four are provided.

6.5.6.12.4 *Criterion for passing the test*

No damage to the IBC or its lifting devices which renders the IBC unsafe for transport or handling.

6.5.6.13 ***Vibration test***

6.5.6.13.1 *Applicability*

For all IBCs used for liquids, as a design type test.

NOTE: *This test applies to design types for IBCs manufactured as from 1 January 2011.*

6.5.6.13.2 *Preparation of the IBC for test*

A sample IBC shall be selected at random and shall be fitted and closed as for transport. The IBC shall be filled with water to not less than 98 % of its maximum capacity.

6.5.6.13.3 *Test method and duration*

6.5.6.13.3.1 The IBC shall be placed in the center of the test machine platform with a vertical sinusoidal, double amplitude (peak-to peak displacement) of 25 mm ± 5 %. If necessary, restraining devices shall be attached to the platform to prevent the specimen from moving horizontally off the platform without restricting vertical movement.

6.5.6.13.3.2 The test shall be conducted for one hour at a frequency that causes part of the base of the IBC to be momentarily raised from the vibrating platform for part of each cycle to such a degree that a metal shim can be completely inserted intermittently at, at least, one point between the base of the IBC and the test platform. The frequency may need to be adjusted after the initial set point to prevent the packaging from going into resonance. Nevertheless, the test frequency shall continue to allow placement of the metal shim under the IBC as described in this paragraph. The continuing ability to insert the metal shim is essential to passing the test. The metal shim used for this test shall be at least 1.6 mm thick, 50 mm wide, and be of sufficient length to be inserted between the IBC and the test platform a minimum of 100 mm to perform the test.

6.5.6.13.4 *Criteria for passing the test*

No leakage or rupture shall be observed. In addition, no breakage or failure of structural components, such as broken welds or failed fastenings, shall be observed.

6.5.6.14 ***Test report***

6.5.6.14.1 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the IBC:

1. Name and address of the test facility
2. Name and address of applicant (where appropriate)
3. A unique test report identification
4. Date of the test report
5. Manufacturer of the IBC
6. Description of the IBC design type (e.g. dimensions, materials, closures, thickness, etc.) including method of manufacture (e.g. blow moulding) and which may include drawing(s) and/or photograph(s)
7. Maximum capacity
8. Characteristics of test contents, e.g. viscosity and relative density for liquids and particle size for solids. For rigid plastics and composite IBCs subject to the hydraulic pressure test in 6.5.6.8, the temperature of the water used.
9. Test descriptions and results
10. The test report shall be signed with the name and status of the signatory

6.5.6.14.2 The test report shall contain statements that the IBC prepared as for transport was tested in accordance with the appropriate requirements of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority.

CHAPTER 6.6

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF LARGE PACKAGINGS

6.6.1 General

6.6.1.1 The requirements of this Chapter do not apply to:

(a) Class 2, except articles including aerosols;

(b) Class 6.2, except clinical waste of UN 3291;

(c) Class 7 packages containing radioactive material.

6.6.1.2 Large packagings shall be manufactured, tested and remanufactured under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured or remanufactured large packaging meets the requirements of this Chapter.

NOTE: *ISO 16106:2020 "Transport packages for dangerous goods – Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings – Guidelines for the application of ISO 9001" provides acceptable guidance on procedures which may be followed.*

6.6.1.3 The specific requirements for large packagings in 6.6.4 are based on large packagings currently used. In order to take into account progress in science and technology, there is no objection to the use of large packagings having specifications different from those in 6.6.4 provided they are equally effective, acceptable to the competent authority and able to successfully fulfil the requirements described in 6.6.5. Methods of testing other than those described in these Regulations are acceptable provided they are equivalent.

6.6.1.4 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for transport are capable of passing the applicable performance tests of this Chapter.

6.6.2 Code for designating types of large packagings

6.6.2.1 The code used for large packagings consists of:

(a) Two Arabic numerals:

50 for rigid large packagings; or
51 for flexible large packagings; and

(b) Capital letters in Latin characters indicating the nature of the material, e.g. wood, steel, etc. The capital letters used shall be those shown in 6.1.2.6.

6.6.2.2 The letters "T" or "W" may follow the large packaging code. The letter "T" signifies a large salvage packaging conforming to the requirements of 6.6.5.1.9. The letter "W" signifies that the large packaging, although of the same type indicated by the code, is manufactured to a specification different from those in 6.6.4 and is considered equivalent in accordance with the requirements in 6.6.1.3.

6.6.3 Marking

6.6.3.1 *Primary marking*

Each large packaging manufactured and intended for the use according to these Regulations shall bear marks which are durable, legible and placed in a location so as to be readily visible. Letters, numerals and symbols shall be at least 12 mm high and shall show:

(a) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8.

For metal large packagings on which the marks are stamped or embossed, the capital letters "UN" may be applied instead of the symbol;

(b) The code "50" designating a large rigid packaging or "51" for flexible large packagings, followed by the material type in accordance with 6.5.1.4.1 (b);

(c) A capital letter designating the packing group(s) for which the design type has been approved:

X for packing groups I, II and III
Y for packing groups II and III
Z for packing group III only;

(d) The month and year (last two digits) of manufacture;

(e) The State authorising the allocation of the mark; indicated by the distinguishing sign used on vehicles in international road traffic[1];

(f) The name or symbol of the manufacturer and other identification of the large packagings as specified by the competent authority;

(g) The stacking test load in kg. For large packagings not designed for stacking the figure "0" shall be shown;

(h) The maximum permissible gross mass in kilograms.

The primary mark required above shall be applied in the sequence of the sub-paragraphs.

Each mark applied in accordance with (a) to (h) shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable.

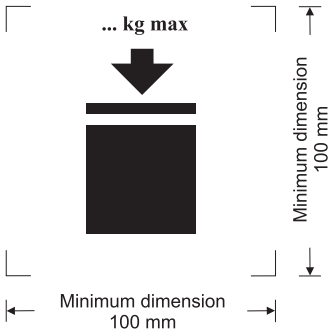
[1] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

6.6.3.2 ***Examples of marking***

50 A/X/05/01/N/PQRS 2500/1000	For a large steel packaging suitable for stacking; stacking load: 2 500 kg; maximum gross mass: 1 000 kg.
50AT/Y/05/01/B/PQRS 2500/1000	For a large steel salvage packaging suitable for stacking; stacking load: 2 500 kg; maximum gross mass: 1 000 kg.
50 H/Y04/02/D/ABCD 987 0/800	For a large plastics packaging not suitable for stacking; maximum gross mass: 800 kg.
51H/Z/06/01/S/1999 0/500	For a large flexible packaging not suitable for stacking; maximum gross mass: 500 kg.

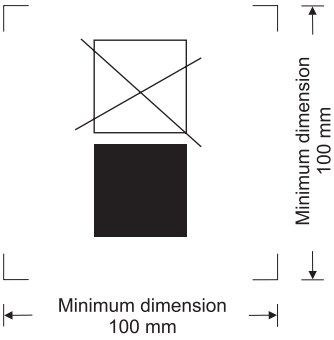
6.6.3.3 The maximum permitted stacking load applicable shall be displayed on a symbol as shown in Figure 6.6.1 or Figure 6.6.2. The symbol shall be durable and clearly visible.

Figure 6.6.1



Large packagings capable of being stacked

Figure 6.6.2



Large packagings NOT capable of being stacked

The minimum dimensions shall be 100 mm × 100 mm. The letters and numbers indicating the mass shall be at least 12 mm high. The area within the printer's marks indicated by the dimensional arrows shall be square. Where dimensions are not specified, all features shall be in approximate proportion to those shown. The mass marked above the symbol shall not exceed the load imposed during the design type test (see 6.6.5.3.3.4) divided by 1.8.

NOTE: *The provisions of 6.6.3.3 shall apply to all large packagings manufactured, repaired or remanufactured as from 1 January 2015. The provisions of 6.6.3.3 from the seventeenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations may continue to be applied to all large packagings manufactured, repaired or remanufactured between 1 January 2015 and 31 December 2016.*

6.6.3.4 Where a large packaging conforms to one or more than one tested large packaging design type, including one or more than one tested packaging or IBC design type, the large packaging may bear more than one mark to indicate the relevant performance test requirements that have been met. Where more than one mark appears on a large packaging, the marks shall appear in close proximity to one another and each mark shall appear in its entirety.

6.6.4 Specific requirements for large packagings

6.6.4.1 ***Specific requirements for metal large packagings***

50A steel
50B aluminium
50N metal (other than steel or aluminium)

6.6.4.1.1 The large packaging shall be made of suitable ductile metal in which the weldability has been fully demonstrated. Welds shall be skilfully made and afford complete safety. Low-temperature performance shall be taken into account when appropriate.

6.6.4.1.2 Care shall be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.

6.6.4.2 ***Specific requirements for flexible material large packagings***

51H flexible plastics
51M flexible paper

6.6.4.2.1 The large packaging shall be manufactured from suitable materials. The strength of the material and the construction of the flexible large packagings shall be appropriate to its capacity and its intended use.

6.6.4.2.2 All materials used in the construction of flexible large packagings of types 51M shall, after complete immersion in water for not less than 24 hours, retain at least 85 % of the tensile strength as measured originally on the material conditioned to equilibrium at 67 % relative humidity or less.

6.6.4.2.3 Seams shall be formed by stitching, heat sealing, gluing or any equivalent method. All stitched seam-ends shall be secured.

6.6.4.2.4 Flexible large packagings shall provide adequate resistance to ageing and to degradation caused by ultraviolet radiation or the climatic conditions, or by the substance contained, thereby rendering them appropriate to their intended use.

6.6.4.2.5 For plastics flexible large packagings where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the large packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.6.4.2.6 Additives may be incorporated into the material of the large packaging to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.6.4.2.7 When filled, the ratio of height to width shall be not more than 2:1.

6.6.4.3 ***Specific requirements for plastics large packagings***

50H rigid plastics

6.6.4.3.1 The large packaging shall be manufactured from suitable plastics material of known specifications and be of adequate strength in relation to its capacity and its intended use. The material shall be adequately resistant to ageing and to degradation caused by the substance contained or, where relevant, by ultraviolet radiation. Low temperature performance shall be taken into account when appropriate. Any permeation of the substance contained shall not constitute a danger under normal conditions of transport.

6.6.4.3.2 Where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the outer packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.6.4.3.3 Additives may be incorporated in the material of the large packaging to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.6.4.4 Specific requirements for fibreboard large packagings

50G rigid fibreboard

6.6.4.4.1 Strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used, appropriate to the capacity of the large packagings and to their intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m^2 – see ISO 535:1991. It shall have proper bending qualities. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting or corrugated fibreboard shall be firmly glued to the facings.

6.6.4.4.2 The walls, including top and bottom, shall have a minimum puncture resistance of 15 J measured according to ISO 3036:1975.

6.6.4.4.3 Manufacturing joins in the outer packaging of large packagings shall be made with an appropriate overlap and shall be taped, glued, stitched with metal staples or fastened by other means at least equally effective. Where joins are effected by gluing or taping, a water-resistant adhesive shall be used. Metal staples shall pass completely through all pieces to be fastened and be formed or protected so that any inner liner cannot be abraded or punctured by them.

6.6.4.4.4 Any integral pallet base forming part of a large packaging or any detachable pallet shall be suitable for mechanical handling with the large packaging filled to its maximum permissible gross mass.

6.6.4.4.5 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the large packaging that might be liable to damage in handling.

6.6.4.4.6 The body shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the large packaging.

6.6.4.4.7 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

6.6.4.4.8 Where large packagings are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

6.6.4.5 *Specific requirements for wooden large packagings*

50C natural wood
50D plywood
50F reconstituted wood

6.6.4.5.1 The strength of the materials used and the method of construction shall be appropriate to the capacity and intended use of the large packagings.

6.6.4.5.2 Natural wood shall be well-seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the large packagings. Each part of the large packagings shall consist of one piece or be equivalent thereto. Parts are considered equivalent to one piece when a suitable method of glued assembly is used as for instance Lindermann joint, tongue and groove joint, ship lap or rabbet joint; or butt joint with at least two corrugated metal fasteners at each joint, or when other methods at least equally effective are used.

6.6.4.5.3 Large packagings of plywood shall be at least 3-ply. They shall be made of well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the

strength of the large packaging. All adjacent plies shall be glued with water-resistant adhesive. Other suitable materials may be used with plywood for the construction of the large packaging.

6.6.4.5.4 Large packagings of reconstituted wood shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

6.6.4.5.5 Large packagings shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

6.6.4.5.6 Any integral pallet base forming part of a large packaging or any detachable pallet shall be suitable for mechanical handling with the large packaging filled to its maximum permissible gross mass.

6.6.4.5.7 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the large packaging that might be liable to damage in handling.

6.6.4.5.8 The body shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the large packaging.

6.6.4.5.9 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

6.6.4.5.10 Where large packagings are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

6.6.5 Test requirements for large packagings

6.6.5.1 *Performance and frequency of test*

6.6.5.1.1 The design type of each large packaging shall be tested as provided in 6.6.5.3 in accordance with procedures established by the competent authority.

6.6.5.1.2 Each large packaging design type shall successfully pass the tests prescribed in this chapter before being used. A large packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes large packagings which differ from the design type only in their lesser design height.

6.6.5.1.3 Tests shall be repeated on production samples at intervals established by the competent authority. For such tests on fibreboard large packagings, preparation at ambient conditions is considered equivalent to the provisions of 6.6.5.2.4.

6.6.5.1.4 Tests shall also be repeated after each modification which alters the design, material or manner of construction of large packagings.

6.6.5.1.5 The competent authority may permit the selective testing of large packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and large packagings which are produced with small reductions in external dimension(s).

6.6.5.1.6 *Reserved.*

NOTE: *For the conditions for assembling different inner packagings in a large packaging and permissible variations in inner packagings, see 4.1.1.5.1.*

6.6.5.1.7 The competent authority may at any time require proof, by tests in accordance with this section, that serially-produced large packagings meet the requirements of the design type tests.

6.6.5.1.8 Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one sample.

6.6.5.1.9 *Large salvage packagings*

Large salvage packagings shall be tested and marked in accordance with the provisions applicable to packing group II large packagings intended for the transport of solids or inner packagings, except as follows:

(a) The test substance used in performing the tests shall be water, and the large salvage packagings shall be filled to not less than 98 % of their maximum capacity. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass so long as they are placed so that the test results are not affected. Alternatively, in performing the drop test, the drop height may be varied in accordance with 6.6.5.3.4.4.2 (b);

(b) Large salvage packagings shall, in addition, have been successfully subjected to the leakproofness test at 30 kPa, with the results of this test reflected in the test report required by 6.6.5.4; and

(c) Large salvage packagings shall be marked with the letter "T" as described in 6.6.2.2.

6.6.5.2 *Preparation for testing*

6.6.5.2.1 Tests shall be carried out on large packagings prepared as for transport including the inner packagings or articles used. Inner packagings shall be filled to not less than 98 % of their maximum capacity for liquids or 95 % for solids. For large packagings where the inner packagings are designed to carry liquids and solids, separate testing is required for both liquid and solid contents. The substances in the inner packagings or the articles to be transported in the large packagings may be replaced by other material or articles except where this would invalidate the results of the tests. When other inner packagings or articles are used they shall have the same physical characteristics (mass, etc) as the inner packagings or articles to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected.

6.6.5.2.2 In the drop tests for liquids, when another substance is used, it shall be of similar relative density and viscosity to those of the substance being transported. Water may also be used for the liquid drop test under the conditions in 6.6.5.3.4.4.

6.6.5.2.3 Large packagings made of plastics materials and large packagings containing inner packagings of plastic materials - other than bags intended to contain solids or articles - shall be drop tested when the temperature of the test sample and its contents has been reduced to -18 °C or lower. This conditioning may be disregarded if the materials in question are of sufficient ductility and tensile strength at low temperatures. Where test sample are prepared in this way, the conditioning in 6.6.5.2.4 may be waived. Test liquids shall be kept in the liquid state by the addition of anti-freeze if necessary.

6.6.5.2.4 Large packagings of fibreboard shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h). There are three options, one of which shall be chosen.

The preferred atmosphere is 23 ± 2 °C and 50 % ± 2 % r.h. The two other options are: 20 ± 2 °C and 65 % ± 2 % r.h.; or 27 ± 2 °C and 65 % ± 2 % r.h.

NOTE: *Average values shall fall within these limits. Short-term fluctuations and measurement limitations may cause individual measurements to vary by up to ± 5 % relative humidity without significant impairment of test reproducibility.*

6.6.5.3 *Test requirements*

6.6.5.3.1 *Bottom lift test*

6.6.5.3.1.1 Applicability

For all types of large packagings which are fitted with means of lifting from the base, as a design type test.

6.6.5.3.1.2 Preparation of large packaging for test

The large packaging shall be loaded to 1.25 times its maximum permissible gross mass, the load being evenly distributed.

6.6.5.3.1.3 Method of testing

The large packaging shall be raised and lowered twice by a lift truck with the forks centrally positioned and spaced at three quarters of the dimension of the side of entry (unless the points of entry are fixed). The forks shall penetrate to three quarters of the direction of entry. The test shall be repeated from each possible direction of entry.

6.6.5.3.1.4 Criteria for passing the test

No permanent deformation which renders the large packaging unsafe for transport and no loss of contents.

6.6.5.3.2 *Top lift test*

6.6.5.3.2.1 Applicability

For types of large packagings which are intended to be lifted from the top and fitted with means of lifting, as a design type test.

6.6.5.3.2.2 Preparation of large packaging for test

The large packaging shall be loaded to twice its maximum permissible gross mass. A flexible large packaging shall be loaded to six times its maximum permissible gross mass, the load being evenly distributed.

6.6.5.3.2.3 Method of testing

The large packaging shall be lifted in the manner for which it is designed until clear of the floor and maintained in that position for a period of five minutes.

6.6.5.3.2.4 Criteria for passing the test

(a) Metal and rigid plastics large packagings: no permanent deformation which renders the large packaging, including the base pallet, if any, unsafe for transport and no loss of contents;

(b) Flexible large packagings: no damage to the large packaging or its lifting devices which renders the large packaging unsafe for transport or handling and no loss of contents.

6.6.5.3.3 *Stacking test*

6.6.5.3.3.1 Applicability

For all types of large packagings which are designed to be stacked on each other, as a design type test.

6.6.5.3.3.2 Preparation of large packaging for test

The large packaging shall be filled to its maximum permissible gross mass.

6.6.5.3.3.3 Method of testing

The large packaging shall be placed on its base on level hard ground and subjected to a uniformly distributed superimposed test load (see 6.6.5.3.3.4) for a period of at least five minutes: for large packagings of wood, fibreboard and plastics materials the period shall be 24 h.

6.6.5.3.3.4 Calculation of superimposed test load

The load to be placed on the large packaging shall be 1.8 times the combined maximum permissible gross mass of the number of similar large packaging that may be stacked on top of the large packaging during transport.

6.6.5.3.3.5 Criteria for passing the test

(a) All types of large packagings other than flexible large packagings: no permanent deformation which renders the large packaging including the base pallet, if any, unsafe for transport and no loss of contents;

(b) Flexible large packagings: no deterioration of the body which renders the large packaging unsafe for transport and no loss of contents.

6.6.5.3.4 *Drop test*

6.6.5.3.4.1 Applicability

For all types of large packagings as a design type test.

6.6.5.3.4.2 Preparation of large packaging for testing

The large packaging shall be filled in accordance with 6.6.5.2.1.

6.6.5.3.4.3 Method of testing

The large packaging shall be dropped onto a non resilient, horizontal, flat, massive and rigid surface in conformity with the requirements of 6.1.5.3.4, in such a manner as to ensure that the point of impact is that part of the base of the large packaging considered to be the most vulnerable.

6.6.5.3.4.4 Drop height

NOTE: *Large packagings for substances and articles of Class 1 shall be tested at the packing group II performance level.*

6.6.5.3.4.4.1 For inner packagings containing solid or liquid substances or articles, if the test is performed with the solid, liquid or articles to be transported, or with another substance or article having essentially the same characteristics:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

6.6.5.3.4.4.2 For inner packagings containing liquids if the test is performed with water:

(a) Where the substances to be transported have a relative density not exceeding 1.2:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

(b) Where the substances to be transported have a relative density exceeding 1.2, the drop height shall be calculated on the basis of the relative density (d) of the substance to be carried, rounded up to the first decimal, as follows:

Packing group I	Packing group II	Packing group III
d ×1.5 (m)	d × 1.0 (m)	d × 0.67 (m)

6.6.5.3.4.5 Criteria for passing the test

6.6.5.3.4.5.1 The large packaging shall not exhibit any damage liable to affect safety during transport. There shall be no leakage of the filling substance from inner packaging(s) or article(s).

6.6.5.3.4.5.2 No rupture is permitted in large packagings for articles of Class 1 which would permit the spillage of loose explosive substances or articles from the large packaging.

6.6.5.3.4.5.3 Where a large packaging undergoes a drop test, the sample passes the test if the entire contents are retained even if the closure is no longer sift-proof.

6.6.5.4 ***Certification and test report***

6.6.5.4.1 In respect of each design type of large packaging a certificate and mark (as in 6.6.3) shall be issued attesting that the design type including its equipment meets the test requirements.

6.6.5.4.2 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the large packaging:

1. Name and address of the test facility;
2. Name and address of applicant (where appropriate);
3. A unique test report identification;
4. Date of the test report;
5. Manufacturer of the large packaging;
6. Description of the large packaging design type (e.g. dimensions, materials, closures, thickness, etc) and/or photograph(s);
7. Maximum capacity/maximum permissible gross mass;
8. Characteristics of test contents, e.g. types and descriptions of inner packagings or articles used;
9. Test descriptions and results;
10. The test report shall be signed with the name and status of the signatory.

6.6.5.4.3 The test report shall contain statements that the large packaging prepared as for transport was tested in accordance with the appropriate provisions of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority.

CHAPTER 6.7

REQUIREMENTS FOR THE DESIGN, CONSTRUCTION, INSPECTION AND TESTING OF PORTABLE TANKS AND MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs)

NOTE: *The requirements of this Chapter also apply to portable tanks with shells made of fibre-reinforced plastics (FRP) to the extent indicated in Chapter 6.9.*

6.7.1 Application and general requirements

6.7.1.1 The requirements of this Chapter apply to portable tanks intended for the transport of dangerous goods, and to MEGCs intended for the transport of non-refrigerated gases of Class 2, by all modes of transport. In addition to the requirements of this Chapter, unless otherwise specified, the applicable requirements of the International Convention for Safe Containers (CSC) 1972, as amended, shall be fulfilled by any multimodal portable tank or MEGC which meets the definition of a "container" within the terms of that Convention. Additional requirements may apply to offshore portable tanks or MEGCs that are handled in open seas.

6.7.1.2 In recognition of scientific and technological advances, the technical requirements of this Chapter may be varied by alternative arrangements. These alternative arrangements shall offer a level of safety not less than that given by the requirements of this Chapter with respect to the compatibility with substances transported and the ability of the portable tank or MEGC to withstand impact, loading and fire conditions. For international transport, alternative arrangement portable tanks or MEGCs shall be approved by the applicable competent authorities.

6.7.1.3 When a substance is not assigned a portable tank instruction (T1 to T23, T50 or T75) in Column 10 of the Dangerous Goods List in Chapter 3.2, interim approval for transport may be issued by the competent authority of the country of origin. The approval shall be included in the documentation of the consignment and contain as a minimum the information normally provided in the portable tank instructions and the conditions under which the substance shall be transported. Appropriate measures shall be initiated by the competent authority to include the assignment in the Dangerous Goods List.

6.7.2 Requirements for the design, construction, inspection and testing of portable tanks intended for the transport of substances of Class 1 and Classes 3 to 9

6.7.2.1 *Definitions*

For the purposes of this section:

Design pressure means the pressure to be used in calculations required by a recognized pressure vessel code. The design pressure shall be not less than the highest of the following pressures:

(a) The maximum effective gauge pressure allowed in the shell during filling or discharge; or

(b) The sum of:

(i) the absolute vapour pressure (in bar) of the substance at 65 °C (at highest temperature during filling, discharge or transport for substances transported above 65 °C), minus 1 bar; and

(ii) the partial pressure (in bar) of air or other gases in the ullage space being determined by a maximum ullage temperature of 65 °C and a liquid expansion due to an increase in mean bulk temperature of $t_r - t_f$ (t_f = filling temperature usually 15 °C; t_r = 50 °C maximum mean bulk temperature); and

(iii) a head pressure determined on the basis of the static forces specified in 6.7.2.2.12, but not less than 0.35 bar; or

(c) Two thirds of the minimum test pressure specified in the applicable portable tank instruction in 4.2.5.2.6;

Design temperature range for the shell shall be -40 °C to 50 °C for substances transported under ambient conditions. For the other substances handled under elevated temperature conditions the design temperature shall be not less than the maximum temperature of the substance during filling, discharge or transport. More severe design temperatures shall be considered for portable tanks subjected to severe climatic conditions;

Fine grain steel means steel which has a ferritic grain size of 6 or finer when determined in accordance with ASTM E 112-96 or as defined in EN 10028-3, Part 3;

Fusible element means a non-reclosable pressure relief device that is thermally actuated;

Leakproofness test means a test using gas subjecting the shell and its service equipment to an effective internal pressure of not less than 25 % of the MAWP;

Maximum allowable working pressure (MAWP) means a pressure that shall be not less than the highest of the following pressures measured at the top of the shell while in operating position:

(a) The maximum effective gauge pressure allowed in the shell during filling or discharge; or

(b) The maximum effective gauge pressure to which the shell is designed which shall be not less than the sum of:

(i) the absolute vapour pressure (in bar) of the substance at 65 °C (at the highest temperature during filling, discharge or transport for substances transported above 65 °C), minus 1 bar; and

(ii) the partial pressure (in bar) of air or other gases in the ullage space being determined by a maximum ullage temperature of 65 °C and a liquid expansion due to an increase in mean bulk temperature of $t_r - t_f$ (t_f = filling temperature, usually 15 °C; t_r = 50 °C, maximum mean bulk temperature);

Maximum permissible gross mass (MPGM) means the sum of the tare mass of the portable tank and the heaviest load authorized for transport;

Mild steel means a steel with a guaranteed minimum tensile strength of 360 N/mm^2 to 440 N/mm^2 and a guaranteed minimum elongation at fracture conforming to 6.7.2.3.3.3;

Offshore portable tank means a portable tank specially designed for repeated use for transport of dangerous goods to, from and between offshore facilities. An offshore portable tank is designed and constructed in accordance with the Guidelines for the Approval of Containers Handled in Open Seas specified by the International Maritime Organization in document MSC/Circ.860.

Portable tank means a multimodal tank used for the transport of substances of Class 1 and Classes 3 to 9. The portable tank includes a shell fitted with service equipment and structural equipment necessary for the transport of dangerous substances. The portable tank shall be capable of being filled and discharged without the removal of its structural equipment. It shall possess stabilizing members external to the shell, and shall be capable of being lifted when full. It shall be designed primarily to be loaded onto a transport vehicle or ship and shall be equipped with skids, mountings or accessories to facilitate mechanical handling. Road tank-vehicles, rail tank-wagons, non-metallic tanks and intermediate bulk containers (IBCs) are not considered to fall within the definition for portable tanks;

Reference steel means a steel with a tensile strength of 370 N/mm^2 and an elongation at fracture of 27 %;

Service equipment means measuring instruments and filling, discharge, venting, safety, heating, cooling and insulating devices;

Shell means the part of the portable tank which retains the substance intended for transport (tank proper), including openings and their closures, but does not include service equipment or external structural equipment;

Structural equipment means the reinforcing, fastening, protective and stabilizing members external to the shell;

Test pressure means the maximum gauge pressure at the top of the shell during the hydraulic pressure test equal to not less than 1.5 times the design pressure. The minimum test pressure for portable tanks intended for specific substances is specified in the applicable portable tank instruction in 4.2.5.2.6.

6.7.2.2 ***General design and construction requirements***

6.7.2.2.1 Shells shall be designed and constructed in accordance with the requirements of a pressure vessel code recognized by the competent authority. Shells shall be made of metallic materials suitable for forming. The materials shall in principle conform to national or international material standards. For welded shells only a material whose weldability has been fully demonstrated shall be used. Welds shall be skilfully made and afford complete safety. When the manufacturing process or the materials make it necessary, the shells shall be suitably heat-treated to guarantee adequate toughness in the weld and in the heat affected zones. In choosing the material, the design temperature range shall be taken into account with respect to risk of brittle fracture, to stress corrosion cracking and to resistance to impact. When fine grain steel is used, the guaranteed value of the yield strength shall be not more than 460 N/mm^2 and the guaranteed value of the upper limit of the tensile strength shall be not more than 725 N/mm^2 according to the material specification. Aluminium may only be used as a construction material when indicated in a portable tank special provision assigned to a specific substance in Column 11 of the Dangerous Goods List or when approved by the competent authority. When aluminium is authorized, it shall be insulated to prevent significant loss of physical properties when subjected to a heat load of 110 kW/m^2 for a period of not less than 30 minutes. The insulation shall remain effective at all temperatures less than 649 °C and shall be jacketed with a material with a melting point of not less than 700 °C. Portable tank materials shall be suitable for the external environment in which they may be transported.

6.7.2.2.2 Portable tank shells, fittings, and pipework shall be constructed from materials which are:

(a) Substantially immune to attack by the substance(s) intended to be transported; or

(b) Properly passivated or neutralized by chemical reaction; or

(c) Lined with corrosion-resistant material directly bonded to the shell or attached by equivalent means.

6.7.2.2.3 Gaskets shall be made of materials not subject to attack by the substance(s) intended to be transported.

6.7.2.2.4 When shells are lined, the lining shall be substantially immune to attack by the substance(s) intended to be transported, homogeneous, non porous, free from perforations, sufficiently elastic and compatible with the thermal expansion characteristics of the shell. The lining of every shell, shell fittings and piping shall be continuous, and shall extend around the face of any flange. Where external fittings are welded to the tank, the lining shall be continuous through the fitting and around the face of external flanges.

6.7.2.2.5 Joints and seams in the lining shall be made by fusing the material together or by other equally effective means.

6.7.2.2.6 Contact between dissimilar metals which could result in damage by galvanic action shall be avoided.

6.7.2.2.7 The materials of the portable tank, including any devices, gaskets, linings and accessories, shall not adversely affect the substance(s) intended to be transported in the portable tank.

6.7.2.2.8 Portable tanks shall be designed and constructed with supports to provide a secure base during transport and with suitable lifting and tie-down attachments.

6.7.2.2.9 Portable tanks shall be designed to withstand, without loss of contents, at least the internal pressure due to the contents, and the static, dynamic and thermal loads during normal conditions of handling and transport. The design shall demonstrate that the effects of fatigue, caused by repeated application of these loads through the expected life of the portable tank, have been taken into account.

6.7.2.2.9.1 For portable tanks that are intended for use offshore, the dynamic stresses imposed by handling in open seas shall be taken into account.

6.7.2.2.10 A shell which is to be equipped with a vacuum-relief device shall be designed to withstand, without permanent deformation, an external pressure of not less than 0.21 bar above the internal pressure. The vacuum-relief device shall be set to relieve at a vacuum setting not greater than minus 0.21 bar unless the shell is designed for a higher external over pressure, in which case the vacuum-relief pressure of the device to be fitted shall be not greater than the tank design vacuum pressure. A shell used for the transport of solid substances of packing groups II or III only, which do not liquefy during transport, may be designed for a lower external pressure, subject to competent authority approval. In this case, the vacuum-relief device shall be set to relieve at this lower pressure. A shell that is not to be fitted with a vacuum-relief device shall be designed to withstand, without permanent deformation, an external pressure of not less than 0.4 bar above the internal pressure.

6.7.2.2.11 Vacuum-relief devices used on portable tanks intended for the transport of substances meeting the flash point criteria of Class 3, including elevated temperature substances transported at or above their flash point, shall prevent the immediate passage of flame into the shell, or the portable tank shall have a shell capable of withstanding, without leakage an internal explosion resulting from the passage of flame into the shell.

6.7.2.2.12 Portable tanks and their fastenings shall, under the maximum permissible load, be capable of absorbing the following separately applied static forces:

(a) In the direction of travel: twice the MPGM multiplied by the acceleration due to gravity (g)[1];

(b) Horizontally at right angles to the direction of travel: the MPGM (when the direction of travel is not clearly determined, the forces shall be equal to twice the MPGM) multiplied by the acceleration due to gravity (g)1;

(c) Vertically upwards: the MPGM multiplied by the acceleration due to gravity (g) [1]; and

(d) Vertically downwards: twice the MPGM (total loading including the effect of gravity) multiplied by the acceleration due to gravity (g) [1].

6.7.2.2.13 Under each of the forces in 6.7.2.2.12, the safety factor to be observed shall be as follows:

(a) For metals having a clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed yield strength; or

(b) For metals with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2 % proof strength and, for austenitic steels, the 1 % proof strength.

6.7.2.2.14 The values of yield strength or proof strength shall be the values according to national or international material standards. When austenitic steels are used, the specified minimum values of yield strength or proof strength according to the material standards may be increased by up to 15 % when these greater values are attested in the material inspection certificate. When no material standard exists for the metal in question, the value of yield strength or proof strength used shall be approved by the competent authority.

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1 *For calculation purposes $g = 9.81\ m/s^2$.*

6.7.2.2.15 Portable tanks shall be capable of being electrically earthed when intended for the transport of substances meeting the flash point criteria of Class 3 including elevated temperature substances transported at or above their flash point. Measures shall be taken to prevent dangerous electrostatic discharge.

6.7.2.2.16 When required for certain substances by the applicable portable tank instruction indicated in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6, or by a portable tank special provision indicated in Column 11 of the Dangerous Goods List and described in 4.2.5.3, portable tanks shall be provided with additional protection, which may take the form of additional shell thickness or a higher test pressure, the additional shell thickness or higher test pressure being determined in the light of the inherent risks associated with the transport of the substances concerned.

6.7.2.2.17 Thermal insulation directly in contact with the shell intended for substances transported at elevated temperature shall have an ignition temperature at least 50 °C higher than the maximum design temperature of the tank.

6.7.2.3 ***Design criteria***

6.7.2.3.1 Shells shall be of a design capable of being stress-analysed mathematically or experimentally by resistance strain gauges, or by other methods approved by the competent authority.

6.7.2.3.2 Shells shall be designed and constructed to withstand a hydraulic test pressure not less than 1.5 times the design pressure. Specific requirements are laid down for certain substances in the applicable portable tank instruction indicated in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6 or by a portable tank special provision indicated in Column 11 of the Dangerous Goods List and described in 4.2.5.3. Attention is drawn to the minimum shell thickness requirements for these tanks specified in 6.7.2.4.1 to 6.7.2.4.10.

6.7.2.3.3 For metals exhibiting a clearly defined yield point or characterized by a guaranteed proof strength (0.2 % proof strength, generally, or 1 % proof strength for austenitic steels) the primary membrane stress σ (sigma) in the shell shall not exceed 0.75 Re or 0.50 Rm, whichever is lower, at the test pressure, where:

Re = yield strength in N/mm^2, or 0.2 % proof strength or, for austenitic steels, 1 % proof strength;
Rm = minimum tensile strength in N/mm^2.

6.7.2.3.3.1 The values of Re and Rm to be used shall be the specified minimum values according to national or international material standards. When austenitic steels are used, the specified minimum values for Re and Rm according to the material standards may be increased by up to 15 % when greater values are attested in the material inspection certificate. When no material standard exists for the metal in question, the values of Re and Rm used shall be approved by the competent authority or its authorized body.

6.7.2.3.3.2 Steels which have a Re/Rm ratio of more than 0.85 are not allowed for the construction of welded shells. The values of Re and Rm to be used in determining this ratio shall be the values specified in the material inspection certificate.

6.7.2.3.3.3 Steels used in the construction of shells shall have an elongation at fracture, in %, of not less than 10 000/Rm with an absolute minimum of 16 % for fine grain steels and 20 % for other steels. Aluminium and aluminium alloys used in the construction of shells shall have an elongation at fracture, in %, of not less than 10 000/6Rm with an absolute minimum of 12 %.

6.7.2.3.3.4 For the purpose of determining actual values for materials, it shall be noted that for sheet metal, the axis of the tensile test specimen shall be at right angles (transversely) to the direction of rolling. The permanent elongation at fracture shall be measured on test specimens of rectangular cross sections in accordance with ISO 6892:1998 using a 50 mm gauge length.

6.7.2.4 ***Minimum shell thickness***

6.7.2.4.1 The minimum shell thickness shall be the greater thickness based on:

(a) The minimum thickness determined in accordance with the requirements of 6.7.2.4.2 to 6.7.2.4.10;

(b) The minimum thickness determined in accordance with the recognized pressure vessel code including the requirements in 6.7.2.3; and

(c) The minimum thickness specified in the applicable portable tank instruction indicated in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6, or by a portable tank special provision indicated in Column 11 of the Dangerous Goods List and described in 4.2.5.3.

6.7.2.4.2 The cylindrical portions, ends (heads) and manhole covers of shells not more than 1.80 m in diameter shall be not less than 5 mm thick in the reference steel or of equivalent thickness in the metal to be used. Shells more than 1.80 m in diameter shall be not less than 6 mm thick in the reference steel or of equivalent thickness in the metal to be used, except that for powdered or granular solid substances of Packing Group II or III the minimum thickness requirement may be reduced to not less than 5 mm thick in the reference steel or of equivalent thickness in the metal to be used.

6.7.2.4.3 When additional protection against shell damage is provided, portable tanks with test pressures less than 2.65 bar, may have the minimum shell thickness reduced, in proportion to the protection provided, as approved by the competent authority. However, shells not more than 1.80 m in diameter shall be not less than 3 mm thick in the reference steel or of equivalent thickness in the metal to be used. Shells more than 1.80 m in diameter shall be not less than 4 mm thick in the reference steel or of equivalent thickness in the metal to be used.

6.7.2.4.4 The cylindrical portions, ends (heads) and manhole covers of all shells shall be not less than 3 mm thick regardless of the material of construction.

6.7.2.4.5 The additional protection referred to in 6.7.2.4.3 may be provided by overall external structural protection, such as suitable “sandwich” construction with the outer sheathing (jacket) secured to the shell, double wall construction or by enclosing the shell in a complete framework with longitudinal and transverse structural members.

6.7.2.4.6 The equivalent thickness of a metal other than the thickness prescribed for the reference steel in 6.7.2.4.3 shall be determined using the following formula:

$$e_1 = \frac{21.4e_0}{\sqrt[3]{Rm_1 \times A_1}}$$

where:

e_1 = required equivalent thickness (in mm) of the metal to be used;

e_0 = minimum thickness (in mm) of the reference steel specified in the applicable portable tank instruction indicated in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6 or by a portable tank special provision indicated in Column 11 of the Dangerous Goods List and described in 4.2.5.3;

Rm_1 = guaranteed minimum tensile strength (in N/mm^2) of the metal to be used (see 6.7.2.3.3);

A_1 = guaranteed minimum elongation at fracture (in %) of the metal to be used according to national or international standards.

6.7.2.4.7 When in the applicable portable tank instruction in 4.2.5.2.6, a minimum thickness of 8 mm or 10 mm is specified, it shall be noted that these thicknesses are based on the properties of the reference steel and a shell diameter of 1.80 m. When a metal other than mild steel (see 6.7.2.1) is used or the shell has a diameter of more than 1.80 m, the thickness shall be determined using the following formula:

$$e_1 = \frac{21.4e_0d_1}{1.8\sqrt[3]{Rm_1 \times A_1}}$$

where:

e_1 = required equivalent thickness (in mm) of the metal to be used;

e_0 = minimum thickness (in mm) of the reference steel specified in the applicable portable tank instruction indicated in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6 or by a portable tank special provision indicated in Column 11 of the Dangerous Goods List and described in 4.2.5.3;

d_1 = diameter of the shell (in m), but not less than 1.80 m;

Rm_1 = guaranteed minimum tensile strength (in N/mm^2) of the metal to be used (see 6.7.2.3.3);

A_1 = guaranteed minimum elongation at fracture (in %) of the metal to be used according to national or international standards.

6.7.2.4.8 In no case shall the wall thickness be less than that prescribed in 6.7.2.4.2, 6.7.2.4.3 and 6.7.2.4.4. All parts of the shell shall have a minimum thickness as determined by 6.7.2.4.2 to 6.7.2.4.4. This thickness shall be exclusive of any corrosion allowance.

6.7.2.4.9 When mild steel is used (see 6.7.2.1), calculation using the formula in 6.7.2.4.6 is not required.

6.7.2.4.10 There shall be no sudden change of plate thickness at the attachment of the ends (heads) to the cylindrical portion of the shell.

6.7.2.5 ***Service equipment***

6.7.2.5.1 Service equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during handling and transport. When the connection between the frame and the shell allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without risk of damage to working parts. The external discharge fittings (pipe sockets, shut-off devices), the internal stop-valve and its seating shall be protected against the danger of being wrenched off by external forces (for example using shear sections). The filling and discharge devices (including flanges or threaded plugs) and any protective caps shall be capable of being secured against unintended opening.

6.7.2.5.2 All openings in the shell, intended for filling or discharging the portable tank shall be fitted with a manually operated stop-valve located as close to the shell as reasonably practicable. Other openings, except for openings leading to venting or pressure-relief devices, shall be equipped with either a stop-valve or another suitable means of closure located as close to the shell as reasonably practicable.

6.7.2.5.3 All portable tanks shall be fitted with a manhole or other inspection openings of a suitable size to allow for internal inspection and adequate access for maintenance and repair of the interior. Compartmented portable tanks shall have a manhole or other inspection openings for each compartment.

6.7.2.5.4 As far as reasonably practicable, external fittings shall be grouped together. For insulated portable tanks, top fittings shall be surrounded by a spill collection reservoir with suitable drains.

6.7.2.5.5 Each connection to a portable tank shall be clearly marked to indicate its function.

6.7.2.5.6 Each stop-valve or other means of closure shall be designed and constructed to a rated pressure not less than the MAWP of the shell taking into account the temperatures expected during transport. All stop-valves with screwed spindles shall close by a clockwise motion of the handwheel. For other stop-valves the position (open and closed) and direction of closure shall be clearly indicated. All stop-valves shall be designed to prevent unintentional opening.

6.7.2.5.7 No moving parts, such as covers, components of closures, etc., shall be made of unprotected corrodible steel when they are liable to come into frictional or percussive contact with aluminium portable tanks intended for the transport of substances meeting the flash point criteria of Class 3 including elevated temperature substances transported at or above their flash point.

6.7.2.5.8 Piping shall be designed, constructed and installed so as to avoid the risk of damage due to thermal expansion and contraction, mechanical shock and vibration. All piping shall be of a suitable metallic material. Welded pipe joints shall be used wherever possible.

6.7.2.5.9 Joints in copper tubing shall be brazed or have an equally strong metal union. The melting point of brazing materials shall be no lower than 525 °C. The joints shall not decrease the strength of the tubing as may happen when cutting threads.

6.7.2.5.10 The burst pressure of all piping and pipe fittings shall be not less than the highest of four times the MAWP of the shell or four times the pressure to which it may be subjected in service by the action of a pump or other device (except pressure-relief devices).

6.7.2.5.11 Ductile metals shall be used in the construction of valves and accessories.

6.7.2.5.12 The heating system shall be designed or controlled so that a substance cannot reach a temperature at which the pressure in the tank exceeds its MAWP or causes other hazards (e.g. dangerous thermal decomposition).

6.7.2.5.13 The heating system shall be designed or controlled so that power for internal heating elements shall not be available unless the heating elements are completely submerged. The temperature at the surface of the heating elements for internal heating equipment, or the temperature at the shell for external heating equipment shall, in no case, exceed 80 % of the autoignition temperature (in °C) of the substance transported.

6.7.2.5.14 If an electrical heating system is installed inside the tank, it shall be equipped with an earth leakage circuit breaker with a releasing current of less than 100 mA.

6.7.2.5.15 Electrical switch cabinets mounted to tanks shall not have a direct connection to the tank interior and shall provide protection of at least the equivalent of type IP56 according to IEC 144 or IEC 529.

6.7.2.6 ***Bottom openings***

6.7.2.6.1 Certain substances shall not be transported in portable tanks with bottom openings. When the applicable portable tank instruction identified in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6 indicates that bottom openings are prohibited there shall be no openings below the liquid level of the shell when it is filled to its maximum permissible filling limit. When an existing opening is closed it shall be accomplished by internally and externally welding one plate to the shell.

6.7.2.6.2 Bottom discharge outlets for portable tanks carrying certain solid, crystallizable or highly viscous substances shall be equipped with not less than two serially fitted and mutually independent shut-off devices. The design of the equipment shall be to the satisfaction of the competent authority or its authorized body and shall include:

(a) An external stop-valve, fitted as close to the shell as reasonably practicable, and so designed as to prevent any unintended opening through impact or other inadvertent act; and

(b) A liquid tight closure at the end of the discharge pipe, which may be a bolted blank flange or a screw cap.

6.7.2.6.3 Every bottom discharge outlet, except as provided in 6.7.2.6.2, shall be equipped with three serially fitted and mutually independent shut-off devices. The design of the equipment shall be to the satisfaction of the competent authority or its authorized body and include:

(a) A self-closing internal stop-valve, that is a stop-valve within the shell or within a welded flange or its companion flange, such that:

(i) The control devices for the operation of the valve are designed so as to prevent any unintended opening through impact or other inadvertent act;

(ii) The valve may be operable from above or below;

(iii) If possible, the setting of the valve (open or closed) shall be capable of being verified from the ground;

(iv) Except for portable tanks having a capacity of not more than 1 000 litres, it shall be possible to close the valve from an accessible position of the portable tank that is remote from the valve itself; and

(v) The valve shall continue to be effective in the event of damage to the external device for controlling the operation of the valve;

(b) An external stop-valve fitted as close to the shell as reasonably practicable; and

(c) A liquid tight closure at the end of the discharge pipe, which may be a bolted blank flange or a screw cap.

6.7.2.6.4 For a lined shell, the internal stop-valve required by 6.7.2.6.3 (a) may be replaced by an additional external stop-valve. The manufacturer shall satisfy the requirements of the competent authority or its authorized body.

6.7.2.7 ***Safety relief devices***

6.7.2.7.1 All portable tanks shall be fitted with at least one pressure-relief device. All relief devices shall be designed, constructed and marked to the satisfaction of the competent authority or its authorized body.

6.7.2.8 ***Pressure-relief devices***

6.7.2.8.1 Every portable tank with a capacity not less than 1 900 litres and every independent compartment of a portable tank with a similar capacity, shall be provided with one or more pressure-relief devices of the spring-loaded type and may in addition have a frangible disc or fusible element in parallel with the spring-loaded devices except when prohibited by reference to 6.7.2.8.3 in the applicable portable tank instruction in 4.2.5.2.6. The pressure-relief devices shall have sufficient capacity to prevent rupture of the shell due to over pressurization or vacuum resulting from filling, discharging, or from heating of the contents.

6.7.2.8.2 Pressure-relief devices shall be designed to prevent the entry of foreign matter, the leakage of liquid and the development of any dangerous excess pressure.

6.7.2.8.3 When required for certain substances by the applicable portable tank instruction identified in Column 10 of the Dangerous Goods List and described in 4.2.5.2.6, portable tanks shall have a pressure-relief device approved by the competent authority. Unless a portable tank in dedicated service is fitted with an approved relief device constructed of materials compatible with the load, the relief device shall comprise a frangible disc preceding a spring-loaded pressure-relief device. When a frangible disc is inserted in series with the required pressure-relief device, the space between the frangible disc and the pressure-relief device shall be provided with a pressure gauge or suitable tell-tale indicator for the detection of disc rupture, pinholing, or leakage which could cause a malfunction of the pressure-relief system. The frangible disc shall rupture at a nominal pressure 10 % above the start to discharge pressure of the relief device.

6.7.2.8.4 Every portable tank with a capacity less than 1 900 litres shall be fitted with a pressure-relief device which may be a frangible disc when this disc complies with the requirements of 6.7.2.11.1. When no spring-loaded pressure-relief device is used, the frangible disc shall be set to rupture at a nominal pressure equal to the test pressure. In addition, fusible elements conforming to 6.7.2.10.1 may also be used.

6.7.2.8.5 When the shell is fitted for pressure discharge, the inlet line shall be provided with a suitable pressure-relief device set to operate at a pressure not higher than the MAWP of the shell, and a stop-valve shall be fitted as close to the shell as reasonably practicable.

6.7.2.9 ***Setting of pressure-relief devices***

6.7.2.9.1 It shall be noted that the pressure-relief devices shall operate only in conditions of excessive rise in temperature, since the shell shall not be subject to undue fluctuations of pressure during normal conditions of transport (see 6.7.2.12.2).

6.7.2.9.2 The required pressure-relief device shall be set to start-to-discharge at a nominal pressure of five-sixths of the test pressure for shells having a test pressure of not more than 4.5 bar and 110 % of two-thirds of the test pressure for shells having a test pressure of more than 4.5 bar. After discharge the device shall close at a pressure not more than 10 % below the pressure at which the discharge starts. The device shall remain closed at all lower pressures. This requirement does not prevent the use of vacuum-relief or combination pressure-relief and vacuum-relief devices.

6.7.2.10 ***Fusible elements***

6.7.2.10.1 Fusible elements shall operate at a temperature between 100 °C and 149 °C on condition that the pressure in the shell at the fusing temperature will be not more than the test pressure. They shall be placed at the top of the shell with their inlets in the vapour space and when used for transport safety purposes, they shall not be shielded from external heat. Fusible elements shall not be used on portable tanks with a test pressure which exceeds 2.65 bar unless specified by special provision TP36 in Column 11 of the Dangerous Goods List of Chapter 3.2. Fusible elements used on portable tanks intended for the transport of elevated temperature substances shall be designed to operate at a temperature higher than the maximum temperature that will be experienced during transport and shall be to the satisfaction of the competent authority or its authorized body.

6.7.2.11 ***Frangible discs***

6.7.2.11.1 Except as specified in 6.7.2.8.3, frangible discs shall be set to rupture at a nominal pressure equal to the test pressure throughout the design temperature range. Particular attention shall be given to the requirements of 6.7.2.5.1 and 6.7.2.8.3 if frangible discs are used.

6.7.2.11.2 Frangible discs shall be appropriate for the vacuum pressures which may be produced in the portable tank.

6.7.2.12 ***Capacity of pressure-relief devices***

6.7.2.12.1 The spring-loaded pressure-relief device required by 6.7.2.8.1 shall have a minimum cross sectional flow area equivalent to an orifice of 31.75 mm diameter. Vacuum-relief devices, when used, shall have a cross sectional flow area not less than 284 mm2.

6.7.2.12.2 The combined delivery capacity of the pressure relief system (taking into account the reduction of the flow when the portable tank is fitted with frangible-discs preceding spring-loaded pressure-relief devices or when the spring-loaded pressure-relief devices are provided with a device to prevent the passage of the flame), in condition of complete fire engulfment of the portable tank shall be sufficient to limit the pressure in the shell to 20 % above the start-to-discharge pressure of the pressure limiting device. Emergency pressure-relief devices may be used to achieve the full relief capacity prescribed. These devices may be fusible, spring loaded or frangible disc components, or a combination of spring-loaded and frangible disc devices. The total required capacity of the relief devices may be determined using the formula in 6.7.2.12.2.1 or the table in 6.7.2.12.2.3.

6.7.2.12.2.1 To determine the total required capacity of the relief devices, which shall be regarded as being the sum of the individual capacities of all the contributing devices, the following formula shall be used:

$$Q = 12.4 \frac{FA^{0.82}}{LC} \sqrt{\frac{ZT}{M}}$$

where:

Q = minimum required rate of discharge in cubic metres of air per second (m^3/s) at standard conditions: 1 bar and 0 °C (273 K);

F = is a coefficient with the following value:

for uninsulated shells F = 1;

for insulated shells F = U(649 - t)/13.6

but in no case is less than 0.25, where:

U = heat transfer coefficient of the insulation, in $kW \cdot m^{-2} \cdot K^{-1}$, at 38 °C

t = actual temperature of the substance during filling (in °C);

when this temperature is unknown, let t = 15 °C:

The value of F given above for insulated shells may be taken provided that the insulation is in conformance with 6.7.2.12.2.4;

A = total external surface area of shell in square metres;

Z = the gas compressibility factor in the accumulating condition (when this factor is unknown, let Z equal 1.0);

T = absolute temperature in Kelvin (°C + 273) above the pressure-relief devices in the accumulating condition;

L = the latent heat of vaporization of the liquid, in kJ/kg, in the accumulating condition;

M = molecular mass of the discharged gas;

C = a constant which is derived from one of the following formulae as a function of the ratio k of specific heats:

$$k = \frac{c_p}{c_v}$$

where:

c_p is the specific heat at constant pressure; and
c_v is the specific heat at constant volume.

When k > 1:

$$C = \sqrt{k\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$$

When $k = 1$ or k is unknown:

$$C = \frac{1}{\sqrt{e}} = 0.607$$

where e is the mathematical constant 2.7183

C may also be taken from the following table:

k	C	k	C	k	C
1.00	0.607	1.26	0.660	1.52	0.704
1.02	0.611	1.28	0.664	1.54	0.707
1.04	0.615	1.30	0.667	1.56	0.710
1.06	0.620	1.32	0.671	1.58	0.713
1.08	0.624	1.34	0.674	1.60	0.716
1.10	0.628	1.36	0.678	1.62	0.719
1.12	0.633	1.38	0.681	1.64	0.722
1.14	0.637	1.40	0.685	1.66	0.725
1.16	0.641	1.42	0.688	1.68	0.728
1.18	0.645	1.44	0.691	1.70	0.731
1.20	0.649	1.46	0.695	2.00	0.770
1.22	0.652	1.48	0.698	2.20	0.793
1.24	0.656	1.50	0.701		

6.7.2.12.2.2 As an alternative to the formula above, shells designed for the transport of liquids may have their relief devices sized in accordance with the table in 6.7.2.12.2.3. This table assumes an insulation value of F = 1 and shall be adjusted accordingly when the shell is insulated. Other values used in determining this table are:

M	=	86.7	T	=	394 K
L	=	334.94 kJ/kg	C	=	0.607
Z	=	1			

6.7.2.12.2.3 Minimum required rate of discharge, Q, in cubic metres of air per second at 1 bar and 0 °C (273 K)

A Exposed area (square metres)	Q (Cubic metres of air per second)	A Exposed area (square metres)	Q (Cubic metres of air per second)
2	0.230	37.5	2.539
3	0.320	40	2.677
4	0.405	42.5	2.814
5	0.487	45	2.949
6	0.565	47.5	3.082
7	0.641	50	3.215
8	0.715	52.5	3.346
9	0.788	55	3.476
10	0.859	57.5	3.605
12	0.998	60	3.733
14	1.132	62.5	3.860
16	1.263	65	3.987
18	1.391	67.5	4.112
20	1.517	70	4.236
22.5	1.670	75	4.483
25	1.821	80	4.726
27.5	1.969	85	4.967
30	2.115	90	5.206
32.5	2.258	95	5.442
35	2.400	100	5.676

6.7.2.12.2.4 Insulation systems, used for the purpose of reducing venting capacity, shall be approved by the competent authority or its authorized body. In all cases, insulation systems approved for this purpose shall:

(a) Remain effective at all temperatures up to 649 °C; and

(b) Be jacketed with a material having a melting point of 700 °C or greater.

6.7.2.13 ***Marking of pressure-relief devices***

6.7.2.13.1 Every pressure-relief device shall be clearly and permanently marked with the following:

(a) The pressure (in bar or kPa) or temperature (in °C) at which it is set to discharge;

(b) The allowable tolerance at the discharge pressure for spring-loaded devices;

(c) The reference temperature corresponding to the rated pressure for frangible discs;

(d) The allowable temperature tolerance for fusible elements; and

(e) The rated flow capacity of the spring-loaded pressure relief devices, frangible discs or fusible elements in standard cubic meters of air per second (m3/s);

(f) The cross sectional flow areas of the spring loaded pressure-relief devices, frangible discs and fusible elements in mm^2.

When practicable, the following information shall also be shown:

(g) The manufacturer's name and relevant catalogue number.

6.7.2.13.2 The rated flow capacity marked on the spring-loaded pressure-relief devices shall be determined according to ISO 4126-1:2004 and ISO 4126-7:2004.

6.7.2.14 ***Connections to pressure-relief devices***

6.7.2.14.1 Connections to pressure-relief devices shall be of sufficient size to enable the required discharge to pass unrestricted to the safety device. No stop-valve shall be installed between the shell and the pressure-relief devices except where duplicate devices are provided for maintenance or other reasons and the stop-valves serving the devices actually in use are locked open or the stop-valves are interlocked so that at least one of the duplicate devices is always in use. There shall be no obstruction in an opening leading to a vent or pressure-relief device which might restrict or cut-off the flow from the shell to that device. Vents or pipes from the pressure-relief device outlets, when used, shall deliver the relieved vapour or liquid to the atmosphere in conditions of minimum back-pressure on the relieving devices.

6.7.2.15 ***Siting of pressure-relief devices***

6.7.2.15.1 Each pressure-relief device inlet shall be situated on top of the shell in a position as near the longitudinal and transverse centre of the shell as reasonably practicable. All pressure-relief device inlets shall under maximum filling conditions be situated in the vapour space of the shell and the devices shall be so arranged as to ensure the escaping vapour is discharged unrestrictedly. For flammable substances, the escaping vapour shall be directed away from the shell in such a manner that it cannot impinge upon the shell. Protective devices which deflect the flow of vapour are permissible provided the required relief-device capacity is not reduced.

6.7.2.15.2 Arrangements shall be made to prevent access to the pressure-relief devices by unauthorized persons and to protect the devices from damage caused by the portable tank overturning.

6.7.2.16 ***Gauging devices***

6.7.2.16.1 Glass level-gauges and gauges made of other fragile material, which are in direct communication with the contents of the tank shall not be used.

6.7.2.17 ***Portable tank supports, frameworks, lifting and tie-down attachments***

6.7.2.17.1 Portable tanks shall be designed and constructed with a support structure to provide a secure base during transport. The forces specified in 6.7.2.2.12 and the safety factor specified in 6.7.2.2.13 shall be considered in this aspect of the design. Skids, frameworks, cradles or other similar structures are acceptable.

6.7.2.17.2 The combined stresses caused by portable tank mountings (e.g. cradles, framework, etc.) and portable tank lifting and tie-down attachments shall not cause excessive stress in any portion of the shell. Permanent lifting and tie-down attachments shall be fitted to all portable tanks. Preferably they shall be fitted to the portable tank supports but may be secured to reinforcing plates located on the shell at the points of support.

6.7.2.17.3 In the design of supports and frameworks the effects of environmental corrosion shall be taken into account.

6.7.2.17.4 Forklift pockets shall be capable of being closed off. The means of closing forklift pockets shall be a permanent part of the framework or permanently attached to the framework. Single compartment portable tanks with a length less than 3.65 m need not have closed off forklift pockets provided that:

(a) The shell including all the fittings are well protected from being hit by the forklift blades; and

(b) The distance between the centres of the forklift pockets is at least half of the maximum length of the portable tank.

6.7.2.17.5 When portable tanks are not protected during transport, according to 4.2.1.2, the shells and service equipment shall be protected against damage to the shell and service equipment resulting from lateral or longitudinal impact or overturning. External fittings shall be protected so as to preclude the release of the shell contents upon impact or overturning of the portable tank on its fittings. Examples of protection include:

(a) Protection against lateral impact which may consist of longitudinal bars protecting the shell on both sides at the level of the median line;

(b) Protection of the portable tank against overturning which may consist of reinforcement rings or bars fixed across the frame;

(c) Protection against rear impact which may consist of a bumper or frame;

(d) Protection of the shell against damage from impact or overturning by use of an ISO frame in accordance with ISO 1496-3:1995.

6.7.2.18 ***Design approval***

6.7.2.18.1 The competent authority or its authorized body shall issue a design approval certificate for any new design of a portable tank. This certificate shall attest that a portable tank has been surveyed by that authority, is suitable for its intended purpose and meets the requirements of this Chapter and where appropriate, the provisions for substances provided in Chapter 4.2 and in the Dangerous Goods List in Chapter 3.2. When a series of portable tanks are manufactured without change in the design, the certificate shall be valid for the entire series. The certificate shall refer to the prototype test report, the substances or group of substances allowed to be transported, the materials of construction of the shell and lining (when applicable) and an approval number. The approval number shall consist of the distinguishing sign or mark of the State in whose territory the approval was granted, indicated by the distinguishing sign used on vehicles in international road traffic[2], and a registration number. Any alternative arrangements according to 6.7.1.2 shall be indicated on the certificate. A design approval may serve for the approval of smaller portable tanks made of materials of the

[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

same kind and thickness, by the same fabrication techniques and with identical supports, equivalent closures and other appurtenances.

6.7.2.18.2 The prototype test report for the design approval shall include at least the following:

(a) The results of the applicable framework test specified in ISO 1496-3:1995;

(b) The results of the initial inspection and test in 6.7.2.19.3; and

(c) The results of the impact test in 6.7.2.19.1, when applicable.

6.7.2.19 ***Inspection and testing***

6.7.2.19.1 Portable tanks meeting the definition of container in the International Convention for Safe Containers (CSC), 1972, as amended, shall not be used unless they are successfully qualified by subjecting a representative prototype of each design to the Dynamic Longitudinal Impact Test prescribed in the Manual of Tests and Criteria, Part IV, Section 41.

6.7.2.19.2 The shell and items of equipment of each portable tank shall be inspected and tested before being put into service for the first time (initial inspection and test) and thereafter at not more than five-year intervals (5 year periodic inspection and test) with an intermediate periodic inspection and test (2.5 year periodic inspection and test) midway between the 5 year periodic inspections and tests. The 2.5 year inspection and test may be performed within 3 months of the specified date. An exceptional inspection and test shall be performed regardless of the date of the last periodic inspection and test when necessary according to 6.7.2.19.7.

6.7.2.19.3 The initial inspection and test of a portable tank shall include a check of the design characteristics, an internal and external examination of the portable tank and its fittings with due regard to the substances to be transported, and a pressure test. Before the portable tank is placed into service, a leakproofness test and a test of the satisfactory operation of all service equipment shall also be performed. When the shell and its fittings have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.

6.7.2.19.4 The 5-year periodic inspection and test shall include an internal and external examination and, as a general rule, a hydraulic pressure test. For tanks only used for the transport of solid substances, other than toxic or corrosive substances that do not liquefy during transport, the hydraulic pressure test may be replaced by a suitable pressure test at 1.5 times the MAWP, subject to competent authority approval. Sheathing, thermal insulation and the like shall be removed only to the extent required for reliable appraisal of the condition of the portable tank. When the shell and equipment have been pressure-tested separately, they shall also be subjected to a leakproofness test together after assembly.

6.7.2.19.5 The intermediate 2.5 year periodic inspection and test shall at least include an internal and external examination of the portable tank and its fittings with due regard to the substances intended to be transported, a leakproofness test and a test of the satisfactory operation of all service equipment. Sheathing, thermal insulation and the like shall be removed only to the extent required for reliable appraisal of the condition of the portable tank. For portable tanks dedicated to the transport of a single substance, the 2.5 year internal examination may be waived or substituted by other test methods or inspection procedures specified by the competent authority or its authorized body.

6.7.2.19.6 A portable tank may not be filled and offered for transport after the date of expiry of the last 5 year or 2.5 year periodic inspection and test as required by 6.7.2.19.2. However a portable tank filled prior to the date of expiry of the last periodic inspection and test may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, a portable tank may be transported after the date of expiry of the last periodic test and inspection:

(a) After emptying but before cleaning, for purposes of performing the next required test or inspection prior to refilling; and

(b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection, in order to allow

the return of dangerous goods for proper disposal or recycling. Reference to this exemption shall be mentioned in the transport document.

6.7.2.19.6.1 Except as provided for in 6.7.2.19.6, portable tanks which have missed the timeframe for their scheduled 5 year or 2.5 year periodic inspection and test may only be filled and offered for transport if a new 5 year periodic inspection and test is performed according to 6.7.2.19.4.

6.7.2.19.7 The exceptional inspection and test is necessary when the portable tank shows evidence of damaged or corroded areas, or leakage, or other conditions that indicate a deficiency that could affect the integrity of the portable tank. The extent of the exceptional inspection and test shall depend on the amount of damage or deterioration of the portable tank. It shall include at least the 2.5 year inspection and test according to 6.7.2.19.5.

6.7.2.19.8 The internal and external examinations shall ensure that:

(a) The shell is inspected for pitting, corrosion, or abrasions, dents, distortions, defects in welds or any other conditions, including leakage, that might render the portable tank unsafe for transport. The wall thickness shall be verified by appropriate measurement if this inspection indicates a reduction of wall thickness;

(b) The piping, valves, heating/cooling system, and gaskets are inspected for corroded areas, defects, or any other conditions, including leakage, that might render the portable tank unsafe for filling, discharge or transport;

(c) Devices for tightening manhole covers are operative and there is no leakage at manhole covers or gaskets;

(d) Missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;

(e) All emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;

(f) Linings, if any, are inspected in accordance with criteria outlined by the lining manufacturer;

(g) Required marks on the portable tank are legible and in accordance with the applicable requirements; and

(h) The framework, supports and arrangements for lifting the portable tank are in a satisfactory condition.

6.7.2.19.9 The inspections and tests in 6.7.2.19.1, 6.7.2.19.3, 6.7.2.19.4, 6.7.2.19.5 and 6.7.2.19.7 shall be performed or witnessed by an expert approved by the competent authority or its authorized body. When the pressure test is a part of the inspection and test, the test pressure shall be the one indicated on the data plate of the portable tank. While under pressure, the portable tank shall be inspected for any leaks in the shell, piping or equipment.

6.7.2.19.10 In all cases when cutting, burning or welding operations on the shell have been effected, that work shall be to the approval of the competent authority or its authorized body taking into account the pressure vessel code used for the construction of the shell. A pressure test to the original test pressure shall be performed after the work is completed.

6.7.2.19.11 When evidence of any unsafe condition is discovered, the portable tank shall not be returned to service until it has been corrected and the test is repeated and passed.

6.7.2.20 ***Marking***

6.7.2.20.1 Every portable tank shall be fitted with a corrosion resistant metal plate permanently attached to the portable tank in a conspicuous place readily accessible for inspection. When for reasons of portable tank arrangements the plate cannot be permanently attached to the shell, the shell shall be marked with at least the information required by the pressure vessel code. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8;

(ii) Approval country;

(iii) Authorized body for the design approval;

(iv) Design approval number;

(v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);

(vi) Pressure vessel code to which the shell is designed;

(d) Pressures

(i) MAWP (in bar gauge or kPa gauge)[3];

(ii) Test pressure (in bar gauge or kPa gauge)[3];

(iii) Initial pressure test date (month and year);

(iv) Identification mark of the initial pressure test witness;

(v) External design pressure[4] (in bar gauge or kPa gauge)[3];

(vi) MAWP for heating/cooling system (in bar gauge or kPa gauge)[3] (when applicable);

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[3] *The unit used shall be indicated.*

[4] *See 6.7.2.2.10.*

(e) Temperatures

(i) Design temperature range (in °C)[3];

(f) Materials

(i) Shell material(s) and material standard reference(s);

(ii) Equivalent thickness in reference steel (in mm)[3];

(iii) Lining material (when applicable);

(g) Capacity

(i) Tank water capacity at 20 °C (in litres)[3];

This indication is to be followed by the symbol "S" when the shell is divided by surge plates into sections of not more than 7 500 litres capacity;

(ii) Water capacity of each compartment at 20 °C (in litres)[3] (when applicable, for multi-compartment tanks).

This indication is to be followed by the symbol "S" when the compartment is divided by surge plates into sections of not more than 7 500 litres capacity;

(h) Periodic inspections and tests

(i) Type of the most recent periodic test (2.5-year, 5-year or exceptional);

(ii) Date of the most recent periodic test (month and year);

(iii) Test pressure (in bar gauge or kPa gauge)[3] of the most recent periodic test (if applicable);

(iv) Identification mark of the authorized body who performed or witnessed the most recent test.

[3] *The unit used shall be indicated.*

Figure 6.7.2.20.1: Example of a plate for marking

Owner's registration number					
MANUFACTURING INFORMATION					
Country of manufacture					
Year of manufacture					
Manufacturer					
Manufacturer's serial number					
APPROVAL INFORMATION					
(UN)	Approval country				
	Authorized body for design approval				
	Design approval number				'AA' *(if applicable)*
Shell design code (pressure vessel code)					
PRESSURES					
MAWP					bar *or* kPa
Test pressure					bar *or* kPa
Initial pressure test date:	*(mm/yyyy)*	Witness stamp:			
External design pressure					bar *or* kPa
MAWP for heating/cooling system (*when applicable)*					bar *or* kPa
TEMPERATURES					
Design temperature range		°C to			°C
MATERIALS					
Shell material(s) and material standard reference(s)					
Equivalent thickness in reference steel					mm
Lining material *(when applicable)*					
CAPACITY					
Tank water capacity at 20 °C			litres		'S' *(if applicable)*
Water capacity of compartment ___ at 20 °C *(when applicable, for multi-compartment tanks)*			litres		'S' *(if applicable)*

PERIODIC INSPECTIONS / TESTS							
Test type	Test date	Witness stamp and test pressure[a]		Test type	Test date	Witness stamp and test pressure[a]	
	(mm/yyyy)		bar *or* kPa		*(mm/yyyy)*		bar *or* kPa

[a] *Test pressure if applicable*.

6.7.2.20.2 The following information shall be durably marked either on the portable tank itself or on a metal plate firmly secured to the portable tank:

Name of the operator
Maximum permissible gross mass (MPGM) _____ kg
Unladen (tare) mass _____ kg
Portable tank instruction in accordance with 4.2.5.2.6

NOTE: *For the identification of the substances being transported, see also Part 5.*

6.7.2.20.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate.

6.7.3 Requirements for the design, construction, inspection and testing of portable tanks intended for the transport of non-refrigerated liquefied gases

NOTE: *These requirements also apply to portable tanks intended for the transport of chemicals under pressure (UN Nos. 3500, 3501, 3502, 3503, 3504 and 3505).*

6.7.3.1 *Definitions*

For the purposes of this section:

Design pressure means the pressure to be used in calculations required by a recognized pressure vessel code. The design pressure shall be not less than the highest of the following pressures:

(a) The maximum effective gauge pressure allowed in the shell during filling or discharge; or

(b) The sum of:

(i) the maximum effective gauge pressure to which the shell is designed as defined in (b) of the MAWP definition (see above); and

(ii) a head pressure determined on the basis of the static forces specified in 6.7.3.2.9, but not less than 0.35 bar;

Design reference temperature means the temperature at which the vapour pressure of the contents is determined for the purpose of calculating the MAWP. The design reference temperature shall be less than the critical temperature of the non-refrigerated liquefied gas or liquefied gas propellants of chemicals under pressure intended to be transported to ensure that the gas at all times is liquefied. This value for each portable tank type is as follows:

(a) Shell with a diameter of 1.5 metres or less: 65 °C;

(b) Shell with a diameter of more than 1.5 metres:

(i) without insulation or sun shield: 60 °C;

(ii) with sun shield (see 6.7.3.2.12): 55 °C; and

(iii) with insulation (see 6.7.3.2.12): 50 °C;

Design temperature range for the shell shall be -40 °C to 50 °C for non-refrigerated liquefied gases transported under ambient conditions. More severe design temperatures shall be considered for portable tanks subjected to severe climatic conditions;

Filling density means the average mass of non-refrigerated liquefied gas per litre of shell capacity (kg/l). The filling density is given in portable tank instruction T50 in 4.2.5.2.6;

Leakproofness test means a test using gas subjecting the shell and its service equipment to an effective internal pressure of not less than 25 % of the MAWP;

Maximum allowable working pressure (MAWP) means a pressure that shall be not less than the highest of the following pressures measured at the top of the shell while in operating position, but in no case less than 7 bar:

(a) The maximum effective gauge pressure allowed in the shell during filling or discharge; or

(b) The maximum effective gauge pressure to which the shell is designed, which shall be:

(i) for a non-refrigerated liquefied gas listed in the portable tank instruction T50 in 4.2.5.2.6, the MAWP (in bar) given in T50 portable tank instruction for that gas;

(ii) for other non-refrigerated liquefied gases, not less than the sum of:

- the absolute vapour pressure (in bar) of the non-refrigerated liquefied gas at the design reference temperature minus 1 bar; and

- the partial pressure (in bar) of air or other gases in the ullage space being determined by the design reference temperature and the liquid phase expansion due to an increase of the mean bulk temperature of t_r-t_f (t_f = filling temperature, usually 15 °C, t_r = 50 °C maximum mean bulk temperature);

(iii) for chemicals under pressure, the MAWP (in bar) given in T50 portable tank instruction for the liquefied gas portion of the propellants listed in T50 in 4.2.5.2.6;

Maximum permissible gross mass (MPGM) means the sum of the tare mass of the portable tank and the heaviest load authorized for transport;

Mild steel means a steel with a guaranteed minimum tensile strength of 360 N/mm^2 to 440 N/mm^2 and a guaranteed minimum elongation at fracture conforming to 6.7.3.3.3.3;

Portable tank means a multimodal tank having a capacity of more than 450 litres used for the transport of non-refrigerated liquefied gases of Class 2. The portable tank includes a shell fitted with service equipment and structural equipment necessary for the transport of gases. The portable tank shall be capable of being filled and discharged without the removal of its structural equipment. It shall possess stabilizing members external to the shell, and shall be capable of being lifted when full. It shall be designed primarily to be loaded onto a transport vehicle or ship and shall be equipped with skids, mountings or accessories to facilitate mechanical handling. Road tank-vehicles, rail tank-wagons, non-metallic tanks, intermediate bulk containers (IBCs), gas cylinders and large receptacles are not considered to fall within the definition for portable tanks;

Reference steel means a steel with a tensile strength of 370 N/mm^2 and an elongation at fracture of 27 %;

Service equipment means measuring instruments and filling, discharge, venting, safety and insulating devices;

Shell means the part of the portable tank which retains the non-refrigerated liquefied gas intended for transport (tank proper), including openings and their closures, but does not include service equipment or external structural equipment;

Structural equipment means the reinforcing, fastening, protective and stabilizing members external to the shell;

Test pressure means the maximum gauge pressure at the top of the shell during the pressure test.

6.7.3.2 *General design and construction requirements*

6.7.3.2.1 Shells shall be designed and constructed in accordance with the requirements of a pressure vessel code recognized by the competent authority. Shells shall be made of steel suitable for forming. The materials shall in principle conform to national or international material standards. For welded shells, only a material whose weldability has been fully demonstrated shall be used. Welds shall be skilfully made and afford complete safety. When the manufacturing process or the materials make it necessary, the shells shall be suitability heat-treated to guarantee adequate toughness in the weld and in the heat affected zones. In choosing the material the design temperature range shall be taken into account with respect to risk of brittle fracture, to stress corrosion cracking and to resistance to impact. When fine grain steel is used, the guaranteed value of the yield strength shall be not more than 460 N/mm^2 and the guaranteed value of the upper limit of the tensile strength shall be not more than 725 N/mm^2 according to the material specification. Portable tank materials shall be suitable for the external environment in which they may be transported.

6.7.3.2.2 Portable tank shells, fittings and pipework shall be constructed of materials which are:

(a) Substantially immune to attack by the non-refrigerated liquefied gas(es) intended to be transported; or

(b) Properly passivated or neutralized by chemical reaction.

6.7.3.2.3 Gaskets shall be made of materials compatible with the non-refrigerated liquefied gas(es) intended to be transported.

6.7.3.2.4 Contact between dissimilar metals which could result in damage by galvanic action shall be avoided.

6.7.3.2.5 The materials of the portable tank, including any devices, gaskets, and accessories, shall not adversely affect the non-refrigerated liquefied gas(es) intended for transport in the portable tank.

6.7.3.2.6 Portable tanks shall be designed and constructed with supports to provide a secure base during transport and with suitable lifting and tie-down attachments.

6.7.3.2.7 Portable tanks shall be designed to withstand, without loss of contents, at least the internal pressure due to the contents, and the static, dynamic and thermal loads during normal conditions of handling and transport. The design shall demonstrate that the effects of fatigue, caused by repeated application of these loads through the expected life of the portable tank, have been taken into account.

6.7.3.2.8 Shells shall be designed to withstand an external pressure of at least 0.4 bar gauge above the internal pressure without permanent deformation. When the shell is to be subjected to a significant vacuum before filling or during discharge it shall be designed to withstand an external pressure of at least 0.9 bar gauge above the internal pressure and shall be proven at that pressure.

6.7.3.2.9 Portable tanks and their fastenings shall, under the maximum permissible load, be capable of absorbing the following separately applied static forces:

(a) In the direction of travel: twice the MPGM multiplied by the acceleration due to gravity (g)[1];

(b) Horizontally at right angles to the direction of travel: the MPGM (when the direction of travel is not clearly determined, the forces shall be equal to twice the MPGM) multiplied by the acceleration due to gravity (g)[1];

(c) Vertically upwards: the MPGM multiplied by the acceleration due to gravity (g)[1]; and

(d) Vertically downwards: twice the MPGM (total loading including the effect of gravity) multiplied by the acceleration due to gravity (g)[1].

6.7.3.2.10 Under each of the forces in 6.7.3.2.9, the safety factor to be observed shall be as follows:

(a) For steels having a clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed yield strength; or

(b) For steels with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2 % proof strength and, for austenitic steels, the 1 % proof strength.

6.7.3.2.11 The values of yield strength or proof strength shall be the values according to national or international material standards. When austenitic steels are used, the specified minimum values of yield strength and proof strength according to the material standards may be increased by up to 15 % when these

[1] *For calculation purposes g = 9.81 m/s^2.*

greater values are attested in the material inspection certificate. When no material standard exists for the steel in question, the value of yield strength or proof strength used shall be approved by the competent authority.

6.7.3.2.12 When the shells intended for the transport of non-refrigerated liquefied gases are equipped with thermal insulation, the thermal insulation systems shall satisfy the following requirements:

(a) It shall consist of a shield covering not less than the upper third but not more than the upper half of the surface of the shell and separated from the shell by an air space about 40 mm across; or

(b) It shall consist of a complete cladding of adequate thickness of insulating materials protected so as to prevent the ingress of moisture and damage under normal conditions of transport and so as to provide a thermal conductance of not more than 0.67 ($W \cdot m^{-2} \cdot K^{-1}$);

(c) When the protective covering is so closed as to be gas-tight, a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas tightness of the shell or of its items of equipment;

(d) The thermal insulation shall not inhibit access to the fittings and discharge devices.

6.7.3.2.13 Portable tanks intended for the transport of flammable non-refrigerated liquefied gases shall be capable of being electrically earthed.

6.7.3.3 ***Design criteria***

6.7.3.3.1 Shells shall be of a circular cross-section.

6.7.3.3.2 Shells shall be designed and constructed to withstand a test pressure not less than 1.3 times the design pressure. The shell design shall take into account the minimum MAWP values provided in portable tank instruction T50 in 4.2.5.2.6 for each non-refrigerated liquefied gas intended for transport. Attention is drawn to the minimum shell thickness requirements for these shells specified in 6.7.3.4.

6.7.3.3.3 For steels exhibiting a clearly defined yield point or characterized by a guaranteed proof strength (0.2 % proof strength, generally, or 1 % proof strength for austenitic steels) the primary membrane stress σ (sigma) in the shell shall not exceed 0.75 Re or 0.50 Rm, whichever is lower, at the test pressure, where:

Re = yield strength in N/mm^2, or 0.2 % proof strength or, for austenitic steels, 1 % proof strength;
Rm = minimum tensile strength in N/mm^2.

6.7.3.3.3.1 The values of Re and Rm to be used shall be the specified minimum values according to national or international material standards. When austenitic steels are used, the specified minimum values for Re and Rm according to the material standards may be increased by up to 15 % when these greater values are attested in the material inspection certificate. When no material standard exists for the steel in question, the values of Re and Rm used shall be approved by the competent authority or its authorized body.

6.7.3.3.3.2 Steels which have an Re/Rm ratio of more than 0.85 are not allowed for the construction of welded shells. The values of Re and Rm to be used in determining this ratio shall be the values specified in the material inspection certificate.

6.7.3.3.3.3 Steels used in the construction of shells shall have an elongation at fracture, in %, of not less than 10 000/Rm with an absolute minimum of 16 % for fine grain steels and 20 % for other steels.

6.7.3.3.3.4 For the purpose of determining actual values for materials, it shall be noted that for sheet metal, the axis of the tensile test specimen shall be at right angles (transversely) to the direction of rolling. The permanent elongation at fracture shall be measured on test specimens of rectangular cross sections in accordance with ISO 6892:1998 using a 50 mm gauge length.

6.7.3.4 ***Minimum shell thickness***

6.7.3.4.1 The minimum shell thickness shall be the greater thickness based on:

(a) The minimum thickness determined in accordance with the requirements in 6.7.3.4; and

(b) The minimum thickness determined in accordance with the recognized pressure vessel code including the requirements in 6.7.3.3.

In addition, any relevant portable tank special provision indicated in Column 11 of the Dangerous Goods List and described in 4.2.5.3 shall be taken into account.

6.7.3.4.2 The cylindrical portions, ends (heads) and manhole covers of shells of not more than 1.80 m in diameter shall be not less than 5 mm thick in the reference steel or of equivalent thickness in the steel to be used. Shells of more than 1.80 m in diameter shall be not less than 6 mm thick in the reference steel or of equivalent thickness in the steel to be used.

6.7.3.4.3 The cylindrical portions, ends (heads) and manhole covers of all shells shall be not less than 4 mm thick regardless of the material of construction.

6.7.3.4.4 The equivalent thickness of a steel other than the thickness prescribed for the reference steel in 6.7.3.4.2 shall be determined using the following formula:

$$e_1 = \frac{21.4 e_0}{\sqrt[3]{Rm_1 \times A_1}}$$

where:

e_1 = required equivalent thickness (in mm) of the steel to be used;

e_0 = minimum thickness (in mm) for the reference steel specified in 6.7.3.4.2;

Rm_1 = guaranteed minimum tensile strength (in N/mm^2) of the steel to be used (see 6.7.3.3.3);

A_1 = guaranteed minimum elongation at fracture (in %) of the steel to be used according to national or international standards.

6.7.3.4.5 In no case shall the wall thickness be less than that prescribed in 6.7.3.4.1 to 6.7.3.4.3. All parts of the shell shall have a minimum thickness as determined by 6.7.3.4.1 to 6.7.3.4.3. This thickness shall be exclusive of any corrosion allowance.

6.7.3.4.6 When mild steel is used (see 6.7.3.1), calculation using the formula in 6.7.3.4.4 is not required.

6.7.3.4.7 There shall be no sudden change of plate thickness at the attachment of the ends (heads) to the cylindrical portion of the shell.

6.7.3.5 ***Service equipment***

6.7.3.5.1 Service equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during handling and transport. When the connection between the frame and the shell allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without risk of damage to working parts. The external discharge fittings (pipe sockets, shut-off devices), the internal stop-valve and its seating shall be protected against the danger of being wrenched off by external forces (for example using shear sections). The filling and discharge devices (including flanges or threaded plugs) and any protective caps shall be capable of being secured against unintended opening.

6.7.3.5.2 All openings with a diameter of more than 1.5 mm in shells of portable tanks, except openings for pressure-relief devices, inspection openings and closed bleed holes, shall be fitted with at least three mutually independent shut-off devices in series, the first being an internal stop-valve, excess flow valve or

equivalent device, the second being an external stop-valve and the third being a blank flange or equivalent device.

6.7.3.5.2.1 When a portable tank is fitted with an excess flow valve the excess flow valve shall be so fitted that its seating is inside the shell or inside a welded flange or, when fitted externally, its mountings shall be designed so that in the event of impact its effectiveness shall be maintained. The excess flow valves shall be selected and fitted so as to close automatically when the rated flow specified by the manufacturer is reached. Connections and accessories leading to or from such a valve shall have a capacity for a flow more than the rated flow of the excess flow valve.

6.7.3.5.3 For filling and discharge openings the first shut-off device shall be an internal stop-valve and the second shall be a stop-valve placed in an accessible position on each discharge and filling pipe.

6.7.3.5.4 For filling and discharge bottom openings of portable tanks intended for the transport of flammable and/or toxic non-refrigerated liquefied gases or chemicals under pressure the internal stop-valve shall be a quick closing safety device which closes automatically in the event of unintended movement of the portable tank during filling or discharge or fire engulfment. Except for portable tanks having a capacity of not more than 1 000 litres, it shall be possible to operate this device by remote control.

6.7.3.5.5 In addition to filling, discharge and gas pressure equalizing orifices, shells may have openings in which gauges, thermometers and manometers can be fitted. Connections for such instruments shall be made by suitable welded nozzles or pockets and not be screwed connections through the shell.

6.7.3.5.6 All portable tanks shall be fitted with manholes or other inspection openings of suitable size to allow for internal inspection and adequate access for maintenance and repair of the interior.

6.7.3.5.7 External fittings shall be grouped together so far as reasonably practicable.

6.7.3.5.8 Each connection on a portable tank shall be clearly marked to indicate its function.

6.7.3.5.9 Each stop-valve or other means of closure shall be designed and constructed to a rated pressure not less than the MAWP of the shell taking into account the temperatures expected during transport. All stop-valves with a screwed spindle shall close by a clockwise motion of the handwheel. For other stop-valves the position (open and closed) and direction of closure shall be clearly indicated. All stop-valves shall be designed to prevent unintentional opening.

6.7.3.5.10 Piping shall be designed, constructed and installed so as to avoid the risk of damage due to thermal expansion and contraction, mechanical shock and vibration. All piping shall be of suitable metallic material. Welded pipe joints shall be used wherever possible.

6.7.3.5.11 Joints in copper tubing shall be brazed or have an equally strong metal union. The melting point of brazing materials shall be no lower than 525 °C. The joints shall not decrease the strength of tubing as may happen when cutting threads.

6.7.3.5.12 The burst pressure of all piping and pipe fittings shall be not less than the highest of four times the MAWP of the shell or four times the pressure to which it may be subjected in service by the action of a pump or other device (except pressure-relief devices).

6.7.3.5.13 Ductile metals shall be used in the construction of valves and accessories.

6.7.3.6 ***Bottom openings***

6.7.3.6.1 Certain non-refrigerated liquefied gases shall not be transported in portable tanks with bottom openings. When portable tank instruction T50 in 4.2.5.2.6 indicates that bottom openings are not allowed, there shall be no openings below the liquid level of the shell when it is filled to its maximum permissible filling limit.

6.7.3.7 ***Pressure-relief devices***

6.7.3.7.1 Portable tanks shall be provided with one or more spring-loaded pressure-relief devices. The pressure-relief devices shall open automatically at a pressure not less than the MAWP and be fully open at a pressure equal to 110 % of the MAWP. These devices shall, after discharge, close at a pressure not lower than 10 % below the pressure at which discharge starts and shall remain closed at all lower pressures. The pressure-relief devices shall be of a type that will resist dynamic forces including liquid surge. Frangible discs not in series with a spring-loaded pressure-relief device are not permitted.

6.7.3.7.2 Pressure-relief devices shall be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure.

6.7.3.7.3 Portable tanks intended for the transport of certain non-refrigerated liquefied gases identified in portable tank instruction T50 in 4.2.5.2.6 shall have a pressure-relief device approved by the competent authority. Unless a portable tank in dedicated service is fitted with an approved relief device constructed of materials compatible with the load, such device shall comprise a frangible disc preceding a spring-loaded device. The space between the frangible disc and the device shall be provided with a pressure gauge or a suitable tell-tale indicator. This arrangement permits the detection of disc rupture, pinholing or leakage which could cause a malfunction of the pressure-relief device. The frangible discs shall rupture at a nominal pressure 10 % above the start-to-discharge pressure of the relief device.

6.7.3.7.4 In the case of multi-purpose portable tanks, the pressure-relief devices shall open at a pressure indicated in 6.7.3.7.1 for the gas having the highest maximum allowable pressure of the gases allowed to be transported in the portable tank.

6.7.3.8 ***Capacity of relief devices***

6.7.3.8.1 The combined delivery capacity of the relief devices shall be sufficient that, in the event of total fire engulfment, the pressure (including accumulation) inside the shell does not exceed 120 % of the MAWP. Spring-loaded relief devices shall be used to achieve the full relief capacity prescribed. In the case of multi-purpose tanks, the combined delivery capacity of the pressure-relief devices shall be taken for the gas which requires the highest delivery capacity of the gases allowed to be transported in portable tanks.

6.7.3.8.1.1 To determine the total required capacity of the relief devices, which shall be regarded as being the sum of the individual capacities of the several devices, the following formula shall be used:

$$Q = 12.4 \frac{FA^{0.82}}{LC} \sqrt{\frac{ZT}{M}}$$

where:

Q = minimum required rate of discharge in cubic metres of air per second (m^3/s) at standard conditions: 1 bar and 0 °C (273 K);

F = is a coefficient with the following value:

for uninsulated shells F = 1;

for insulated shells F = U(649-t)/13.6

but in no case is less than 0.25 where:

U = heat transfer coefficient of the insulation, in $kW \cdot m^{-2} \cdot K^{-1}$, at 38 °C,

t = actual temperature of the non-refrigerated liquefied gas during filling (°C); when this temperature is unknown, let t = 15 °C:

The value of F given above for insulated shells may be taken provided that the insulation is in conformance with 6.7.3.8.1.2;

A = total external surface area of shell in square metres;

Z = the gas compressibility factor in the accumulating condition (when this factor is unknown, let Z equal 1.0);

T = absolute temperature in Kelvin (°C + 273) above the pressure-relief devices in the accumulating condition;

L = the latent heat of vaporization of the liquid, in kJ/kg, in the accumulating condition;

M = molecular mass of the discharged gas;

C = a constant which is derived from one of the following formulae as a function of the ratio k of specific heats:

$$k = \frac{C_p}{C_v}$$

where

c_p is the specific heat at constant pressure; and
c_v is the specific heat at constant volume.

when k > 1:

$$C = \sqrt{k\left(\frac{2}{k+1}\right)^{\frac{k+1}{k-1}}}$$

when k = 1 or k is unknown

$$C = \frac{1}{\sqrt{e}} = 0.607$$

where e is the mathematical constant 2.7183
C may also be taken from the following table:

k	C	k	C	k	C
1.00	0.607	1.26	0.660	1.52	0.704
1.02	0.611	1.28	0.664	1.54	0.707
1.04	0.615	1.30	0.667	1.56	0.710
1.06	0.620	1.32	0.671	1.58	0.713
1.08	0.624	1.34	0.674	1.60	0.716
1.10	0.628	1.36	0.678	1.62	0.719
1.12	0.633	1.38	0.681	1.64	0.722
1.14	0.637	1.40	0.685	1.66	0.725
1.16	0.641	1.42	0.688	1.68	0.728
1.18	0.645	1.44	0.691	1.70	0.731
1.20	0.649	1.46	0.695	2.00	0.770
1.22	0.652	1.48	0.698	2.20	0.793
1.24	0.656	1.50	0.701		

NOTE: *This formula applies only to non-refrigerated liquefied gases which have critical temperatures well above the temperature at the accumulating condition. For gases which have critical temperatures near or below the temperature at the accumulating condition, the calculation of the pressure-relief device delivery capacity shall consider further thermodynamic properties of the gas (see, e.g. CGA S-1.2-2003 Pressure Relief Device Standards – Part 2 – Cargo and Portable Tanks for Compressed Gases).*

6.7.3.8.1.2 Insulation systems, used for the purpose of reducing the venting capacity, shall be approved by the competent authority or its authorized body. In all cases, insulation systems approved for this purpose shall:

(a) Remain effective at all temperatures up to 649 °C; and

(b) Be jacketed with a material having a melting point of 700 °C or greater.

6.7.3.9 ***Marking of pressure-relief devices***

6.7.3.9.1 Every pressure-relief device shall be plainly and permanently marked with the following:

(a) The pressure (in bar or kPa) at which it is set to discharge;

(b) The allowable tolerance at the discharge pressure for spring-loaded devices;

(c) The reference temperature corresponding to the rated pressure for frangible discs; and

(d) The rated flow capacity of the device in standard cubic metres of air per second (m3/s);

(e) The cross sectional flow areas of the spring loaded pressure-relief devices and frangible discs in mm².

When practicable, the following information shall also be shown:

(f) The manufacturer's name and relevant catalogue number.

6.7.3.9.2 The rated flow capacity marked on the pressure-relief devices shall be determined according to ISO 4126-1:2004 and ISO 4126-7:2004.

6.7.3.10 ***Connections to pressure-relief devices***

6.7.3.10.1 Connections to pressure-relief devices shall be of sufficient size to enable the required discharge to pass unrestricted to the safety device. No stop-valve shall be installed between the shell and the pressure-relief devices except when duplicate devices are provided for maintenance or other reasons and the stop-valves serving the devices actually in use are locked open or the stop-valves are interlocked so that at least one of the duplicate devices is always operable and capable of meeting the requirements of 6.7.3.8. There shall be no obstruction in an opening leading to a vent or pressure-relief device which might restrict or cut-off the flow from the shell to that device. Vents from the pressure-relief devices, when used, shall deliver the relieved vapour or liquid to the atmosphere in conditions of minimum back-pressure on the relieving device.

6.7.3.11 ***Siting of pressure-relief devices***

6.7.3.11.1 Each pressure-relief device inlet shall be situated on top of the shell in a position as near the longitudinal and transverse centre of the shell as reasonably practicable. All pressure relief device inlets shall under maximum filling conditions be situated in the vapour space of the shell and the devices shall be so arranged as to ensure that the escaping vapour is discharged unrestrictedly. For flammable non-refrigerated liquefied gases, the escaping vapour shall be directed away from the shell in such a manner that it cannot impinge upon the shell. Protective devices which deflect the flow of vapour are permissible provided the required relief-device capacity is not reduced.

6.7.3.11.2 Arrangements shall be made to prevent access to the pressure-relief devices by unauthorized persons and to protect the devices from damage caused by the portable tank overturning.

6.7.3.12 ***Gauging devices***

6.7.3.12.1 Unless a portable tank is intended to be filled by mass it shall be equipped with one or more gauging devices. Glass level-gauges and gauges made of other fragile material, which are in direct communication with the contents of the shell shall not be used.

6.7.3.13 *Portable tank supports, frameworks, lifting and tie-down attachments*

6.7.3.13.1 Portable tanks shall be designed and constructed with a support structure to provide a secure base during transport. The forces specified in 6.7.3.2.9 and the safety factor specified in 6.7.3.2.10 shall be considered in this aspect of the design. Skids, frameworks, cradles or other similar structures are acceptable.

6.7.3.13.2 The combined stresses caused by portable tank mountings (e.g. cradles, frameworks, etc.) and portable tank lifting and tie-down attachments shall not cause excessive stress in any portion of the shell. Permanent lifting and tie-down attachments shall be fitted to all portable tanks. Preferably they shall be fitted to the portable tank supports but may be secured to reinforcing plates located on the shell at the points of support.

6.7.3.13.3 In the design of supports and frameworks the effects of environmental corrosion shall be taken into account.

6.7.3.13.4 Forklift pockets shall be capable of being closed off. The means of closing forklift pockets shall be a permanent part of the framework or permanently attached to the framework. Single compartment portable tanks with a length less than 3.65 m need not have closed off forklift pockets provided that:

(a) The shell and all the fittings are well protected from being hit by the forklift blades; and

(b) The distance between the centres of the forklift pockets is at least half of the maximum length of the portable tank.

6.7.3.13.5 When portable tanks are not protected during transport, according to 4.2.2.3, the shells and service equipment shall be protected against damage to the shell and service equipment resulting from lateral or longitudinal impact or overturning. External fittings shall be protected so as to preclude the release of the shell contents upon impact or overturning of the portable tank on its fittings. Examples of protection include:

(a) Protection against lateral impact which may consist of longitudinal bars protecting the shell on both sides at the level of the median line;

(b) Protection of the portable tank against overturning which may consist of reinforcement rings or bars fixed across the frame;

(c) Protection against rear impact which may consist of a bumper or frame;

(d) Protection of the shell against damage from impact or overturning by use of an ISO frame in accordance with ISO 1496-3:1995.

6.7.3.14 *Design approval*

6.7.3.14.1 The competent authority or its authorized body shall issue a design approval certificate for any new design of a portable tank. This certificate shall attest that a portable tank has been surveyed by that authority, is suitable for its intended purpose and meets the requirements of this Chapter and where appropriate the provisions for gases provided in portable tank instruction T50 in 4.2.5.2.6. When a series of portable tanks are manufactured without change in the design, the certificate shall be valid for the entire series. The certificate shall refer to the prototype test report, the gases allowed to be transported, the materials of construction of the shell and an approval number. The approval number shall consist of the distinguishing sign or mark of the State in whose territory the approval was granted, indicated by the distinguishing sign used on vehicles in international road traffic[2], and a registration number. Any alternative arrangements according to 6.7.1.2 shall be indicated on the certificate. A design approval may serve for the approval of smaller portable tanks made of materials of the same kind and thickness, by the same fabrication techniques and with identical supports, equivalent closures and other appurtenances.

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[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

6.7.3.14.2 The prototype test report for the design approval shall include at least the following:

(a) The results of the applicable framework test specified in ISO 1496-3:1995;

(b) The results of the initial inspection and test in 6.7.3.15.3; and

(c) The results of the impact test in 6.7.3.15.1, when applicable.

6.7.3.15 ***Inspection and testing***

6.7.3.15.1 Portable tanks meeting the definition of container in the International Convention for Safe Containers (CSC), 1972, as amended, shall not be used unless they are successfully qualified by subjecting a representative prototype of each design to the Dynamic, Longitudinal Impact Test prescribed in the Manual of Tests and Criteria, Part IV, Section 41.

6.7.3.15.2 The shell and items of equipment of each portable tank shall be inspected and tested before being put into service for the first time (initial inspection and test) and thereafter at not more than five-year intervals (5 year periodic inspection and test) with an intermediate periodic inspection and test (2.5 year periodic inspection and test) midway between the 5 year periodic inspections and tests. The 2.5 year inspection and test may be performed within 3 months of the specified date. An exceptional inspection and test shall be performed regardless of the last periodic inspection and test when necessary according to 6.7.3.15.7.

6.7.3.15.3 The initial inspection and test of a portable tank shall include a check of the design characteristics, an internal and external examination of the portable tank and its fittings with due regard to the non-refrigerated liquefied gases to be transported, and a pressure test referring to the test pressures according to 6.7.3.3.2. The pressure test may be performed as a hydraulic test or by using another liquid or gas with the agreement of the competent authority or its authorized body. Before the portable tank is placed into service, a leakproofness test and a test of the satisfactory operation of all service equipment shall also be performed. When the shell and its fittings have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test. All welds subject to full stress level in the shell shall be inspected during the initial test by radiographic, ultrasonic, or another suitable non-destructive test method. This does not apply to the jacket.

6.7.3.15.4 The 5 year periodic inspection and test shall include an internal and external examination and, as a general rule, a hydraulic pressure test. Sheathing, thermal insulation and the like shall be removed only to the extent required for reliable appraisal of the condition of the portable tank. When the shell and equipment have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.

6.7.3.15.5 The intermediate 2.5 year periodic inspection and test shall at least include an internal and external examination of the portable tank and its fittings with due regard to the non-refrigerated liquefied gases intended to be transported, a leakproofness test and a test of the satisfactory operation of all service equipment. Sheathing thermal insulation and the like shall be removed only to the extent required for reliable appraisal of the condition of the portable tank. For portable tanks intended for the transport of a single non-refrigerated liquefied gas, the 2.5 year internal examination may be waived or substituted by other test methods or inspection procedures specified by the competent authority or its authorized body.

6.7.3.15.6 A portable tank may not be filled and offered for transport after the date of expiry of the last 5 year or 2.5 year periodic inspection and test as required by 6.7.3.15.2. However a portable tank filled prior to the date of expiry of the last periodic inspection and test may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, a portable tank may be transported after the date of expiry of the last periodic test and inspection:

(a) After emptying but before cleaning, for purposes of performing the next required test or inspection prior to refilling; and

(b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection, in order to allow the return of dangerous goods for proper disposal or recycling. Reference to this exemption shall be mentioned in the transport document.

6.7.3.15.6.1 Except as provided for in 6.7.3.15.6, portable tanks which have missed the timeframe for their scheduled 5 year or 2.5 year periodic inspection and test may only be filled and offered for transport if a new 5 year periodic inspection and test is performed according to 6.7.3.15.4.

6.7.3.15.7 The exceptional inspection and test is necessary when the portable tank shows evidence of damaged or corroded areas, or leakage, or other conditions that indicate a deficiency that could affect the integrity of the portable tank. The extent of the exceptional inspection and test shall depend on the amount of damage or deterioration of the portable tank. It shall include at least the 2.5 year inspection and test according to 6.7.3.15.5.

6.7.3.15.8 The internal and external examinations shall ensure that:

(a) The shell is inspected for pitting, corrosion, or abrasions, dents, distortions, defects in welds or any other conditions, including leakage, that might render the portable tank unsafe for transport. The wall thickness shall be verified by appropriate measurement if this inspection indicates a reduction of wall thickness;

(b) The piping, valves, and gaskets are inspected for corroded areas, defects, or any other conditions, including leakage, that might render the portable tank unsafe for filling, discharge or transport;

(c) Devices for tightening manhole covers are operative and there is no leakage at manhole covers or gaskets;

(d) Missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;

(e) All emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;

(f) Required marks on the portable tank are legible and in accordance with the applicable requirements; and

(g) The framework, the supports and the arrangements for lifting the portable tank are in satisfactory condition.

6.7.3.15.9 The inspections and tests in 6.7.3.15.1, 6.7.3.15.3, 6.7.3.15.4, 6.7.3.15.5 and 6.7.3.15.7 shall be performed or witnessed by an expert approved by the competent authority or its authorized body. When the pressure test is a part of the inspection and test, the test pressure shall be the one indicated on the data plate of the portable tank. While under pressure, the portable tank shall be inspected for any leaks in the shell, piping or equipment.

6.7.3.15.10 In all cases when cutting, burning or welding operations on the shell have been effected, that work shall be to the approval of the competent authority or its authorized body taking into account the pressure vessel code used for the construction of the shell. A pressure test to the original test pressure shall be performed after the work is completed.

6.7.3.15.11 When evidence of any unsafe condition is discovered, the portable tank shall not be returned to service until it has been corrected and the pressure test is repeated and passed.

6.7.3.16 *Marking*

6.7.3.16.1 Every portable tank shall be fitted with a corrosion resistant metal plate permanently attached to the portable tank in a conspicuous place readily accessible for inspection. When for reasons of portable tank arrangements the plate cannot be permanently attached to the shell, the shell shall be marked with at least the information required by the pressure vessel code. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8;

(ii) Approval country;

(iii) Authorized body for the design approval;

(iv) Design approval number;

(v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);

(vi) Pressure vessel code to which the shell is designed;

(d) Pressures

(i) MAWP (in bar gauge or kPa gauge)3;

(ii) Test pressure (in bar gauge or kPa gauge)3;

(iii) Initial pressure test date (month and year);

(iv) Identification mark of the initial pressure test witness;

(v) External design pressure6 (in bar gauge or kPa gauge)3;

(e) Temperatures

(i) Design temperature range (in °C)[3];

(ii) Design reference temperature (in °C)[3];

(f) Materials

(i) Shell material(s) and material standard reference(s);

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[3] *The unit used shall be indicated.*

[6] *See 6.7.3.2.8.*

(ii) Equivalent thickness in reference steel (in mm)[3];

(g) Capacity

(i) Tank water capacity at 20 °C (in litres)[3];

(h) Periodic inspections and tests

(i) Type of the most recent periodic test (2.5-year, 5-year or exceptional);

(ii) Date of the most recent periodic test (month and year);

(iii) Test pressure (in bar gauge or kPa gauge)[3] of the most recent periodic test (if applicable);

(iv) Identification mark of the authorized body who performed or witnessed the most recent test.

Figure 6.7.3.16.1: Example of a plate for marking

Owner's registration number					
MANUFACTURING INFORMATION					
Country of manufacture					
Year of manufacture					
Manufacturer					
Manufacturer's serial number					
APPROVAL INFORMATION					
u n	Approval country				
	Authorized body for design approval				
	Design approval number				'AA' *(if applicable)*
Shell design code (pressure vessel code)					
PRESSURES					
MAWP					bar *or* kPa
Test pressure					bar *or* kPa
Initial pressure test date:	*(mm/yyyy)*		Witness stamp:		
External design pressure					bar *or* kPa
TEMPERATURES					
Design temperature range			°C to		°C
Design reference temperature					°C
MATERIALS					
Shell material(s) and material standard reference(s)					
Equivalent thickness in reference steel					mm
CAPACITY					
Tank water capacity at 20 °C					litres

PERIODIC INSPECTIONS / TESTS							
Test type	Test date	Witness stamp and test pressure[a]		Test type	Test date	Witness stamp and test pressure[a]	
	(mm/yyyy)		bar *or* kPa		*(mm/yyyy)*		bar *or* kPa

[a] *Test pressure if applicable.*

[3] *The unit used shall be indicated.*

6.7.3.16.2 The following information shall be durably marked either on the portable tank itself or on a metal plate firmly secured to the portable tank:

Name of the operator
Name of non-refrigerated liquefied gas(es) permitted for transport
Maximum permissible load mass for each non-refrigerated liquefied gas permitted _____ kg
Maximum permissible gross mass (MPGM) _____ kg
Unladen (tare) mass _____ kg
Portable tank instruction in accordance with 4.2.5.2.6

NOTE: *For the identification of the non-refrigerated liquefied gases being transported, see also Part 5.*

6.7.3.16.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate.

6.7.4 Requirements for the design, construction, inspection and testing of portable tanks intended for the transport of refrigerated liquefied gases

6.7.4.1 *Definitions*

For the purposes of this section:

Holding time means the time that will elapse from the establishment of the initial filling condition until the pressure has risen due to heat influx to the lowest set pressure of the pressure limiting device(s);

Jacket means the outer insulation cover or cladding which may be part of the insulation system;

Leakproofness test means a test using gas subjecting the shell and its service equipment, to an effective internal pressure not less than 90 % of the MAWP;

Maximum allowable working pressure (MAWP) means the maximum effective gauge pressure permissible at the top of the shell of a loaded portable tank in its operating position including the highest effective pressure during filling and discharge;

Maximum permissible gross mass (MPGM) means the sum of the tare mass of the portable tank and the heaviest load authorized for transport;

Minimum design temperature means the temperature which is used for the design and construction of the shell not higher than the lowest (coldest) temperature (service temperature) of the contents during normal conditions of filling, discharge and transport;

Portable tank means a thermally insulated multimodal tank having a capacity of more than 450 litres fitted with service equipment and structural equipment necessary for the transport of refrigerated liquefied gases. The portable tank shall be capable of being filled and discharged without the removal of its structural equipment. It shall possess stabilizing members external to the tank, and shall be capable of being lifted when full. It shall be designed primarily to be loaded onto a transport vehicle or ship and shall be equipped with skids, mountings or accessories to facilitate mechanical handling. Road tank-vehicles, rail tank-wagons, non-metallic tanks, intermediate bulk containers (IBCs), gas cylinders and large receptacles are not considered to fall within the definition for portable tanks;

Reference steel means a steel with a tensile strength of 370 N/mm^2 and an elongation at fracture of 27 %;

Shell means the part of the portable tank which retains the refrigerated liquefied gas intended for transport, including openings and their closures, but does not include service equipment or external structural equipment;

Service equipment means measuring instruments and filling, discharge, venting, safety, pressurizing, cooling and thermal insulation devices;

Structural equipment means the reinforcing, fastening, protective and stabilizing members external to the shell;

Tank means a construction which normally consists of either:

(a) A jacket and one or more inner shells where the space between the shell(s) and the jacket is exhausted of air (vacuum insulation) and may incorporate a thermal insulation system; or

(b) A jacket and an inner shell with an intermediate layer of solid thermally insulating material (e.g. solid foam);

Test pressure means the maximum gauge pressure at the top of the shell during the pressure test.

6.7.4.2 *General design and construction requirements*

6.7.4.2.1 Shells shall be designed and constructed in accordance with the requirements of a pressure vessel code recognized by the competent authority. Shells and jackets shall be made of metallic materials suitable for forming. Jackets shall be made of steel. Non-metallic materials may be used for the attachments and supports between the shell and jacket, provided their material properties at the minimum design temperature are proven to be sufficient. The materials shall in principle conform to national or international material standards. For welded shells and jackets only materials whose weldability has been fully demonstrated shall be used. Welds shall be skilfully made and afford complete safety. When the manufacturing process or the materials make it necessary, the shell shall be suitably heat treated to guarantee adequate toughness in the weld and in the heat affected zones. In choosing the material, the minimum design temperature shall be taken into account with respect to risk of brittle fracture, to hydrogen embrittlement, to stress corrosion cracking and to resistance to impact. When fine grain steel is used, the guaranteed value of the yield strength shall be not more than 460 N/mm^2 and the guaranteed value of the upper limit of the tensile strength shall be not more than 725 N/mm^2 in accordance with the material specifications. Portable tank materials shall be suitable for the external environment in which they may be transported.

6.7.4.2.2 Any part of a portable tank, including fittings, gaskets and pipe-work, which can be expected normally to come into contact with the refrigerated liquefied gas transported shall be compatible with that refrigerated liquefied gas.

6.7.4.2.3 Contact between dissimilar metals which could result in damage by galvanic action shall be avoided.

6.7.4.2.4 The thermal insulation system shall include a complete covering of the shell(s) with effective insulating materials. External insulation shall be protected by a jacket so as to prevent the ingress of moisture and other damage under normal transport conditions.

6.7.4.2.5 When a jacket is so closed as to be gas-tight, a device shall be provided to prevent any dangerous pressure from developing in the insulation space.

6.7.4.2.6 Portable tanks intended for the transport of refrigerated liquefied gases having a boiling point below minus 182 °C at atmospheric pressure shall not include materials which may react with oxygen or oxygen enriched atmospheres in a dangerous manner, when located in parts of the thermal insulation when there is a risk of contact with oxygen or with oxygen enriched fluid.

6.7.4.2.7 Insulating materials shall not deteriorate unduly in service.

6.7.4.2.8 A reference holding time shall be determined for each refrigerated liquefied gas intended for transport in a portable tank.

6.7.4.2.8.1 The reference holding time shall be determined by a method recognized by the competent authority on the basis of the following:

(a) The effectiveness of the insulation system, determined in accordance with 6.7.4.2.8.2;

(b) The lowest set pressure of the pressure limiting device(s);

(c) The initial filling conditions;

(d) An assumed ambient temperature of 30 °C;

(e) The physical properties of the individual refrigerated liquefied gas intended to be transported.

6.7.4.2.8.2 The effectiveness of the insulation system (heat influx in watts) shall be determined by type testing the portable tank in accordance with a procedure recognized by the competent authority. This test shall consist of either:

(a) A constant pressure test (for example at atmospheric pressure) when the loss of refrigerated liquefied gas is measured over a period of time; or

(b) A closed system test when the rise in pressure in the shell is measured over a period of time.

When performing the constant pressure test, variations in atmospheric pressure shall be taken into account. When performing either tests corrections shall be made for any variation of the ambient temperature from the assumed ambient temperature reference value of 30 °C.

***NOTE**: For the determination of the actual holding time before each journey, refer to 4.2.3.7.*

6.7.4.2.9 The jacket of a vacuum-insulated double-wall tank shall have either an external design pressure not less than 100 kPa (1 bar) gauge pressure calculated in accordance with a recognized technical code or a calculated critical collapsing pressure of not less than 200 kPa (2 bar) gauge pressure. Internal and external reinforcements may be included in calculating the ability of the jacket to resist the external pressure.

6.7.4.2.10 Portable tanks shall be designed and constructed with supports to provide a secure base during transport and with suitable lifting and tie-down attachments.

6.7.4.2.11 Portable tanks shall be designed to withstand, without loss of contents, at least the internal pressure due to the contents, and the static, dynamic and thermal loads during normal conditions of handling and transport. The design shall demonstrate that the effects of fatigue, caused by repeated application of these loads through the expected life of the portable tank, have been taken into account.

6.7.4.2.12 Portable tanks and their fastenings under the maximum permissible load shall be capable of absorbing the following separately applied static forces:

(a) In the direction of travel: twice the MPGM multiplied by the acceleration due to gravity (g)[1];

(b) Horizontally at right angles to the direction of travel: the MPGM (when the direction of travel is not clearly determined, the forces shall be equal to twice the MPGM) multiplied by the acceleration due to gravity (g)[1];

(c) Vertically upwards: the MPGM multiplied by the acceleration due to gravity (g)[1]; and

(d) Vertically downwards: twice the MPGM (total loading including the effect of gravity) multiplied by the acceleration due to gravity (g)[1].

6.7.4.2.13 Under each of the forces in 6.7.4.2.12, the safety factor to be observed shall be as follows:

(a) For materials having a clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed yield strength; or

[1] *For calculation purposes $g = 9.81\ m/s^2$.*

(b) For materials with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2 % proof strength or, for austenitic steels, the 1 % proof strength.

6.7.4.2.14 The values of yield strength or proof strength shall be the values according to national or international material standards. When austenitic steels are used, the specified minimum values according to the material standards may be increased by up to 15 % when these greater values are attested in the material inspection certificate. When no material standard exists for the metal in question, or when non-metallic materials are used the values of yield strength or proof strength shall be approved by the competent authority.

6.7.4.2.15 Portable tanks intended for the transport of flammable refrigerated liquefied gases shall be capable of being electrically earthed.

6.7.4.3 ***Design criteria***

6.7.4.3.1 Shells shall be of a circular cross section.

6.7.4.3.2 Shells shall be designed and constructed to withstand a test pressure not less than 1.3 times the MAWP. For shells with vacuum insulation the test pressure shall not be less than 1.3 times the sum of the MAWP and 100 kPa (1 bar). In no case shall the test pressure be less than 300 kPa (3 bar) gauge pressure. Attention is drawn to the minimum shell thickness requirements, specified in 6.7.4.4.2 to 6.7.4.4.7.

6.7.4.3.3 For metals exhibiting a clearly defined yield point or characterized by a guaranteed proof strength (0.2 % proof strength, generally, or 1 % proof strength for austenitic steels) the primary membrane stress σ (sigma) in the shell shall not exceed 0.75 Re or 0.50 Rm, whichever is lower, at the test pressure, where:

Re = yield strength in N/mm^2, or 0.2 % proof strength or, for austenitic steels, 1 % proof strength;
Rm = minimum tensile strength in N/mm^2.

6.7.4.3.3.1 The values of Re and Rm to be used shall be the specified minimum values according to national or international material standards. When austenitic steels are used, the specified minimum values for Re and Rm according to the material standards may be increased by up to 15 % when greater values are attested in the material inspection certificate. When no material standard exists for the metal in question, the values of Re and Rm used shall be approved by the competent authority or its authorized body.

6.7.4.3.3.2 Steels which have a Re/Rm ratio of more than 0.85 are not allowed for the construction of welded shells. The values of Re and Rm to be used in determining this ratio shall be the values specified in the material inspection certificate.

6.7.4.3.3.3 Steels used in the construction of shells shall have an elongation at fracture, in %, of not less than 10 000/Rm with an absolute minimum of 16 % for fine grain steels and 20 % for other steels. Aluminium and aluminium alloys used in the construction of shells shall have an elongation at fracture, in %, of not less than 10 000/6Rm with an absolute minimum of 12 %.

6.7.4.3.3.4 For the purpose of determining actual values for materials, it shall be noted that for sheet metal, the axis of the tensile test specimen shall be at right angles (transversely) to the direction of rolling. The permanent elongation at fracture shall be measured on test specimens of rectangular cross sections in accordance with ISO 6892:1998 using a 50 mm gauge length.

6.7.4.4 ***Minimum shell thickness***

6.7.4.4.1 The minimum shell thickness shall be the greater thickness based on:

(a) The minimum thickness determined in accordance with the requirements in 6.7.4.4.2 to 6.7.4.4.7; and

(b) The minimum thickness determined in accordance with the recognized pressure vessel code including the requirements in 6.7.4.3.

6.7.4.4.2 Shells of not more than 1.80 m in diameter shall be not less than 5 mm thick in the reference steel or of equivalent thickness in the metal to be used. Shells of more than 1.80 m in diameter shall be not less than 6 mm thick in the reference steel or of equivalent thickness in the metal to be used.

6.7.4.4.3 Shells of vacuum-insulated tanks of not more than 1.80 m in diameter shall be not less than 3 mm thick in the reference steel or of equivalent thickness in the metal to be used. Such shells of more than 1.80 m in diameter shall be not less than 4 mm thick in the reference steel or of equivalent thickness in the metal to be used.

6.7.4.4.4 For vacuum-insulated tanks, the aggregate thickness of the jacket and the shell shall correspond to the minimum thickness prescribed in 6.7.4.4.2, the thickness of the shell itself being not less than the minimum thickness prescribed in 6.7.4.4.3.

6.7.4.4.5 Shells shall be not less than 3 mm thick regardless of the material of construction.

6.7.4.4.6 The equivalent thickness of a metal other than the thickness prescribed for the reference steel in 6.7.4.4.2 and 6.7.4.4.3 shall be determined using the following formula:

$$e_1 = \frac{21.4 \times e_0}{\sqrt[3]{Rm_1 \times A_1}}$$

where:

e_1 = required equivalent thickness (in mm) of the metal to be used;

e_0 = minimum thickness (in mm) of the reference steel specified in 6.7.4.4.2 and 6.7.4.4.3;

Rm_1 = guaranteed minimum tensile strength (in N/mm^2) of the metal to be used (see 6.7.4.3.3);

A_1 = guaranteed minimum elongation at fracture (in %) of the metal to be used according to national or international standards.

6.7.4.4.7 In no case shall the wall thickness be less than that prescribed in 6.7.4.4.1 to 6.7.4.4.5. All parts of the shell shall have a minimum thickness as determined by 6.7.4.4.1 to 6.7.4.4.6. This thickness shall be exclusive of any corrosion allowance.

6.7.4.4.8 There shall be no sudden change of plate thickness at the attachment of the ends (heads) to the cylindrical portion of the shell.

6.7.4.5 *Service equipment*

6.7.4.5.1 Service equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during handling and transport. When the connection between the frame and the tank or the jacket and the shell allows relative movement, the equipment shall be so fastened as to permit such movement without risk of damage to working parts. The external discharge fittings (pipe sockets, shut-off devices), the stop-valve and its seating shall be protected against the danger of being wrenched off by external forces (for example using shear sections). The filling and discharge devices (including flanges or threaded plugs) and any protective caps shall be capable of being secured against unintended opening.

6.7.4.5.2 Each filling and discharge opening in portable tanks used for the transport of flammable refrigerated liquefied gases shall be fitted with at least three mutually independent shut-off devices in series, the first being a stop-valve situated as close as reasonably practicable to the jacket, the second being a stop-valve and the third being a blank flange or equivalent device. The shut-off device closest to the jacket shall be a quick closing device, which closes automatically in the event of unintended movement of the portable tank during filling or discharge or fire engulfment. This device shall also be possible to operate by remote control.

6.7.4.5.3 Each filling and discharge opening in portable tanks used for the transport of non-flammable refrigerated liquefied gases shall be fitted with at least two mutually independent shut-off devices in series, the

first being a stop-valve situated as close as reasonably practicable to the jacket, the second a blank flange or equivalent device.

6.7.4.5.4 For sections of piping which can be closed at both ends and where liquid product can be trapped, a method of automatic pressure relief shall be provided to prevent excess pressure build-up within the piping.

6.7.4.5.5 Vacuum insulated tanks need not have an opening for inspection.

6.7.4.5.6 External fittings shall be grouped together so far as reasonably practicable.

6.7.4.5.7 Each connection on a portable tank shall be clearly marked to indicate its function.

6.7.4.5.8 Each stop-valve or other means of closure shall be designed and constructed to a rated pressure not less than the MAWP of the shell taking into account the temperature expected during transport. All stop-valves with a screwed spindle shall be closed by a clockwise motion of the handwheel. In the case of other stop-valves the position (open and closed) and direction of closure shall be clearly indicated. All stop-valves shall be designed to prevent unintentional opening.

6.7.4.5.9 When pressure-building units are used, the liquid and vapour connections to that unit shall be provided with a valve as close to the jacket as reasonably practicable to prevent the loss of contents in case of damage to the pressure-building unit.

6.7.4.5.10 Piping shall be designed, constructed and installed so as to avoid the risk of damage due to thermal expansion and contraction, mechanical shock and vibration. All piping shall be of a suitable material. To prevent leakage due to fire, only steel piping and welded joints shall be used between the jacket and the connection to the first closure of any outlet. The method of attaching the closure to this connection shall be to the satisfaction of the competent authority or its authorized body. Elsewhere pipe joints shall be welded when necessary.

6.7.4.5.11 Joints in copper tubing shall be brazed or have an equally strong metal union. The melting point of brazing materials shall be no lower than 525 °C. The joints shall not decrease the strength of the tubing as may happen when cutting threads.

6.7.4.5.12 The materials of construction of valves and accessories shall have satisfactory properties at the lowest operating temperature of the portable tank.

6.7.4.5.13 The burst pressure of all piping and pipe fittings shall be not less than the highest of four times the MAWP of the shell or four times the pressure to which it may be subjected in service by the action of a pump or other device (except pressure-relief devices).

6.7.4.6 *Pressure-relief devices*

6.7.4.6.1 Every shell shall be provided with not less than two independent spring-loaded pressure-relief devices. The pressure-relief devices shall open automatically at a pressure not less than the MAWP and be fully open at a pressure equal to 110 % of the MAWP. These devices shall, after discharge, close at a pressure not lower than 10 % below the pressure at which discharge starts and shall remain closed at all lower pressures. The pressure-relief devices shall be of the type that will resist dynamic forces including surge.

6.7.4.6.2 Shells for non-flammable refrigerated liquefied gases and hydrogen may in addition have frangible discs in parallel with the spring-loaded devices as specified in 6.7.4.7.2 and 6.7.4.7.3.

6.7.4.6.3 Pressure-relief devices shall be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure.

6.7.4.6.4 Pressure-relief devices shall be approved by the competent authority or its authorized body.

6.7.4.7 ***Capacity and setting of pressure-relief devices***

6.7.4.7.1 In the case of the loss of vacuum in a vacuum-insulated tank or of loss of 20 % of the insulation of a tank insulated with solid materials, the combined capacity of all pressure-relief devices installed shall be sufficient so that the pressure (including accumulation) inside the shell does not exceed 120 % of the MAWP.

6.7.4.7.2 For non-flammable refrigerated liquefied gases (except oxygen) and hydrogen, this capacity may be achieved by the use of frangible discs in parallel with the required safety-relief devices. Frangible discs shall rupture at nominal pressure equal to the test pressure of the shell.

6.7.4.7.3 Under the circumstances described in 6.7.4.7.1 and 6.7.4.7.2 together with complete fire engulfment the combined capacity of all pressure-relief devices installed shall be sufficient to limit the pressure in the shell to the test pressure.

6.7.4.7.4 The required capacity of the relief devices shall be calculated in accordance with a well-established technical code recognized by the competent authority[7].

6.7.4.8 ***Marking of pressure-relief devices***

6.7.4.8.1 Every pressure-relief device shall be plainly and permanently marked with the following:

(a) The pressure (in bar or kPa) at which it is set to discharge;

(b) The allowable tolerance at the discharge pressure for spring-loaded devices;

(c) The reference temperature corresponding to the rated pressure for frangible discs; and

(d) The rated flow capacity of the device in standard cubic meters of air per second (m3/s);

(e) The cross sectional flow areas of the spring loaded pressure-relief devices and frangible discs in mm^2.

When practicable, the following information shall also be shown:

(f) The manufacturer's name and relevant catalogue number.

6.7.4.8.2 The rated flow capacity marked on the pressure-relief devices shall be determined according to ISO 4126-1:2004 and ISO 4126-7:2004.

6.7.4.9 ***Connections to pressure-relief devices***

6.7.4.9.1 Connections to pressure-relief devices shall be of sufficient size to enable the required discharge to pass unrestricted to the safety device. No stop-valve shall be installed between the shell and the pressure-relief devices except when duplicate devices are provided for maintenance or other reasons and the stop-valves serving the devices actually in use are locked open or the stop-valves are interlocked so that the requirements of 6.7.4.7 are always fulfilled. There shall be no obstruction in an opening leading to a vent or pressure-relief device which might restrict or cut-off the flow from the shell to that device. Pipework to vent the vapour or liquid from the outlet of the pressure-relief devices, when used, shall deliver the relieved vapour or liquid to the atmosphere in conditions of minimum back-pressure on the relieving device.

6.7.4.10 ***Siting of pressure-relief devices***

6.7.4.10.1 Each pressure-relief device inlet shall be situated on top of the shell in a position as near the longitudinal and transverse centre of the shell as reasonably practicable. All pressure-relief device inlets shall under maximum filling conditions be situated in the vapour space of the shell and the devices shall be so arranged as to ensure that the escaping vapour is discharged unrestrictedly. For refrigerated liquefied gases,

[7] *See for example CGA S-1.2-2003 "Pressure Relief Device Standards-Part 2-Cargo and Portable Tanks for Compressed Gases".*

the escaping vapour shall be directed away from the tank and in such a manner that it cannot impinge upon the tank. Protective devices which deflect the flow of vapour are permissible provided the required relief-device capacity is not reduced.

6.7.4.10.2 Arrangements shall be made to prevent access to the devices by unauthorized persons and to protect the devices from damage caused by the portable tank overturning.

6.7.4.11 ***Gauging devices***

6.7.4.11.1 Unless a portable tank is intended to be filled by mass, it shall be equipped with one or more gauging devices. Glass level-gauges and gauges made of other fragile material, which are in direct communication with the contents of the shell shall not be used.

6.7.4.11.2 A connection for a vacuum gauge shall be provided in the jacket of a vacuum-insulated portable tank.

6.7.4.12 ***Portable tank supports, frameworks, lifting and tie-down attachments***

6.7.4.12.1 Portable tanks shall be designed and constructed with a support structure to provide a secure base during transport. The forces specified in 6.7.4.2.12 and the safety factor specified in 6.7.4.2.13 shall be considered in this aspect of the design. Skids, frameworks, cradles or other similar structures are acceptable.

6.7.4.12.2 The combined stresses caused by portable tank mountings (e.g. cradles, frameworks, etc.) and portable tank lifting and tie-down attachments shall not cause excessive stress in any portion of the tank. Permanent lifting and tie-down attachments shall be fitted to all portable tanks. Preferably they shall be fitted to the portable tank supports but may be secured to reinforcing plates located on the tank at the points of support.

6.7.4.12.3 In the design of supports and frameworks the effects of environmental corrosion shall be taken into account.

6.7.4.12.4 Forklift pockets shall be capable of being closed off. The means of closing forklift pockets shall be a permanent part of the framework or permanently attached to the framework. Single compartment portable tanks with a length less than 3.65 m need not have closed off forklift pockets provided that:

(a) The tank and all the fittings are well protected from being hit by the forklift blades; and

(b) The distance between the centres of the forklift pockets is at least half of the maximum length of the portable tank.

6.7.4.12.5 When portable tanks are not protected during transport, according to 4.2.3.3, the shells and service equipment shall be protected against damage to the shell and service equipment resulting from lateral or longitudinal impact or overturning. External fittings shall be protected so as to preclude the release of the shell contents upon impact or overturning of the portable tank on its fittings. Examples of protection include:

(a) Protection against lateral impact which may consist of longitudinal bars protecting the shell on both sides at the level of the median line;

(b) Protection of the portable tank against overturning which may consist of reinforcement rings or bars fixed across the frame;

(c) Protection against rear impact which may consist of a bumper or frame;

(d) Protection of the shell against damage from impact or overturning by use of an ISO frame in accordance with ISO 1496-3:1995;

(e) Protection of the portable tank from impact or overturning by a vacuum insulation jacket.

6.7.4.13 ***Design approval***

6.7.4.13.1 The competent authority or its authorized body shall issue a design approval certificate for any new design of a portable tank. This certificate shall attest that a portable tank has been surveyed by that authority, is suitable for its intended purpose and meets the requirements of this Chapter. When a series of portable tanks is manufactured without change in the design, the certificate shall be valid for the entire series. The certificate shall refer to the prototype test report, the refrigerated liquefied gases allowed to be transported, the materials of construction of the shell and jacket and an approval number. The approval number shall consist of the distinguishing sign or mark of the State in whose territory the approval was granted, indicated by the distinguishing sign for use in international road traffic[2], and a registration number. Any alternative arrangements according to 6.7.1.2 shall be indicated on the certificate. A design approval may serve for the approval of smaller portable tanks made of materials of the same kind and thickness, by the same fabrication techniques and with identical supports, equivalent closures and other appurtenances.

6.7.4.13.2 The prototype test report for the design approval shall include at least the following:

(a) The results of the applicable frame-work test specified in ISO 1496-3:1995;

(b) The results of the initial inspection and test in 6.7.4.14.3; and

(c) The results of the impact test in 6.7.4.14.1, when applicable.

6.7.4.14 ***Inspection and testing***

6.7.4.14.1 Portable tanks meeting the definition of container in the International Convention for Safe Containers (CSC), 1972, as amended, shall not be used unless they are successfully qualified by subjecting a representative prototype of each design to the Dynamic, Longitudinal Impact Test prescribed in the Manual of Tests and Criteria, Part IV, Section 41.

6.7.4.14.2 The tank and items of equipment of each portable tank shall be inspected and tested before being put into service for the first time (initial inspection and test) and thereafter at not more than five-year intervals (5 year periodic inspection and test) with an intermediate periodic inspection and test (2.5 year periodic inspection and test) midway between the 5 year periodic inspections and tests. The 2.5 year inspection and test may be performed within 3 months of the specified date. An exceptional inspection and test shall be performed regardless of the last periodic inspection and test when necessary according to 6.7.4.14.7.

6.7.4.14.3 The initial inspection and test of a portable tank shall include a check of the design characteristics, an internal and external examination of the portable tank shell and its fittings with due regard to the refrigerated liquefied gases to be transported, and a pressure test referring to the test pressures according to 6.7.4.3.2. The pressure test may be performed as a hydraulic test or by using another liquid or gas with the agreement of the competent authority or its authorized body. Before the portable tank is placed into service, a leakproofness test and a test of the satisfactory operation of all service equipment shall also be performed. When the shell and its fittings have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test. All welds subject to full stress level shall be inspected during the initial test by radiographic, ultrasonic, or another suitable non-destructive test method. This does not apply to the jacket.

6.7.4.14.4 The 5 and 2.5 year periodic inspections and tests shall include an external examination of the portable tank and its fittings with due regard to the refrigerated liquefied gases transported, a leakproofness test, a test of the satisfactory operation of all service equipment and a vacuum reading, when applicable. In the case of non-vacuum insulated tanks, the jacket and insulation shall be removed during the 2.5 year and the 5 year periodic inspections and tests but only to the extent necessary for a reliable appraisal.

6.7.4.14.5 *Deleted.*

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[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

6.7.4.14.6 A portable tank may not be filled and offered for transport after the date of expiry of the last 5 year or 2.5 year periodic inspection and test as required by 6.7.4.14.2. However a portable tank filled prior to the date of expiry of the last periodic inspection and test may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, a portable tank may be transported after the date of expiry of the last periodic test and inspection:

(a) After emptying but before cleaning, for purposes of performing the next required test or inspection prior to refilling; and

(b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection, in order to allow the return of dangerous goods for proper disposal or recycling. Reference to this exemption shall be mentioned in the transport document.

6.7.4.14.6.1 Except as provided for in 6.7.4.14.6, portable tanks which have missed the timeframe for their scheduled 5 year or 2.5 year periodic inspection and test may only be filled and offered for transport if a new 5 year periodic inspection and test is performed according to 6.7.4.14.4.

6.7.4.14.7 The exceptional inspection and test is necessary when the portable tank shows evidence of damaged or corroded areas, leakage, or any other conditions that indicate a deficiency that could affect the integrity of the portable tank. The extent of the exceptional inspection and test shall depend on the amount of damage or deterioration of the portable tank. It shall include at least the 2.5 year inspection and test according to 6.7.4.14.4.

6.7.4.14.8 The internal examination during the initial inspection and test shall ensure that the shell is inspected for pitting, corrosion, or abrasions, dents, distortions, defects in welds or any other conditions, that might render the portable tank unsafe for transport.

6.7.4.14.9 The external examination shall ensure that:

(a) The external piping, valves, pressurizing/cooling systems when applicable and gaskets are inspected for corroded areas, defects, or any other conditions, including leakage, that might render the portable tank unsafe for filling, discharge or transport;

(b) There is no leakage at any manhole covers or gaskets;

(c) Missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;

(d) All emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;

(e) Required marks on the portable tank are legible and in accordance with the applicable requirements; and

(f) The framework, the supports and the arrangements for lifting the portable tank are in satisfactory condition.

6.7.4.14.10 The inspections and tests in 6.7.4.14.1, 6.7.4.14.3, 6.7.4.14.4, 6.7.4.14.5 and 6.7.4.14.7 shall be performed or witnessed by an expert approved by the competent authority or its authorized body. When the pressure test is a part of the inspection and test, the test pressure shall be the one indicated on the data plate of the portable tank. While under pressure, the portable tank shall be inspected for any leaks in the shell, piping or equipment.

6.7.4.14.11 In all cases when cutting, burning or welding operations on the shell of a portable tank have been effected, that work shall be to the approval of the competent authority or its authorized body taking into account the pressure vessel code used for the construction of the shell. A pressure test to the original test pressure shall be performed after the work is completed.

6.7.4.14.12 When evidence of any unsafe condition is discovered, the portable tank shall not be returned to service until it has been corrected and the test is repeated and passed.

6.7.4.15 ***Marking***

6.7.4.15.1 Every portable tank shall be fitted with a corrosion resistant metal plate permanently attached to the portable tank in a conspicuous place readily accessible for inspection. When for reasons of portable tank arrangements the plate cannot be permanently attached to the shell, the shell shall be marked with at least the information required by the pressure vessel code. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8;

(ii) Approval country;

(iii) Authorized body for the design approval;

(iv) Design approval number;

(v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);

(vi) Pressure vessel code to which the shell is designed;

(d) Pressures

(i) MAWP (in bar gauge or kPa gauge)[3];

(ii) Test pressure (in bar gauge or kPa gauge)[3];

(iii) Initial pressure test date (month and year);

(iv) Identification mark of the initial pressure test witness;

(e) Temperatures

(i) Minimum design temperature (in °C)[3];

[3] *The unit used shall be indicated.*

(f) Materials

(i) Shell material(s) and material standard reference(s);

(ii) Equivalent thickness in reference steel (in mm)[3];

(g) Capacity

(i) Tank water capacity at 20 °C (in litres)[3];

(h) Insulation

(i) Either “Thermally insulated” or “Vacuum insulated” (as applicable);

(ii) Effectiveness of the insulation system (heat influx) (in Watts)[3];

(i) Holding times – For each refrigerated liquefied gas permitted to be transported in the portable tank:

(i) Name, in full, of the refrigerated liquefied gas;

(ii) Reference holding time (in days or hours)[3];

(iii) Initial pressure (in bar gauge or kPa gauge)[3];

(iv) Degree of filling (in kg)[3];

(j) Periodic inspections and tests

(i) Type of the most recent periodic test (2.5-year, 5-year or exceptional);

(ii) Date of the most recent periodic test (month and year);

(iii) Identification mark of the authorized body who performed or witnessed the most recent test.

[3] *The unit used shall be indicated.*

Figure 6.7.4.15.1: Example of a plate for marking

Owner's registration number				
MANUFACTURING INFORMATION				
Country of manufacture				
Year of manufacture				
Manufacturer				
Manufacturer's serial number				
APPROVAL INFORMATION				
(UN)	Approval country			
	Authorized body for design approval			
	Design approval number			'AA' *(if applicable)*
Shell design code (pressure vessel code)				
PRESSURES				
MAWP				bar *or* kPa
Test pressure				bar *or* kPa
Initial pressure test date:	*(mm/yyyy)*	Witness stamp:		
TEMPERATURES				
Minimum design temperature				°C
MATERIALS				
Shell material(s) and material standard reference(s)				
Equivalent thickness in reference steel				mm
CAPACITY				
Tank water capacity at 20 °C				litres
INSULATION				
'Thermally insulated' or 'Vacuum insulated' *(as applicable)*				
Heat influx				Watts

HOLDING TIMES			
Refrigerated liquefied gas(es) permitted	Reference holding time	Initial pressure	Degree of filling
	days *or* hours	bar *or* kPa	kg

PERIODIC INSPECTIONS / TESTS					
Test type	Test date	Witness stamp	Test type	Test date	Witness stamp
	(mm/yyyy)			*(mm/yyyy)*	

6.7.4.15.2 The following information shall be durably marked either on the portable tank itself or on a metal plate firmly secured to the portable tank.

Name of the owner and the operator
Name of the refrigerated liquefied gas being transported (and minimum mean bulk temperature)
Maximum permissible gross mass (MPGM) _____ kg
Unladen (tare) mass _____ kg
Actual holding time for gas being transported _____ days (or hours)
Portable tank instruction in accordance with 4.2.5.2.6

NOTE: *For the identification of the refrigerated liquefied gas(es) being transported, see also Part 5.*

6.7.4.15.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate.

6.7.5 Requirements for the design, construction, inspection and testing of multiple-element gas containers (MEGCs) intended for the transport of non-refrigerated gases

6.7.5.1 *Definitions*

For the purposes of this section:

*Element*s are cylinders, tubes or bundles of cylinders;

Leakproofness test means a test using gas subjecting the elements and the service equipment of the MEGC to an effective internal pressure of not less than 20 % of the test pressure;

Manifold means an assembly of piping and valves connecting the filling and/or discharge openings of the elements;

Maximum permissible gross mass (MPGM) means the sum of the tare mass of the MEGC and the heaviest load authorized for transport;

Service equipment means measuring instruments and filling, discharge, venting and safety devices;

Structural equipment means the reinforcing, fastening, protective and stabilizing members external to the elements.

6.7.5.2 *General design and construction requirements*

6.7.5.2.1 The MEGC shall be capable of being filled and discharged without the removal of its structural equipment. It shall possess stabilizing members external to the elements to provide structural integrity for handling and transport. MEGCs shall be designed and constructed with supports to provide a secure base during transport and with lifting and tie-down attachments which are adequate for lifting the MEGC including when loaded to its maximum permissible gross mass. The MEGC shall be designed to be loaded onto a vehicle or vessel and shall be equipped with skids, mountings or accessories to facilitate mechanical handling.

6.7.5.2.2 MEGCs shall be designed, manufactured and equipped in such a way as to withstand all conditions to which they will be subjected during normal conditions of handling and transport. The design shall take into account the effects of dynamic loading and fatigue.

6.7.5.2.3 Elements of an MEGC shall be made of seamless steel or composite construction and be constructed and tested according to Chapter 6.2. All of the elements in an MEGC shall be of the same design type.

6.7.5.2.4 Elements of MEGCs, fittings and pipework shall be:

(a) compatible with the substances intended to be transported (for gases see ISO 11114-1:2012 + A1:2017 and ISO 11114-2:2013); or

(b) properly passivated or neutralized by chemical reaction.

6.7.5.2.5 Contact between dissimilar metals which could result in damage by galvanic action shall be avoided.

6.7.5.2.6 The materials of the MEGC, including any devices, gaskets, and accessories, shall not adversely affect the gases intended for transport in the MEGC.

6.7.5.2.7 MEGCs shall be designed to withstand, without loss of contents, at least the internal pressure due to the contents, and the static, dynamic and thermal loads during normal conditions of handling and transport. The design shall demonstrate that the effects of fatigue, caused by repeated application of these loads through the expected life of the multiple-element gas container, have been taken into account.

6.7.5.2.8 MEGCs and their fastenings shall, under the maximum permissible load, be capable of withstanding the following separately applied static forces:

(a) in the direction of travel: twice the MPGM multiplied by the acceleration due to gravity (g)[1]

(b) horizontally at right angles to the direction of travel: the MPGM (when the direction of travel is not clearly determined, the forces shall be equal to twice the MPGM) multiplied by the acceleration due to gravity (g)[1];

(c) vertically upwards: the MPGM multiplied by the acceleration due to gravity (g)[1]; and

(d) vertically downwards: twice the MPGM (total loading including the effect of gravity) multiplied by the acceleration due to gravity (g)[1].

6.7.5.2.9 Under the forces defined above, the stress at the most severely stressed point of the elements shall not exceed the values given in either the relevant standards of 6.2.2.1 or, if the elements are not designed, constructed and tested according to those standards, in the technical code or standard recognised or approved by the competent authority of the country of use (see 6.2.3.1).

6.7.5.2.10 Under each of the forces in 6.7.5.2.8, the safety factor for the framework and fastenings to be observed shall be as follows:

(a) for steels having a clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed yield strength; or

(b) for steels with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2 % proof strength and, for austenitic steels, the 1 % proof strength.

6.7.5.2.11 MEGCs intended for the transport of flammable gases shall be capable of being electrically earthed.

6.7.5.2.12 The elements shall be secured in a manner that prevents undesired movement in relation to the structure and the concentration of harmful localized stresses.

6.7.5.3 ***Service equipment***

6.7.5.3.1 Service equipment shall be configured or designed to prevent damage that could result in the release of the pressure receptacle contents during normal conditions of handling and transport. When the connection between the frame and the elements allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without damage to working parts. The manifolds, the discharge fittings (pipe sockets, shut-off devices), and the stop-valves shall be protected from being wrenched off by external forces. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the valves and the piping from shearing, or releasing the pressure receptacle contents. The filling and discharge devices (including flanges or threaded plugs) and any protective caps shall be capable of being secured against unintended opening.

6.7.5.3.2 Each element intended for the transport of gases of Division 2.3 shall be fitted with a valve. The manifold for liquefied gases of Division 2.3 shall be so designed that the elements can be filled separately and be kept isolated by a valve capable of being sealed. For the transport of gases of Division 2.1, the elements shall be divided into groups of not more than 3 000 litres each isolated by a valve.

6.7.5.3.3 For filling and discharge openings of the MEGC, two valves in series shall be placed in an accessible position on each discharge and filling pipe. One of the valves may be a non-return valve. The filling and discharge devices may be fitted to a manifold. For sections of piping which can be closed at both ends and where a liquid product can be trapped, a pressure-relief valve shall be provided to prevent excessive pressure build-up. The main isolation valves on an MEGC shall be clearly marked to indicate their directions of closure.

[1] *For calculation purposes g = 9.81 m/s^2.*

Each stop-valve or other means of closure shall be designed and constructed to withstand a pressure equal to or greater than 1.5 times the test pressure of the MEGC. All stop-valves with screwed spindles shall close by a clockwise motion of the handwheel. For other stop-valves, the position (open or closed) and direction of closure shall be clearly indicated. All stop-valves shall be designed and positioned to prevent unintentional opening. Ductile metals shall be used in the construction of valves or accessories.

6.7.5.3.4 Piping shall be designed, constructed and installed so as to avoid damage due to expansion and contraction, mechanical shock and vibration. Joints in tubing shall be brazed or have an equally strong metal union. The melting point of brazing materials shall be no lower than 525 °C. The rated pressure of the service equipment and of the manifold shall be not less than two thirds of the test pressure of the elements.

6.7.5.4 ***Pressure-relief devices***

6.7.5.4.1 The elements of MEGCs used for the transport of UN 1013 carbon dioxide and UN 1070 nitrous oxide shall be divided into groups of not more than 3 000 litres each isolated by a valve. Each group shall be fitted with one or more pressure relief devices. If so required by the competent authority of the country of use, MEGCs for other gases shall be fitted with pressure relief devices as specified by that competent authority.

6.7.5.4.2 When pressure relief devices are fitted, every element or group of elements of an MEGC that can be isolated shall then be fitted with one or more pressure relief devices. Pressure relief devices shall be of a type that will resist dynamic forces including liquid surge and shall be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure.

6.7.5.4.3 MEGCs used for the transport of certain non-refrigerated gases identified in instruction T50 in 4.2.5.2.6 may have a pressure-relief device as required by the competent authority of the country of use. Unless an MEGC in dedicated service is fitted with an approved pressure relief device constructed of materials compatible with the load, such a device shall comprise a frangible disc preceding a spring-loaded device. The space between the frangible disc and the spring-loaded device may be equipped with a pressure gauge or a suitable telltale indicator. This arrangement permits the detection of disc rupture, pinholing or leakage which could cause a malfunction of the pressure relief device. The frangible disc shall rupture at a nominal pressure 10 % above the start-to-discharge pressure of the spring-loaded device.

6.7.5.4.4 In the case of multi-purpose MEGCs used for the transport of low-pressure liquefied gases, the pressure-relief devices shall open at a pressure as specified in 6.7.3.7.1 for the gas having the highest maximum allowable working pressure of the gases allowed to be transported in the MEGC.

6.7.5.5 ***Capacity of pressure relief devices***

6.7.5.5.1 The combined delivery capacity of the pressure relief devices when fitted shall be sufficient that, in the event of total fire engulfment of the MEGC, the pressure (including accumulation) inside the elements does not exceed 120 % of the set pressure of the pressure relief device. The formula provided in CGA S-1.2-2003 “Pressure Relief Device Standards – Part 2 – Cargo and Portable Tanks for Compressed Gases” shall be used to determine the minimum total flow capacity for the system of pressure relief devices. CGA S-1.1-2003 “Pressure Relief Device Standards – Part 1 – Cylinders for Compressed Gases” may be used to determine the relief capacity of individual elements. Spring-loaded pressure relief devices may be used to achieve the full relief capacity prescribed in the case of low pressure liquefied gases. In the case of multi-purpose MEGCs, the combined delivery capacity of the pressure-relief devices shall be taken for the gas which requires the highest delivery capacity of the gases allowed to be transported in the MEGC.

6.7.5.5.2 To determine the total required capacity of the pressure relief devices installed on the elements for the transport of liquefied gases, the thermodynamic properties of the gas shall be considered (see, for example, CGA S-1.2-2003 “Pressure Relief Device Standards – Part 2 – Cargo and Portable Tanks for Compressed Gases” for low pressure liquefied gases and CGA S-1.1-2003 “Pressure Relief Device Standards, Part 1, Cylinders for Compressed Gases” for high pressure liquefied gases).

6.7.5.6 ***Marking of pressure-relief devices***

6.7.5.6.1 Pressure relief devices shall be clearly and permanently marked with the following:

(a) the manufacturer's name and relevant catalogue number;

(b) the set pressure and/or the set temperature;

(c) the date of the last test;

(d) The cross sectional flow areas of the spring loaded pressure-relief devices and frangible discs in mm^2.

6.7.5.6.2 The rated flow capacity marked on spring loaded pressure relief devices for low pressure liquefied gases shall be determined according to ISO 4126-1:2004 and ISO 4126-7:2004.

6.7.5.7 ***Connections to pressure-relief devices***

6.7.5.7.1 Connections to pressure-relief devices shall be of sufficient size to enable the required discharge to pass unrestricted to the pressure relief device. No stop-valve shall be installed between the element and the pressure-relief devices, except when duplicate devices are provided for maintenance or other reasons, and the stop-valves serving the devices actually in use are locked open, or the stop-valves are interlocked so that at least one of the duplicate devices is always operable and capable of meeting the requirements of 6.7.5.5. There shall be no obstruction in an opening leading to or leaving from a vent or pressure-relief device which might restrict or cut-off the flow from the element to that device. The opening through all piping and fittings shall have at least the same flow area as the inlet of the pressure relief device to which it is connected. The nominal size of the discharge piping shall be at least as large as that of the pressure relief device outlet. Vents from the pressure-relief devices, when used, shall deliver the relieved vapour or liquid to the atmosphere in conditions of minimum backpressure on the relieving device.

6.7.5.8 ***Siting of pressure-relief devices***

6.7.5.8.1 Each pressure relief device shall, under maximum filling conditions, be in communication with the vapour space of the elements for the transport of liquefied gases. The devices, when fitted, shall be so arranged as to ensure that the escaping vapour is discharged upwards and unrestrictedly as to prevent any impingement of escaping gas or liquid upon the MEGC, its elements or personnel. For flammable, pyrophoric and oxidizing gases, the escaping gas shall be directed away from the element in such a manner that it cannot impinge upon the other elements. Heat resistant protective devices which deflect the flow of gas are permissible provided the required pressure relief device capacity is not reduced.

6.7.5.8.2 Arrangements shall be made to prevent access to the pressure-relief devices by unauthorized persons and to protect the devices from damage caused by the MEGC overturning.

6.7.5.9 ***Gauging devices***

6.7.5.9.1 When a MEGC is intended to be filled by mass, it shall be equipped with one or more gauging devices. Level-gauges made of glass or other fragile material shall not be used.

6.7.5.10 ***MEGC supports, frameworks, lifting and tie-down attachments***

6.7.5.10.1 MEGCs shall be designed and constructed with a support structure to provide a secure base during transport. The forces specified in 6.7.5.2.8 and the safety factor specified in 6.7.5.2.10 shall be considered in this aspect of the design. Skids, frameworks, cradles or other similar structures are acceptable.

6.7.5.10.2 The combined stresses caused by element mountings (e.g. cradles, frameworks, etc.) and MEGC lifting and tie-down attachments shall not cause excessive stress in any element. Permanent lifting and tie-down attachments shall be fitted to all MEGCs. In no case shall mountings or attachments be welded onto the elements.

6.7.5.10.3 In the design of supports and frameworks, the effects of environmental corrosion shall be taken into account.

6.7.5.10.4 When MEGCs are not protected during transport, according to 4.2.4.3, the elements and service equipment shall be protected against damage resulting from lateral or longitudinal impact or overturning. External fittings shall be protected so as to preclude the release of the elements' contents upon impact or overturning of the MEGC on its fittings. Particular attention shall be paid to the protection of the manifold. Examples of protection include:

(a) protection against lateral impact which may consist of longitudinal bars;

(b) protection against overturning which may consist of reinforcement rings or bars fixed across the frame;

(c) protection against rear impact which may consist of a bumper or frame;

(d) protection of the elements and service equipment against damage from impact or overturning by use of an ISO frame in accordance with the relevant provisions of ISO 1496-3:1995.

6.7.5.11 ***Design approval***

6.7.5.11.1 The competent authority or its authorized body shall issue a design approval certificate for any new design of a MEGC. This certificate shall attest that the MEGC has been surveyed by that authority, is suitable for its intended purpose and meets the requirements of this Chapter, the applicable provisions for gases of Chapter 4.1 and of packing instruction P200. When a series of MEGCs are manufactured without change in the design, the certificate shall be valid for the entire series. The certificate shall refer to the prototype test report, the materials of construction of the manifold, the standards to which the elements are made and an approval number. The approval number shall consist of the distinguishing sign or mark of the country granting the approval, indicated by the distinguishing sign used on vehicles in international road traffic[2], and a registration number. Any alternative arrangements according to 6.7.1.2 shall be indicated on the certificate. A design approval may serve for the approval of smaller MEGCs made of materials of the same type and thickness, by the same fabrication techniques and with identical supports, equivalent closures and other appurtenances.

6.7.5.11.2 The prototype test report for the design approval shall include at least the following:

(a) the results of the applicable framework test specified in ISO 1496-3:1995;

(b) the results of the initial inspection and test specified in 6.7.5.12.3;

(c) the results of the impact test specified in 6.7.5.12.1; and

(d) certification documents verifying that the cylinders and tubes comply with the applicable standards.

6.7.5.12 ***Inspection and testing***

6.7.5.12.1 MEGCs meeting the definition of container in the International Convention for Safe Containers (CSC), 1972, as amended, shall not be used unless they are successfully qualified by subjecting a representative prototype of each design to the Dynamic, Longitudinal Impact Test prescribed in the Manual of Tests and Criteria, Part IV, Section 41.

6.7.5.12.2 The elements and items of equipment of each MEGC shall be inspected and tested before being put into service for the first time (initial inspection and test). Thereafter, MEGCs shall be inspected at no more than five-year intervals (5 year periodic inspection). An exceptional inspection and test shall be performed, regardless of the last periodic inspection and test, when necessary according to 6.7.5.12.5.

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[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

6.7.5.12.3 The initial inspection and test of an MEGC shall include a check of the design characteristics, an external examination of the MEGC and its fittings with due regard to the gases to be transported, and a pressure test performed at the test pressures according to packing instruction P200. The pressure test of the manifold may be performed as a hydraulic test or by using another liquid or gas with the agreement of the competent authority or its authorized body. Before the MEGC is placed into service, a leakproofness test and a test of the satisfactory operation of all service equipment shall also be performed. When the elements and their fittings have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.

6.7.5.12.4 The 5-year periodic inspection and test shall include an external examination of the structure, the elements and the service equipment in accordance with 6.7.5.12.6. The elements and the piping shall be tested at the periodicity specified in packing instruction P200 and in accordance with the provisions described in 6.2.1.6. When the elements and equipment have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.

6.7.5.12.5 An exceptional inspection and test is necessary when the MEGC shows evidence of damaged or corroded areas, leakage, or other conditions that indicate a deficiency that could affect the integrity of the MEGC. The extent of the exceptional inspection and test shall depend on the amount of damage or deterioration of the MEGC. It shall include at least the examinations required under 6.7.5.12.6.

6.7.5.12.6 The examinations shall ensure that:

(a) the elements are inspected externally for pitting, corrosion, abrasions, dents, distortions, defects in welds or any other conditions, including leakage, that might render the MEGC unsafe for transport;

(b) the piping, valves, and gaskets are inspected for corroded areas, defects, and other conditions, including leakage, that might render the MEGC unsafe for filling, discharge or transport;

(c) missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;

(d) all emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;

(e) required marks on the MEGC are legible and in accordance with the applicable requirements; and

(f) the framework, the supports and the arrangements for lifting the MEGC are in satisfactory condition.

6.7.5.12.7 The inspections and tests in 6.7.5.12.1, 6.7.5.12.3, 6.7.5.12.4 and 6.7.5.12.5 shall be performed or witnessed by a body authorized by the competent authority. When the pressure test is a part of the inspection and test, the test pressure shall be the one indicated on the data plate of the MEGC. While under pressure, the MEGC shall be inspected for any leaks in the elements, piping or equipment.

6.7.5.12.8 When evidence of any unsafe condition is discovered, the MEGC shall not be returned to service until it has been corrected and the applicable tests and verifications are passed.

6.7.5.13 *Marking*

6.7.5.13.1 Every MEGC shall be fitted with a corrosion resistant metal plate permanently attached to the MEGC in a conspicuous place readily accessible for inspection. The metal plate shall not be affixed to the elements. The elements shall be marked in accordance with Chapter 6.2. As a minimum, at least the following information shall be marked on the plate by stamping or by any other similar method:

(a) Owner information

(i) Owner's registration number;

(b) Manufacturing information

(i) Country of manufacture;

(ii) Year of manufacture;

(iii) Manufacturer's name or mark;

(iv) Manufacturer's serial number;

(c) Approval information

(i) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8;

(ii) Approval country;

(iii) Authorized body for the design approval;

(iv) Design approval number;

(v) Letters 'AA', if the design was approved under alternative arrangements (see 6.7.1.2);

(d) Pressures

(i) Test pressure (in bar gauge)[3];

(ii) Initial pressure test date (month and year);

(iii) Identification mark of the initial pressure test witness;

(e) Temperatures

(i) Design temperature range (in °C)[3];

(f) Elements / Capacity

(i) Number of elements;

(ii) Total water capacity (in litres)[3];

(g) Periodic inspections and tests

(i) Type of the most recent periodic test (5-year or exceptional);

(ii) Date of the most recent periodic test (month and year);

(iii) Identification mark of the authorized body who performed or witnessed the most recent test.

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3 *The unit used shall be indicated.*

Figure 6.7.5.13.1: Example of a plate for marking

Owner's registration number					
MANUFACTURING INFORMATION					
Country of manufacture					
Year of manufacture					
Manufacturer					
Manufacturer's serial number					
APPROVAL INFORMATION					
(UN)	Approval country				
	Authorized body for design approval				
	Design approval number			'AA' *(if applicable)*	
PRESSURES					
Test pressure				bar	
Initial pressure test date:	*(mm/yyyy)*	Witness stamp:			
TEMPERATURES					
Design temperature range		°C to °C			
ELEMENTS / CAPACITY					
Number of elements					
Total water capacity		litres			
PERIODIC INSPECTIONS / TESTS					

Test type	Test date	Witness stamp	Test type	Test date	Witness stamp
	(mm/yyyy)			*(mm/yyyy)*	

6.7.5.13.2 The following information shall be durably marked on a metal plate firmly secured to the MEGC:

Name of the operator
Maximum permissible load mass _____ kg
Working pressure at 15°C _____ bar gauge
Maximum permissible gross mass (MPGM) _____ kg
Unladen (tare) mass _____ kg

CHAPTER 6.8

REQUIREMENTS FOR THE DESIGN, CONSTRUCTION, INSPECTION AND TESTING OF BULK CONTAINERS

6.8.1 Definitions

For the purposes of this section:

Closed bulk container means a totally closed bulk container having a rigid roof, sidewalls, end walls and floor (including hopper-type bottoms). The term includes bulk containers with an opening roof, side or end wall that can be closed during transport. Closed bulk containers may be equipped with openings to allow for the exchange of vapours and gases with air and which prevent under normal conditions of transport the release of solid contents as well as the penetration of rain and splash water.

Flexible bulk container means a flexible container with a capacity not exceeding 15 m^3 and includes liners and attached handling devices and service equipment.

Sheeted bulk container means an open top bulk container with rigid bottom (including hopper-type bottom), side and end walls and a non-rigid covering;

6.8.2 Application and general requirements

6.8.2.1 Bulk containers and their service and structural equipment shall be designed and constructed to withstand, without loss of contents, the internal pressure of the contents and the stresses of normal handling and transport.

6.8.2.2 Where a discharge valve is fitted, it shall be capable of being made secure in the closed position and the whole discharge system shall be suitably protected from damage. Valves having lever closures shall be able to be secured against unintended opening and the open or closed position shall be readily apparent.

6.8.2.3 *Code for designating types of bulk container*

The following table indicates the codes to be used for designating types of bulk containers:

Types of bulk containers	Code
Sheeted bulk container	BK1
Closed bulk container	BK2
Flexible bulk container	BK3

6.8.2.4 In order to take account of progress in science and technology, the use of alternative arrangements which offer at least equivalent safety as provided by the requirements of this chapter may be considered by the competent authority.

6.8.3 Requirements for the design, construction, inspection and testing of freight containers used as BK1 or BK2 bulk containers

6.8.3.1 *Design and construction requirements*

6.8.3.1.1 The general design and construction requirements of this section are deemed to be met if the bulk container complies with the requirements of ISO 1496-4:1991 “Series 1 Freight containers – Specification and testing – Part 4: Non pressurized containers for dry bulk” and the container is siftproof.

6.8.3.1.2 Freight containers designed and tested in accordance with ISO 1496-1:1990 “Series 1 Freight containers – Specification and testing – Part 1: General cargo containers for general purposes” shall be equipped with operational equipment which is, including its connection to the freight container, designed to

strengthen the end walls and to improve the longitudinal restraint as necessary to comply with the test requirements of ISO 1496-4:1991 as relevant.

6.8.3.1.3 Bulk containers shall be siftproof. Where a liner is used to make the container siftproof it shall be made of a suitable material. The strength of material used for, and the construction of, the liner shall be appropriate to the capacity of the container and its intended use. Joins and closures of the liner shall withstand pressures and impacts liable to occur under normal conditions of handling and transport. For ventilated bulk containers any liner shall not impair the operation of ventilating devices.

6.8.3.1.4 The operational equipment of bulk containers designed to be emptied by tilting shall be capable of withstanding the total filling mass in the tilted orientation.

6.8.3.1.5 Any movable roof or side or end wall or roof section shall be fitted with locking devices with securing devices designed to show the locked state to an observer at ground level.

6.8.3.2 ***Service equipment***

6.8.3.2.1 Filling and discharge devices shall be so constructed and arranged as to be protected against the risk of being wrenched off or damaged during transport and handling. The filling and discharge devices shall be capable of being secured against unintended opening. The open and closed position and direction of closure shall be clearly indicated.

6.8.3.2.2 Seals of openings shall be so arranged as to avoid any damage by the operation, filling and emptying of the bulk container.

6.8.3.2.3 Where ventilation is required bulk containers shall be equipped with means of air exchange, either by natural convection, e.g. by openings, or active elements, e.g. fans. The ventilation shall be designed to prevent negative pressures in the container at all times. Ventilating elements of bulk containers for the transport of flammable substances or substances emitting flammable gases or vapours shall be designed so as not to be a source of ignition.

6.8.3.3 ***Inspection and testing***

6.8.3.3.1 Freight containers used maintained and qualified as bulk containers in accordance with the requirements of this section shall be tested and approved in accordance with the International Convention for Safe Containers (CSC), 1972, as amended.

6.8.3.3.2 Freight containers used and qualified as bulk containers shall be inspected periodically according to the International Convention for Safe Containers (CSC), 1972, as amended.

6.8.3.4 ***Marking***

6.8.3.4.1 Freight containers used as bulk containers shall be marked with a Safety Approval Plate in accordance with the International Convention for Safe Containers (CSC), 1972, as amended.

6.8.4 Requirements for the design, construction and approval of BK1 and BK2 bulk containers other than freight containers

6.8.4.1 Bulk containers covered in this section include skips, offshore bulk containers, bulk bins, swap bodies, trough shaped containers, roller containers, and load compartments of vehicles.

6.8.4.2 These bulk containers shall be designed and constructed so as to be strong enough to withstand the shocks and loadings normally encountered during transport including, as applicable, transhipment between modes of transport.

6.8.4.3 Vehicles shall comply with the requirements of, and be acceptable to, the competent authority responsible for land transport of the materials to be transported in bulk.

6.8.4.4 These bulk containers shall be approved by the competent authority and the approval shall include the code for designating types of bulk containers in accordance with 6.8.2.3 and the requirements for inspection and testing as appropriate.

6.8.4.5 Where it is necessary to use a liner in order to retain the dangerous goods it shall meet the provisions of 6.8.3.1.3.

6.8.4.6 The following statement shall be shown on the transport document: "Bulk container BK(x)[1] approved by the competent authority of ……".

6.8.5 Requirements for the design, construction, inspection and testing of flexible bulk containers BK3

6.8.5.1 ***Design and construction requirements***

6.8.5.1.1 Flexible bulk containers shall be sift-proof.

6.8.5.1.2 Flexible bulk containers shall be completely closed to prevent the release of contents.

6.8.5.1.3 Flexible bulk containers shall be waterproof.

6.8.5.1.4 Parts of the flexible bulk container which are in direct contact with dangerous goods:

(a) Shall not be affected or significantly weakened by those dangerous goods;

(b) Shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods; and

(c) Shall not allow permeation of the dangerous goods that could constitute a danger under normal conditions of transport.

6.8.5.2 ***Service equipment and handling devices***

6.8.5.2.1 Filling and discharge devices shall be so constructed as to be protected against damage during transport and handling. The filling and discharge devices shall be capable of being secured against unintended opening.

6.8.5.2.2 Slings of the flexible bulk container, if fitted, shall withstand pressure and dynamic forces which can appear in normal conditions of handling and transport.

6.8.5.2.3 The handling devices shall be strong enough to withstand repeated use.

6.8.5.3 ***Inspection and testing***

6.8.5.3.1 Each flexible bulk container design type shall successfully pass the tests prescribed in this Chapter before being used.

6.8.5.3.2 Tests shall also be repeated after each modification of design type which alters the design, material or manner of construction of a flexible bulk container.

6.8.5.3.3 Tests shall be carried out on flexible bulk containers prepared as for transport. Flexible bulk containers shall be filled to the maximum mass at which they may be used and the contents shall be evenly distributed. The substances to be transported in the flexible bulk container may be replaced by other substances except where this would invalidate the results of the tests. When another substance is used it shall have the same physical characteristics (mass, grain size, etc.) as the substance to be transported. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total mass of the flexible bulk container, so long as they are placed so that the test results are not affected.

[1] *x shall be replaced with "1" or "2" as appropriate.*

6.8.5.3.4 Flexible bulk containers shall be manufactured and tested under a quality assurance programme which satisfies the competent authority, in order to ensure that each manufactured flexible bulk container meets the requirements of this Chapter.

6.8.5.3.5 *Drop test*

6.8.5.3.5.1 Applicability

For all types of flexible bulk containers, as a design type test.

6.8.5.3.5.2 Preparation for testing

The flexible bulk container shall be filled to its maximum permissible gross mass.

6.8.5.3.5.3 The flexible bulk container shall be dropped onto a target surface that is non-resilient and horizontal. The target surface shall be:

(a) Integral and massive enough to be immovable;

(b) Flat with a surface kept free from local defects capable of influencing the test results;

(c) Rigid enough to be non-deformable under test conditions and not liable to become damaged by the tests; and

(d) Sufficiently large to ensure that the test flexible bulk container falls entirely upon the surface.

Following the drop, the flexible bulk container shall be restored to the upright position for observation.

6.8.5.3.5.4 Drop height shall be:

Packing group III: 0.8 m

6.8.5.3.5.5 Criteria for passing the test:

(a) There shall be no loss of contents. A slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of the flexible bulk container provided that no further leakage occurs after the container has been restored to the upright position;

(b) There shall be no damage which renders the flexible bulk container unsafe to be transported for salvage or for disposal.

6.8.5.3.6 *Top lift test*

6.8.5.3.6.1 Applicability

For all types of flexible bulk containers as a design type test.

6.8.5.3.6.2 Preparation for testing

Flexible bulk containers shall be filled to six times the maximum net mass, the load being evenly distributed.

6.8.5.3.6.3 A flexible bulk container shall be lifted in the manner for which it is designed until clear of the floor and maintained in that position for a period of five minutes.

6.8.5.3.6.4 Criteria for passing the test: there shall be no damage to the flexible bulk container or its lifting devices which renders the flexible bulk container unsafe for transport or handling, and no loss of contents.

6.8.5.3.7 *Topple test*

6.8.5.3.7.1 Applicability

For all types of flexible bulk containers as a design type test.

6.8.5.3.7.2 Preparation for testing

The flexible bulk container shall be filled to its maximum permissible gross mass.

6.8.5.3.7.3 Flexible bulk container shall be toppled onto any part of its top by lifting the side furthest from the drop edge upon a target surface that is non-resilient and horizontal. The target surface shall be:

(a) Integral and massive enough to be immovable;

(b) Flat with a surface kept free from local defects capable of influencing the test results;

(c) Rigid enough to be non-deformable under test conditions and not liable to become damaged by the tests; and

(d) Sufficiently large to ensure that the test flexible bulk container falls entirely upon the surface.

6.8.5.3.7.4 For all flexible bulk containers, the topple height is specified as follows:

Packing group III: 0.8 m

6.8.5.3.7.5 Criterion for passing the test: there shall be no loss of contents. A slight discharge, e.g., from closures or stitch holes, upon impact shall not be considered to be a failure of the flexible bulk container provided that no further leakage occurs.

6.8.5.3.8 *Righting test*

6.8.5.3.8.1 Applicability

For all types of flexible bulk containers designed to be lifted from the top or side, as a design type test.

6.8.5.3.8.2 Preparation for testing

The flexible bulk container shall be filled to not less than 95 % of its capacity and to its maximum permissible gross mass.

6.8.5.3.8.3 The flexible bulk container, lying on its side, shall be lifted at a speed of at least 0.1 m/s to an upright position, clear of the floor, by no more than half of the lifting devices.

6.8.5.3.8.4 Criterion for passing the test: there shall be no damage to the flexible bulk container or its lifting devices which renders the flexible bulk container unsafe for transport or handling.

6.8.5.3.9 *Tear test*

6.8.5.3.9.1 Applicability

For all types of flexible bulk containers as a design type test.

6.8.5.3.9.2 Preparation for testing

The flexible bulk container shall be filled to its maximum permissible gross mass.

6.8.5.3.9.3 With the flexible bulk container placed on the ground, a 300 mm cut shall be made, completely penetrating all layers of the flexible bulk container on a wall of a wide face. The cut shall be made at a 45º angle to the principal axis of the flexible bulk container, halfway between the bottom surface and the top level of the contents. The flexible bulk container shall then be subjected to a uniformly distributed superimposed load equivalent to twice the maximum gross mass. The load must be applied for at least fifteen minutes. A flexible bulk container which is designed to be lifted from the top or the side shall, after removal of the superimposed load, be lifted clear of the floor and maintained in that position for a period of fifteen minutes.

6.8.5.3.9.4 Criterion for passing the test: the cut shall not propagate more than 25 % of its original length.

6.8.5.3.10 *Stacking test*

6.8.5.3.10.1 Applicability

For all types of flexible bulk containers as a design type test.

6.8.5.3.10.2 Preparation for testing

The flexible bulk container shall be filled to its maximum permissible gross mass.

6.8.5.3.10.3 The flexible bulk container shall be subjected to a force applied to its top surface that is four times the design load-carrying capacity for 24 hours.

6.8.5.3.10.4 Criterion for passing the test: there shall be no loss of contents during the test or after removal of the load.

6.8.5.4 *Test report*

6.8.5.4.1 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the flexible bulk container:

1. Name and address of the test facility;
2. Name and address of applicant (where appropriate);
3. Unique test report identification;
4. Date of the test report;
5. Manufacturer of the flexible bulk container;
6. Description of the flexible bulk container design type (e.g. dimensions, materials, closures, thickness, etc) and/or photograph(s);
7. Maximum capacity/maximum permissible gross mass;
8. Characteristics of test contents, e.g. particle size for solids;
9. Test descriptions and results;
10. The test report shall be signed with the name and status of the signatory.

6.8.5.4.2 The test report shall contain statements that the flexible bulk container prepared as for transport was tested in accordance with the appropriate provisions of this Chapter and that the use of other containment methods or components may render it invalid. A copy of the test report shall be available to the competent authority.

6.8.5.5 ***Marking***

6.8.5.5.1 Each flexible bulk container manufactured and intended for use according to these Regulations shall bear marks that are durable, legible and placed in a location so as to be readily visible. Letters, numerals and symbols shall be at least 24 mm high and shall show:

(a) The United Nations packaging symbol  .

This symbol shall not be used for any purpose other than certifying that a packaging, a flexible bulk container, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6, 6.7 or 6.8;

(b) The code BK3;

(c) A capital letter designating the packing group(s) for which the design type has been approved:

Z for packing group III only;

(d) The month and year (last two digits) of manufacture;

(e) The character(s) identifying the country authorizing the allocation of the mark; as indicated by the distinguishing signs used on vehicles in international road traffic[2];

(f) The name or symbol of the manufacturer and other identification of the flexible bulk container as specified by the competent authority;

(g) The stacking test load in kg;

(h) The maximum permissible gross mass in kg.

Marks shall be applied in the sequence shown in (a) to (h); each mark required in these subparagraphs shall be clearly separated, e.g. by a slash or space and presented in a way that ensures that all of the parts of the mark are easily identified.

6.8.5.5.2 *Example of marking*

BK3/Z/11 09
RUS/NTT/MK-14-10
56000/14000

[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

CHAPTER 6.9

REQUIREMENTS FOR THE DESIGN, CONSTRUCTION, INSPECTION AND TESTING OF PORTABLE TANKS WITH SHELLS MADE OF FIBRE REINFORCED PLASTICS (FRP) MATERIALS

6.9.1 Application and general requirements

6.9.1.1 The requirements of section 6.9.2 apply to portable tanks with an FRP shell intended for the transport of dangerous goods of Classes or Divisions 1, 3, 5.1, 6.1, 6.2, 8 and 9 by all modes of transport. In addition to the requirements of this Chapter, unless otherwise specified, the applicable requirements of the International Convention for Safe Containers (CSC) 1972, as amended, shall be fulfilled by any multimodal portable tank with FRP shell which meets the definition of a "container" within the terms of that Convention.

6.9.1.2 The requirements of this Chapter do not apply to offshore portable tanks.

6.9.1.3 The requirements of Chapter 4.2, and section 6.7.2 apply to FRP portable tank shells except for those concerning the use of metal materials for the construction of a portable tank shell and additional requirements stated in this Chapter.

6.9.1.4 In recognition of scientific and technological advances, the technical requirements of this Chapter may be varied by alternative arrangements. These alternative arrangements shall offer a level of safety not less than that given by the requirements of this Chapter with respect to compatibility with substances transported and the ability of the FRP portable tank to withstand impact, loading and fire conditions. For international transport, alternative arrangement FRP portable tanks shall be approved by the applicable competent authorities.

6.9.2 Requirements for the design, construction, inspection and testing of FRP portable tanks

6.9.2.1 *Definitions*

For the purposes of this section, the definitions of 6.7.2.1 apply except for definitions related to metal materials ("Fine grain steel", "Mild steel" and "Reference steel") for the construction of the shell of a portable tank.

Additionally, the following definitions apply to portable tanks with an FRP shell:

External layer means the part of the shell which is directly exposed to the atmosphere;

Fibre-Reinforced Plastic (FRP) means material consisting of fibrous and/or particulate reinforcement contained within a thermoset or thermoplastic polymer (matrix);

Filament winding means a process for constructing FRP structures in which continuous reinforcements (filament, tape, or other), either previously impregnated with a matrix material or impregnated during winding, are placed over a rotating mandrel. Generally, the shape is a surface of revolution and may include heads;

FRP shell means a closed part of cylindrical shape with an interior volume intended for storage and transport of chemical substances;

FRP tank means a tank constructed with an FRP shell, and heads, with service equipment, safety relief devices and other installed equipment;

Glass transition temperature (Tg) means a characteristic value of the temperature range over which the glass transition takes place;

Hand layup means a process for moulding reinforced plastics in which reinforcement and resin are placed on a mould;

Liner means a layer on the inner surface of an FRP shell preventing contact with the dangerous goods being transported;

Mat means a fibre reinforcement made of random, chopped or twisted fibres bonded together as sheets of various length and thickness;

Parallel shell-sample means an FRP specimen, which must be representative of the shell, constructed in parallel to the shell construction if it is not possible to use cut-outs from the shell itself. The parallel shell-sample may be flat or curved;

Representative sample means a sample cut out from the shell;

Resin infusion means an FRP construction method by which dry reinforcement is placed into a matched mould, single sided mould with vacuum bag, or otherwise, and liquid resin is supplied to the part through the use of external applied pressure at the inlet and/or application of full or partial vacuum pressure at the vent;

Structural layer means FRP layers of a shell required to sustain the design loads;

Veil means a thin mat with high absorbency used in FRP product plies where polymeric matrix surplus fraction content is required (surface evenness, chemical resistance, leakage-proof, etc.).

6.9.2.2 *General design and construction requirements*

6.9.2.2.1 The requirements of 6.7.1 and 6.7.2.2 apply to FRP portable tanks. For areas of the shell that are made from FRP, the following requirements of Chapter 6.7 are exempt: 6.7.2.2.1, 6.7.2.2.9.1, 6.7.2.2.13 and 6.7.2.2.14. Shells shall be designed and constructed in accordance with the requirements of a pressure vessel code, applicable to FRP materials, recognized by the competent authority.

In addition, the following requirements apply.

6.9.2.2.2 *Manufacturer's quality system*

6.9.2.2.2.1 The quality system shall contain all the elements, requirements, and provisions adopted by the manufacturer. It shall be documented in a systematic and orderly manner in the form of written policies, procedures, and instructions.

6.9.2.2.2.2 The contents shall in particular include adequate descriptions of:

(a) The organizational structure and responsibilities of personnel with regard to design and product quality;

(b) The design control and design verification techniques, processes, and procedures that will be used when designing the portable tanks;

(c) The relevant manufacturing, quality control, quality assurance and process operation instructions that will be used;

(d) Quality records, such as inspection reports, test data and calibration data;

(e) Management reviews to ensure the effective operation of the quality system arising from the audits in accordance with 6.9.2.2.2.4;

(f) The process describing how customer requirements are met;

(g) The process for control of documents and their revision;

(h) The means for control of non-conforming portable tanks, purchased components, in-process and final materials; and

(i) Training programmes and qualification procedures for relevant personnel.

6.9.2.2.2.3 Under the quality system, the following minimum requirements shall be met for each FRP portable tank manufactured:

(a) Use of an inspection and test plan (ITP);

(b) Visual inspections;

(c) Verification of fibre orientation and mass fraction by means of documented control process;

(d) Verification of fibre and resin quality and characteristics by means of certificates or other documentation;

(e) Verification of liner quality and characteristics by means of certificates or other documentation;

(f) Verification of whichever is applicable of formed thermoplastic resin characteristic or degree of cure of thermoset resin, by direct or indirect means (e.g. Barcol test or differential scanning calorimetry) to be determined in accordance with 6.9.2.7.1.2 (h), or by creep testing of a representative sample or parallel-shell specimen in accordance with 6.9.2.7.1.2 (e) for a period of 100 hours;

(g) Documentation of whichever is applicable of thermoplastic resin forming processes or thermoset resin cure and post-cure processes; and

(h) Retention and archiving of shell samples for future inspection and shell verification (e.g. from manhole cut out) for a period of 5 years.

6.9.2.2.2.4 Audit of the quality system

The quality system shall be initially assessed to determine whether it meets the requirements in 6.9.2.2.2.1 to 6.9.2.2.2.3 to the satisfaction of the competent authority.

The manufacturer shall be notified of the results of the audit. The notification shall contain the conclusions of the audit and any corrective actions required.

Periodic audits shall be carried out, to the satisfaction of the competent authority, to ensure that the manufacturer maintains and applies the quality system. Reports of the periodic audits shall be provided to the manufacturer.

6.9.2.2.2.5 Maintenance of the quality system

The manufacturer shall maintain the quality system as approved in order that it remains adequate and efficient.

The manufacturer shall notify the competent authority that approved the quality system of any intended changes. The proposed changes shall be evaluated to determine whether the amended quality system will still satisfy the requirements in 6.9.2.2.2.1 to 6.9.2.2.2.3.

6.9.2.2.3 *FRP Shells*

6.9.2.2.3.1 FRP shells shall have a secure connection with structural elements of the portable tank frame. FRP shell supports and attachments to the frame shell shall cause no local stress concentrations exceeding the design allowables of the shell structure in accordance with the provisions stated in this Chapter for all operating and test conditions.

6.9.2.2.3.2 Shells shall be made of suitable materials, capable of operating within a minimum design temperature range of -40 °C to +50 °C, unless temperature ranges are specified for specific more severe climatic or operating conditions (e.g. heating elements), by the competent authority of the country where the transport operation is being performed.

6.9.2.2.3.3 If a heating system is installed, it shall comply with 6.7.2.5.12 to 6.7.2.5.15 and with the following requirements:

(a) The maximum operating temperature of the heating elements integrated or connected to the shell shall not exceed the maximum design temperature of the tank;

(b) The heating elements shall be designed, controlled, and utilized so that the temperature of the carried substance cannot exceed the maximum design temperature of the tank or a value at which the internal pressure exceeds MAWP; and

(c) Structures of the tank and its heating elements shall allow examination of the shell with respect to possible effects of overheating.

6.9.2.2.3.4 Shells shall consist of the following functions:

- Liner;
- Structural layer;
- External layer.

NOTE: *The layers may be combined if all applicable functional criteria are met.*

6.9.2.2.3.5 The internal liner is the inner element of the shell designed as the primary barrier to provide for the long-term chemical resistance in relation to the substances to be carried, to prevent any dangerous reaction with the contents or the formation of dangerous compounds and any substantial weakening of the structural layer owing to the diffusion of products through the internal liner. Chemical compatibility shall be verified in accordance with 6.9.2.7.1.3.

The internal liner may be an FRP liner or a thermoplastic liner.

6.9.2.2.3.6 FRP liners shall consist of the following two components:

(a) Surface layer ("gel-coat"): adequate resin rich surface layer, reinforced with a veil, compatible with the resin and contents. This layer shall have a maximum fibre mass content of 30% and have a minimum thickness of 0.25 and a maximum thickness of 0.60 mm;

(b) Strengthening layer(s): layer or several layers with a minimum thickness of 2 mm, containing a minimum of 900 g/m² of glass mat or chopped fibres with a mass content in glass of not less than 30% unless equivalent safety is demonstrated for a lower glass content.

6.9.2.2.3.7 If the liner consists of thermoplastic sheets, they shall be welded together in the required shape, using a qualified welding procedure and personnel. Furthermore, welded liners shall have a layer of electrically conductive media placed against the non-liquid contact surface of the welds to facilitate spark testing. Durable bonding between liners and the structural layer shall be achieved by the use of an appropriate method.

6.9.2.2.3.8 The structural layer shall be designed to withstand the design loads according to 6.7.2.2.12, 6.9.2.2.3.1, 6.9.2.3.2, 6.9.2.3.4 and 6.9.2.3.6.

6.9.2.2.3.9 The external layer of resin or paint shall provide adequate protection of the structural layers of the tank from environmental and service exposure, including to UV radiation and salt fog, and occasional splash exposure to cargoes.

6.9.2.2.3.10 Resins

The processing of the resin mixture shall be carried out in compliance with the recommendations of the supplier. These resins can be:

- Unsaturated polyester resins;
- Vinyl ester resins;
- Epoxy resins;
- Phenolic resins;
- Thermoplastic resins.

The resin heat distortion temperature (HDT), determined in accordance with 6.9.2.7.1.1 shall be at least 20 °C higher than the maximum design temperature of the shell as defined in 6.9.2.2.3.2, but shall in any case not be lower than 70 °C.

6.9.2.2.3.11 Reinforcement material

The reinforcement material of the structural layers shall be selected such that they meet the requirements of the structural layer.

For the internal surface liner glass fibres of at a minimum type C or ECR according to ISO 2078:1993 + Amd 1:2015 shall be used. Thermoplastic veils may only be used for the internal liner when their compatibility with the intended contents has been demonstrated.

6.9.2.2.3.12 Additives

Additives necessary for the treatment of the resin, such as catalysts, accelerators, hardeners and thixotropic substances as well as materials used to improve the tank, such as fillers, colours, pigments etc. shall not cause weakening of the material, taking into account lifetime and temperature expectancy of the design.

6.9.2.2.3.13 FRP shells, their attachments and their service and structural equipment shall be designed to withstand the loads mentioned in 6.7.2.2.12, 6.9.2.2.3, 6.9.2.3.2, 6.9.2.3.4 and 6.9.2.3.6 without loss of contents (other than quantities of gas escaping through any degassing vents) during the design lifetime.

6.9.2.2.3.14 Special requirements for the carriage of substances with a flash-point of not more than 60 °C

6.9.2.2.3.14.1 FRP tanks used for the carriage of flammable liquids of Class 3 with a flash-point of not more than 60 °C shall be constructed to ensure the elimination of static electricity from the various component parts to avoid the accumulation of dangerous charges.

6.9.2.2.3.14.2 The electrical surface resistance of the inside and outside of the shell as established by measurements shall not be higher than 10^9 Ω. This may be achieved by the use of additives in the resin or interlaminate conducting sheets, such as metal or carbon network.

6.9.2.2.3.14.3 The discharge resistance to earth as established by measurements shall not be higher than 10^7 Ω.

6.9.2.2.3.14.4 All components of the shell shall be electrically connected to each other and to the metal parts of the service and structural equipment of the tank and to the vehicle. The electrical resistance between components and equipment in contact with each other shall not exceed 10 Ω.

6.9.2.2.3.14.5 The electrical surface-resistance and discharge resistance shall be measured initially on each manufactured tank or a specimen of the shell in accordance with the procedure recognized by the competent authority. In the event of damage to the shell, requiring repair, the electrical resistance shall be re-measured.

6.9.2.2.3.15 The tank shall be designed to withstand, without significant leakage, the effects of a full engulfment in fire for 30 minutes as specified by the test requirements in 6.9.2.7.1.5. Testing may be waived with the agreement of the competent authority, where sufficient proof can be provided by tests with comparable tank designs.

6.9.2.2.3.16 Construction process for FRP shells

6.9.2.2.3.16.1 Filament winding, hand layup, resin infusion, or other appropriate composite production processes shall be used for construction of FRP shells.

6.9.2.2.3.16.2 The weight of the fibre reinforcement shall conform to that set forth in the procedure specification with a tolerance of +10 % and −0 %. One or more of the fibre types specified in 6.9.2.2.3.11 and in the procedure specification shall be used for reinforcement of shells.

6.9.2.2.3.16.3 The resin system shall be one of the resin systems specified in 6.9.2.2.3.10. No filler, pigment, or dye additions shall be used which will interfere with the natural colour of the resin except as permitted by the procedure specification.

6.9.2.3 ***Design criteria***

6.9.2.3.1 FRP shells shall be of a design capable of being stress-analysed mathematically or experimentally by resistance strain gauges, or by other methods approved by the competent authority.

6.9.2.3.2 FRP shells shall be designed and constructed to withstand the test pressure. Specific provisions are laid down for certain substances in the applicable portable tank instruction indicated in column 10 of the Dangerous Goods List and described in 4.2.5, or by a portable tank special provision indicated in column 11 of the Dangerous Goods List and described in 4.2.5.3. The minimum wall thickness of the FRP shell shall not be less than that specified in 6.9.2.4.

6.9.2.3.3 At the specified test pressure the maximum tensile relative deformation measured in mm/mm in the shell shall not result in the formation of microcracks, and therefore not be greater than the first measured point of elongation based fracture or damage of the resin, measured during tensile tests prescribed under 6.9.2.7.1.2 (c).

6.9.2.3.4 For internal test pressure, external design pressure specified in 6.7.2.2.10, static loads specified in 6.7.2.2.12 and static gravity loads caused by the contents with the maximum density specified for the design and at maximum filling degree, failure criteria (FC) in the longitudinal direction, circumferential direction, and any other in-plane direction of the composite layup shall not exceed the following value:

$$FC \leq \frac{1}{K}$$

where:

$$K = K_0 \times K_1 \times K_2 \times K_3 \times K_4 \times K_5$$

where:

K shall have a minimum value of 4.

$\boldsymbol{K_0}$ is a strength factor. For the general design the value for $\boldsymbol{K_0}$ shall be equal to or more than 1.5. The value of $\boldsymbol{K_0}$ shall be multiplied by a factor of two, unless the shell is provided with protection against damage consisting of a complete metal skeleton including longitudinal and transverse structural members;

$\boldsymbol{K_1}$ is a factor related to the deterioration in the material properties due to creep and ageing. It shall be determined by the formula:

$$K_1 = \frac{1}{\alpha\beta}$$

where "α" is the creep factor and "β" is the ageing factor determined in accordance with 6.9.2.7.1.2 (e) and (f), respectively. When used in calculation, factors α and β shall be between 0 and 1.

Alternatively, a conservative value of K_1 = 2 may be applied for the purpose of undertaking the numerical validation exercise in 6.9.2.3.4 (this does not remove the need to perform testing to determine α and β);

K_2 is a factor related to the service temperature and the thermal properties of the resin, determined by the following equation, with a minimum value of 1: K_2 = 1.25 - 0.0125 (HDT - 70) where HDT is the heat distortion temperature of the resin, in °C;

K_3 is a factor related to the fatigue of the material; the value of K_3 = 1.75 shall be used unless otherwise agreed with the competent authority. For the dynamic design as outlined in 6.7.2.2.12 the value of K_3 = 1.1 shall be used;

K_4 is a factor related to resin curing and has the following values:

1.0 where curing is carried out in accordance with an approved and documented process, and the quality system described under 6.9.2.2.2 includes verification of degree of cure for each FRP portable tank using a direct measurement approach, such as differential scanning calorimetry (DSC) determined via ISO 11357-2:2016, as per 6.9.2.7.1.2 (i);

1.1 where thermoplastic resin forming or thermoset resin curing is carried out in accordance with an approved and documented process, and the quality system described under 6.9.2.2.2 includes verification of whichever is applicable formed thermoplastic resin characteristics or degree of cure of thermoset resin, for each FRP portable tank using an indirect measurement approach as per 6.9.2.7.1.2 (h), such as Barcol testing via ASTM D2583:2013-03 or EN 59:2016, HDT via ISO 75-1:2013, thermo-mechanical analysis (TMA) via ISO 11359-1:2014, or dynamic thermo-mechanical analysis (DMA) via ISO 6721-11:2019;

1.5 in other cases.

K_5 is a factor related to the portable tank instruction in 4.2.5.2.6:

1.0 for T1to T19;

1.33 for T20;

1.67 for T21 to T22.

A design validation exercise using numerical analysis and a suitable composite failure criterion is to be undertaken to verify that the plies in the shell are below the allowables. Suitable composite failure criteria include, but are not limited to, Tsai-Wu, Tsai-Hill, Hashin, Yamada-Sun, Strain Invariant Failure Theory, Maximum Strain, or Maximum Stress. Other relations for the strength criteria are allowed upon agreement with the competent authority. The method and results of this design validation exercise are to be submitted to the competent authority.

The allowables are to be determined using experiments to derive parameters required by the chosen failure criteria combined with factor of safety K, the strength values measured as per 6.9.2.7.1.2 (c), and the maximum elongation strain criteria prescribed in 6.9.2.3.5. The analysis of joints is to be undertaken in accordance with the allowables determined in 6.9.2.3.7 and the strength values measured as per 6.9.2.7.1.2 (g). Buckling is to be considered in accordance with 6.9.2.3.6. Design of openings and metallic inclusions is to be considered in accordance with 6.9.2.3.8.

6.9.2.3.5 At any of the stresses as defined in 6.7.2.2.12 and 6.9.2.3.4, the resulting elongation in any direction shall not exceed the value indicated in the following table or one tenth of the elongation at fracture of the resin determined by ISO 527-2:2012, whichever is lower.

Examples of known limits are presented in the table below.

Type of resin	**Maximum strain in tension (%)**
Unsaturated polyester or phenolic	0.2
Vinylester	0.25
Epoxy	0.3
Thermoplastic	See 6.9.2.3.3

6.9.2.3.6 For the external design pressure the minimum safety factor for linear buckling analysis of the shell shall be as defined in the applicable pressure vessel code but not less than three.

6.9.2.3.7 The adhesive bondlines and/or overlay laminates used in the joints, including the end joints, connection between the equipment and shell, the joints of the surge plates and the partitions with the shell shall be capable of withstanding the loads of 6.7.2.2.12, 6.9.2.2.3.1, 6.9.2.3.2, 6.9.2.3.4 and 6.9.2.3.6. In order to avoid concentrations of stresses in the overlay lamination, the applied taper shall not be steeper than 1:6. The shear strength between the overlay laminate and the tank components to which it is bonded shall not be less than:

$$\tau = \gamma \frac{Q}{l} \leq \frac{\tau_R}{K}$$

where:

τ_R is the interlaminar shear strength according to ISO 14130:1997 and Cor 1:2003;

Q is the load per unit width of the interconnection;

K is the safety factor determined as per 6.9.2.3.4;

l is the length of the overlay laminate;

γ is the notch factor relating average joint stress to peak joint stress at failure initiation location.

Other calculation methods for the joints are allowed following approval with the competent authority.

6.9.2.3.8 Metallic flanges and their closures are permitted to be used in FRP shells, under design requirements of 6.7.2. Openings in the FRP shell shall be reinforced to provide at least the same safety factors against the static and dynamic stresses as specified in 6.7.2.2.12, 6.9.2.3.2, 6.9.2.3.4 and 6.9.2.3.6 as that for the shell itself. The number of openings shall be minimized. The axis ratio of oval-shaped openings shall be not more than 2.

If metallic flanges or componentry are integrated into the FRP shell using bonding, then the characterisation method stated in 6.9.2.3.7 shall apply to the joint between the metal and FRP. If the metallic flanges or componentry are fixed in an alternative fashion, e.g. threaded fastener connections, then the appropriate provisions of the relevant pressure vessel standard shall apply.

6.9.2.3.9 Check calculations of the strength of the shell shall be performed by finite element method simulating the shell layups, joints within FRP shell, joints ~~of~~ between the FRP shell and the container frame, and openings. Treatment of singularities shall be undertaken using an appropriate method according to the applicable pressure vessel code.

6.9.2.4 ***Minimum wall thickness of the shell***

6.9.2.4.1 Minimum thickness of the FRP shell shall be confirmed by check calculations of the strength of the shell considering strength requirements given in 6.9.2.3.4.

6.9.2.4.2 Minimum thickness of the FRP shell structural layers shall be determined in accordance with 6.9.2.3.4, however, in any case the minimum thickness of the structural layers shall be at least 3 mm.

6.9.2.5 ***Equipment components for portable tanks with FRP shell***

Service equipment, bottom openings, pressure relief devices, gauging devices, supports, frameworks, lifting and tie-down attachments of portable tanks shall meet the requirements of 6.7.2.5 to 6.7.2.17. If any other metallic features are required to be integrated into the FRP shell, then the provisions of 6.9.2.3.8 shall apply.

6.9.2.6 ***Design approval***

6.9.2.6.1 Design approval of FRP portable tanks shall be as per 6.7.2.18 requirements. The following additional requirements apply to FRP portable tanks.

6.9.2.6.2 The prototype test report for the purpose of the design approval shall additionally include the following:

(a) Results of the material tests used for FRP shell fabrication in accordance with 6.9.2.7.1 requirements;

(b) Results of the ball drop test in accordance with the requirements of 6.9.2.7.1.4.

(c) Results the fire resistance test in accordance with provisions of 6.9.2.7.1.5.

6.9.2.6.3 A service life inspection programme shall be established, which shall be a part of the operation manual, to monitor the condition of the tank at periodic inspections. The inspection programme shall focus on the critical stress locations identified in the design analysis performed under 6.9.2.3.4. The inspection method shall take into account the potential damage mode at the critical stress location (e.g, tensile stress or interlaminate stress). The inspection shall be a combination of visual and non-destructive testing (e.g., acoustic emissions, ultrasonic evaluation, thermographic). For heating elements, the service life inspection programme shall allow an examination of the shell or its representative locations to take into account the effects of overheating.

6.9.2.6.4 A representative prototype tank shall be subjected to tests as specified below. For this purpose, service equipment may be replaced by other items if necessary.

6.9.2.6.4.1 The prototype shall be inspected for compliance with the design type specification. This shall include an internal and external inspection and measurement of the main dimensions.

6.9.2.6.4.2 The prototype, equipped with strain gauges at all locations of high strain, as identified by the design validation exercise in accordance with 6.9.2.3.4, shall be subjected to the following loads and the strain shall be recorded:

(a) Filled with water to the maximum filling degree. The measuring results shall be used to calibrate the design calculations according to 6.9.2.3.4;

(b) Filled with water to the maximum filling degree and subjected to static loads in all three directions mounted by the base corner castings without additional mass applied external to the shell. For comparison with the design calculation according to 6.9.2.3.4 the strains recorded shall be extrapolated in relation to the quotient of the accelerations required in 6.7.2.2.12 and measured;

(c) Filled with water and subjected to the specified test pressure. Under this load, the shell shall exhibit no visual damage or leakage.

The stress corresponding to the measured strain level shall not exceed the minimum factor of safety calculated in 6.9.2.3.4 under any of these loading conditions.

6.9.2.7 ***Additional provisions applicable to FRP portable tanks***

6.9.2.7.1 *Material testing*

6.9.2.7.1.1 Resins

Resin tensile elongation shall be determined in accordance with ISO 527-2:2012. The heat distortion temperature (HDT) of the resin shall be determined in accordance with ISO 75-1:2013.

6.9.2.7.1.2 Shell samples

Prior to testing, all coatings shall be removed from the samples. If shell samples are not possible then parallel shell samples may be used. The tests shall cover:

(a) Thickness of the laminates of the central shell wall and the ends;

(b) Mass content and composition of composite reinforcement by ISO 1172:1996 or ISO 14127:2008, as well as orientation and arrangement of reinforcement layers;

(c) Tensile strength, elongation at fracture and modulus of elasticity according to ISO 527-4:1997 or ISO 527-5:2009 for the circumferential and longitudinal directions of the shell. For areas of the FRP shell, tests shall be performed on representative laminates in accordance with ISO 527-4:1997 or ISO 527-5:2009, to permit evaluation of the suitability of safety factor (K). A minimum of six specimens per measure of tensile strength shall be used, and the tensile strength shall be taken as the average minus two standard deviations;

(d) Bending deflection and strength shall be established by the three-point or four-point bending test according to ISO 14125:1998 + Amd 1:2011 using a sample with a minimum width of 50 mm and a support distance of at least 20 times the wall thickness. A minimum of five specimens shall be used.

(e) Creep factor α shall be determined by taking the average result of at least two specimens with the configuration described in (d), subject to creep in three-point or four-point bending, at the maximum design temperature nominated under 6.9.2.2.4, for a period of 1 000 hours. The following test is to be undertaken for each specimen:

(i) Place specimen into bending apparatus, unloaded, in oven set to maximum design temperature and allow to acclimatise for a period of not less than 60 minutes;

(ii) Load specimen bending in accordance with ISO 14125:1998 + Amd 1:2011 at flexural stress equal to the strength determined in (d) divided by four. Maintain mechanical load at maximum design temperature without interruption for not less than 1 000 hours;

(iii) Measure the initial deflection six minutes after full load application in (e) (ii). Specimen shall remain loaded in test rig;

(iv) Measure the final deflection 1 000 hours after full load application in (e) (ii); and

(v) Calculate the creep factor α by dividing the initial deflection from (e) (iii) by the final deflection from (e) (iv).

(f) Ageing factor β shall be determined by taking the average result of at least two specimens with the configuration described in (d), subject to loading in static three-point or four-point bending, in conjunction with immersion in water at the maximum design temperature nominated under 6.9.2.2.4 for a period of 1 000 hours. The following test is to be undertaken for each specimen:

(i) Prior to testing or conditioning, specimens shall be dried in an oven at 80 °C for a period of 24 hours;

(ii) The specimen shall be loaded in three-point or four-point bending at ambient temperature, in accordance with to ISO 14125:1998 + Amd 1:2011, at the flexural stress level equal to the strength determined in (d) divided by four. Measure the initial deflection 6 minutes after full load application. Remove specimen from test rig;

(iii) Immerse unloaded specimen in water at the maximum design temperature for a period of not less than 1 000 hours without interruption to the water conditioning period. When conditioning period has lapsed, remove specimens, keep damp at ambient temperature, and complete (f) (iv) within three days;

(iv) The specimen shall be subject to second round of static loading, in a manner identical to (f) (ii). Measure the final deflection six minutes after full load application. Remove specimen from test rig; and

(v) Calculate the ageing factor β by dividing the initial deflection from (f) (ii) by the final deflection from (f) (iv).

(g) The interlaminar shear strength of the joints shall be measured by testing representative samples in accordance with ISO 14130:1997;

(h) The efficiency of whichever is applicable of thermoplastic resin forming characteristics or thermoset resin cure and post-cure processes for laminates are to be determined using one or more of the following methods:

(i) Direct measurement formed thermoplastic resin characteristics or thermoset resin degree of cure: glass transition temperature (Tg) or melting temperature (Tm) determined using differential scanning calorimetry (DSC) via ISO 11357-2:2016; or

(ii) Indirect measurement of formed thermoplastic resin or thermoset resin degree of cure:

- HDT via ISO 75-1:2013;

- Tg or T_m using thermo-mechanical analysis (TMA) via ISO 11359-1:2014;

- Dynamic thermo-mechanical analysis (DMA) via ISO 6721-11:2019:

- Barcol testing via ASTM D2583:2013-03 or EN 59:2016.

6.9.2.7.1.3 The chemical compatibility of the liner and chemical contact surfaces of service equipment with the substances to be carried shall be demonstrated by one of the following methods. This demonstration shall account for all aspects of the compatibility of the materials of the shell and its equipment with the substances to be carried, including chemical deterioration of the shell, initiation of critical reactions of the contents and dangerous reactions between both.

(a) In order to establish any deterioration of the shell, representative samples taken from the shell, including any internal liners with welds, shall be subjected to the chemical compatibility test according to EN 977:1997 for a period of 1 000 hours at 50 °C or the

maximum temperature at which a particular substance is approved for transport. Compared with a virgin sample, the loss of strength and elasticity modulus measured by the bending test according to EN 978:1997 shall not exceed 25 %. Cracks, bubbles, pitting effects as well as separation of layers and liners and roughness shall not be acceptable;

(b) Certified and documented data of positive experiences on the compatibility of filling substances in question with the materials of the shell with which they come into contact at given temperatures, times and other relevant service conditions;

(c) Technical data published in relevant literature, standards or other sources, acceptable to the competent authority;

(d) Upon agreement with the competent authority other methods of chemical compatibility verification may be used.

6.9.2.7.1.4 Ball drop test as per EN 976-1:1997

The prototype shall be subjected to the ball drop test according to EN 976-1:1997, No. 6.6. No visible damage inside or outside the tank shall occur.

6.9.2.7.1.5 Fire resistance test

6.9.2.7.1.5.1 A representative prototype tank with its service and structural equipment in place and filled to 80 % of its maximum capacity with water, shall be exposed to a full engulfment in fire for 30 minutes, caused by an open heating oil pool fire or any other type of fire with the same effect. The fire shall be equivalent to a theoretical fire with a flame temperature of 800 °C, emissivity of 0.9 and to the tank a heat transfer coefficient of 10 W/(m²K) and surface absorptivity of 0.8. A minimum net heat flux of 75 kW/m² shall be calibrated according to ISO 21843:2018. The dimensions of the pool shall exceed those of the tank by at least 50 cm to each side and the distance between fuel level and tank shall be between 50 cm and 80 cm. The rest of the tank below liquid level, including openings and closures, shall remain leakproof except for drips.

6.9.2.8 ***Inspection and testing***

6.9.2.8.1 Inspection and testing of portable FRP tanks shall be carried out as per provisions of 6.7.2.19. In addition, welded thermoplastic liners shall be spark tested under a suitable standard, after pressure tests performed in accordance with the periodic inspections specified in 6.7.2.19.4.

6.9.2.8.2 In addition, the initial and periodic inspections shall follow the service life inspection programme and any associated inspection methods per 6.9.2.6.3.

6.9.2.8.3 The initial inspection and test shall verify that construction of the tank is made in accordance with the quality system required by 6.9.2.2.2.

6.9.2.8.4 Additionally, during inspection of the shell the position of the areas heated by heating elements shall be indicated or marked, be available on design drawings or shall be made visible by a suitable technique (e.g. infrared). Examination of the shell shall take into account the effects of overheating, corrosion, erosion, overpressure and mechanical overloading.

6.9.2.9 ***Retention of samples***

Shell samples (e.g. from manhole cut out) for each tank manufactured shall be maintained for future inspection and shell verification for a period of five years from the date of the initial inspection and test and until successful completion of the required five-year periodic inspection.

6.9.2.10 ***Marking***

6.9.2.10.1 The requirements of 6.7.2.20.1 apply to portable tanks with an FRP shell except those of 6.7.2.20.1 (f) (ii).

6.9.2.10.2 The information required in 6.7.2.20.1 (f) (i) shall be “Shell structural material: Fibre-reinforced plastic”, the reinforcement fibre e.g. “Reinforcement: E-glass”, and resin e.g. “Resin: Vinyl Ester”.

6.9.2.10.3 Requirements of provision 6.7.2.20.2 apply to portable tank with an FRP shell.

PART 7

PROVISIONS CONCERNING TRANSPORT OPERATIONS

Introductory note

NOTE: *In general, development of the detailed provisions of this Part would be left to national, modal or regional authorities. For the purposes of these Regulations, Chapter 7.1 contains operational provisions that are applicable to all modes of transport. An additional chapter is provided, but generally reserved, for additional provisions applicable to the individual modes of transport that may be added by national, modal or regional authorities.*

CHAPTER 7.1

PROVISIONS CONCERNING TRANSPORT OPERATIONS BY ALL MODES OF TRANSPORT

7.1.1 Application, general provisions and loading requirements

7.1.1.1 This Chapter contains provisions applicable to dangerous goods transport operations by all modes of transport.

7.1.1.2 Unless otherwise specified in these Regulations, dangerous goods shall not be offered for transport unless:

(a) goods have been properly classified, packed, marked, labelled and described and certified on a dangerous goods transport document; and

(b) goods are in a fit condition for transport as required by these Regulations, and no dangerous residue of the dangerous goods adheres to the outside of the package.

7.1.1.3 ***Acceptance of dangerous goods by carriers***

7.1.1.3.1 Unless otherwise specified in these Regulations, a carrier shall not accept dangerous goods for transport unless:

(a) A copy of the dangerous goods transport document and other documents or information as required by these Regulations are provided; or

(b) The information applicable to the dangerous goods is provided in electronic form.

7.1.1.3.2 The information applicable to the dangerous goods shall accompany the dangerous goods to final destination. This information may be on the dangerous goods transport document or may be on another document. This information shall be given to the consignee when the dangerous goods are delivered.

7.1.1.3.3 When the information applicable to the dangerous goods is given to the carrier in electronic form, the information shall be available to the carrier at all times during transport to final destination. The information shall be able to be produced without delay as a paper document.

7.1.1.4 Unless otherwise specified in these Regulations, dangerous goods shall not be transported unless:

(a) Cargo transport units have been appropriately marked, labelled and placarded; and

(b) Cargo transport units are otherwise in a condition for transport as required by these Regulations.

7.1.1.5 Packages containing dangerous goods shall only be loaded in cargo transport units that are strong enough to withstand the shocks and loadings normally encountered during transport, having regard to the conditions to be expected during the anticipated journey. The cargo transport unit shall be constructed in such a way as to prevent the loss of contents. Where appropriate the cargo transport unit shall be fitted with devices to facilitate securing and handling of the dangerous goods.

7.1.1.6 The interior and the exterior of a cargo transport unit shall be inspected prior to loading to ensure that there is no damage that could affect its integrity or that of the packages to be loaded in it.

The cargo transport unit shall be checked to ensure it is structurally serviceable, that it is free of possible residues incompatible with the cargo and that the interior floor, walls and ceiling, where applicable,

are free from protrusions or deterioration that could affect the cargo inside and that freight containers are free of damages that affect the weather-tight integrity of the container, when required.

Structurally serviceable means that the cargo transport unit is free from major defects in its structural components. Structural components of cargo transport units for multimodal purpose are e.g. top and bottom side rails, top and bottom end rails, corner posts, corner fittings and, for freight containers, door sill, door header and floor cross members. Major defects include:

(a) Bends, cracks or breaks in structural or supporting members, or any damage to service or operational equipment that affect the integrity of the unit;

(b) Any distortion of the over-all configuration or any damage to lifting attachments or handling equipment interface features great enough to prevent proper alignment of handling equipment, mounting and securing on chassis, vehicle or wagon, or insertion into ships' cells; and, where applicable;

(c) Door hinges, door seals and hardware that are seized, twisted, broken, missing or otherwise inoperative.

NOTE: *For filling portable tanks and MEGCs, see Chapter 4.2. For filling bulk containers, see Chapter 4.3.*

7.1.1.7 Cargo transport units shall be loaded so that incompatible dangerous or other goods are segregated in accordance with this Chapter. Specific loading instructions such as orientation arrows, not to be double stacked, keep dry or temperature control requirements shall be met. Liquid dangerous goods shall be loaded below dry dangerous goods whenever possible.

7.1.1.8 Packages containing dangerous goods and unpackaged dangerous articles shall be secured by suitable means capable of restraining the goods (such as fastening straps, sliding slatboards, adjustable brackets) in the cargo transport unit in a manner that will prevent any movement during transport which would change the orientation of the packages or cause them to be damaged. When dangerous goods are transported with other goods (e.g. heavy machinery or crates), all goods shall be securely fixed or packed in the cargo transport units so as to prevent the release of dangerous goods. Movement of packages may also be prevented by filling any voids by the use of dunnage or by blocking and bracing. Where restraints such as banding or straps are used, these shall not be over-tightened to cause damage or deformation of the package.

7.1.1.9 Packages shall not be stacked unless designed for that purpose. Where different design types of packages that have been designed for stacking are to be loaded together, consideration shall be given to their compatibility for stacking with each other. Where necessary, stacked packages shall be prevented from damaging the package below by the use of load-bearing devices.

7.1.1.10 During loading and unloading, packages containing dangerous goods shall be protected from being damaged. Particular attention shall be paid to the handling of packages during their preparation for transport, the type of cargo transport unit on which they are to be carried and to the method of loading or unloading, so that accidental damage is not caused through dragging or mishandling the packages. Packages that appear to be leaking or damaged so that the contents may escape shall not be accepted for transport. If a package is found to be damaged so that the contents leak, the damaged package shall not be transported but moved to a safe place in accordance with instructions given by a competent authority or a designated responsible person who is familiar with the dangerous goods, the risks involved and the measures that should be taken in an emergency.

NOTE 1: *Additional operational requirements for the transport of packagings and IBCs are provided in the special packing provisions for packagings and IBCs (see Chapter 4.1).*

NOTE 2: *Additional guidance on the packing of cargo transport units can be found in the IMO/ILO/UNECE Guidelines for Packing Cargo Transport Units (CTUs) contained in the supplement to the International Maritime Dangerous Goods Code. Modal and National Codes of Practice (such as the Agreement governing the exchange and use of Wagons between Railway Undertakings (RIV 2000) Appendix*

II loading guidelines published by the International Union of Railways (UIC)) or the United Kingdom Department for Transport Code of Practice on Safety of Loads on Vehicles) may also be available.

7.1.1.11 Flexible bulk containers shall be transported within a conveyance with rigid sides and ends that extend at least two-thirds of the height of the flexible bulk container.

NOTE: *When loading flexible bulk containers in a freight container as defined in 5.4.2 particular attention shall be paid to the guidance on the packing of cargo transport units referred to in 7.1.1.10, Note 2 and notably to the IMO/ILO/UNECE Guidelines for Packing Cargo Transport Units (CTUs) contained in the supplement to the International Maritime Dangerous Goods Code.*

7.1.1.11.1 Flexible bulk containers shall be secured by suitable means capable of restraining the container in the conveyance in a manner that will prevent any movement during transport which would change the orientation of the container or cause the container to be damaged. Movement of the containers may also be prevented by filling any voids by the use of dunnage or by blocking and bracing. Where restraints such as banding or straps are used, these shall not be over-tightened to cause damage or deformation to the flexible bulk containers.

7.1.1.11.2 Flexible bulk containers shall not be stacked for road or rail transport.

7.1.2 Segregation of dangerous goods

7.1.2.1 Incompatible goods shall be segregated from one another during transport. For the purposes of segregation, two substances or articles are considered mutually incompatible when their stowing together may result in undue hazards in the case of leakage, spillage, or any other accident. In this regard, detailed segregation requirements for substances and articles of Class 1 are provided in 7.1.3.1 and 7.1.3.2.

7.1.2.2 The extent of the hazard arising from possible reactions between incompatible dangerous goods may vary and the segregation arrangements required shall also vary as appropriate. In some instances such segregation may be obtained by requiring certain distances between incompatible dangerous goods. Intervening spaces between such dangerous goods may be filled with cargo compatible with the dangerous substances or articles in question.

7.1.2.3 The provisions of these Regulations are general in nature. The segregation provisions for each particular mode of transport shall be based on the following principles:

(a) Incompatible dangerous goods shall be segregated from one another so as to effectively minimize hazards in the event of accidental leakage or spillage or any other accident;

(b) Whenever dangerous goods are stowed together, the most stringent segregation provisions for any of the goods shall be applied;

(c) For packages required to bear a subsidiary hazard label, the segregation appropriate to the subsidiary hazard shall be applied when it is more stringent than that required by the primary hazard.

7.1.2.4 An overpack shall not contain dangerous goods which react dangerously with one another.

7.1.3 Special provisions applicable to the transport of explosives

7.1.3.1 *Separation of goods of Class 1 of different compatibility groups*

NOTE: *The safety of explosive substances and articles would be enhanced by transporting each kind separately, but considerations of practicability and economics preclude such an ideal. In practice, a proper balance of the interest of safety against the other relevant factors necessitates a degree of mixing in the transport of explosive substances and articles of several kinds.*

7.1.3.1.1 The extent to which goods of Class 1 may be loaded together in transport is determined by the "compatibility" of the explosives. Goods of Class 1 are considered to be "compatible" if they can be

transported together without significantly increasing either the probability of an accident or, for a given quantity, the magnitude of the effects of such an accident.

7.1.3.1.2 Goods in Compatibility Groups A to K and N may be transported in accordance with the following provisions:

(a) Packages bearing the same compatibility group letter and the same division number may be transported together;

(b) Goods of the same compatibility group but different divisions may be transported together provided that the whole is treated as belonging to the division having the smaller number. However, when goods of Division 1.5, Compatibility Group D, are transported together with goods of Division 1.2, Compatibility Group D, the total of the consignment shall be treated as Division 1.1, Compatibility Group D, for the purposes of transport;

(c) Packages bearing different compatibility group letters shall not in general be transported together (regardless of the division number) except in the case of compatibility group letters C, D, E and S as explained in 7.1.3.1.3 and 7.1.3.1.4.

NOTE: *Other combinations of Compatibility Groups A to K and N may be permitted under provisions applicable to the individual mode of transport.*

7.1.3.1.3 Goods in Compatibility Groups C, D and E are permitted to be carried together in the same unit load or cargo transport unit provided the over-all classification code is determined in accordance with the classification procedures in 2.1.3. The appropriate division is determined in accordance with 7.1.3.1.2 (b). Any combination of articles in Compatibility Groups C, D and E is assigned to Compatibility Group E. Any combination of substances in Compatibility Groups C and D shall be assigned to the most appropriate of the compatibility groups shown in 2.1.2.1.1, taking cognizance of the predominant characteristics of the combined load.

7.1.3.1.4 Goods in Compatibility Group S may be transported with goods in all compatibility groups other than A and L.

7.1.3.1.5 Goods in Compatibility Group L shall not be transported with goods in other compatibility groups. Furthermore, goods in Compatibility Group L may only be transported with the same type of goods within Compatibility Group L.

7.1.3.1.6 Goods of Compatibility Group N shall not in general (see 7.1.3.1.2 (b)) be transported with goods in other compatibility groups except S. However, if these goods are transported together with goods of Compatibility Groups C, D and E the goods of Compatibility Group N shall be considered as goods having Compatibility Group D (see also 7.1.3.1.3).

7.1.3.2 *Mixed transport of goods of Class 1 with dangerous goods of other classes in freight containers, vehicles or wagons*

7.1.3.2.1 Except where otherwise specially provided for in these Regulations, goods of Class 1 shall not be transported together in freight containers, vehicles or wagons with dangerous goods of other classes.

7.1.3.2.2 Goods in Division 1.4, compatibility group S, may be transported together with dangerous goods of other classes.

7.1.3.2.3 Blasting explosives (except UN 0083 Explosive, blasting, type C) may be transported together with ammonium nitrate (UN Nos. 1942 and 2067), ammonium nitrate emulsion or suspension or gel (UN No. 3375) and alkali metal nitrates (e.g. UN 1486) and alkaline earth metal nitrates (e.g. UN 1454) provided the aggregate is treated as blasting explosives under Class 1 for the purposes of placarding, segregation, stowage and maximum permissible load.

NOTE: *Alkali metal nitrates include caesium nitrate (UN 1451), lithium nitrate (UN 2722), potassium nitrate (UN 1486), rubidium nitrate (UN 1477) and sodium nitrate (UN 1498). Alkaline earth metal nitrates include barium nitrate (UN 1446), beryllium nitrate (UN 2464), calcium nitrate (UN 1454), magnesium nitrate (UN 1474) and strontium nitrate (UN 1507).*

7.1.3.2.4 Life-saving appliances (UN Nos. 3072 and 2990) containing Class 1 goods as equipment may be transported together with the same dangerous goods as contained in the appliances.

7.1.3.2.5 Air bag inflators, or air bag modules, or seat-belt pretensioners, of Division 1.4, compatibility group G, (UN 0503) may be transported with air bag inflators or air bag modules or seat-belt pretensioners of Class 9 (UN 3268).

7.1.3.3 *Transport of explosives in freight containers, road vehicles and rail wagons*

7.1.3.3.1 For free-flowing powdery substances of 1.1C, 1.1D, 1.1G, 1.3C and 1.3G and fireworks of 1.1G, 1.2G and 1.3G, the floor of a freight container shall have a non-metallic surface or covering.

7.1.4 Special provisions applicable to the transport of gases

7.1.4.1 Aerosols transported for the purposes of reprocessing or disposal under the provisions of special provision 327 shall only be transported in well-ventilated cargo transport units other than closed freight containers.

7.1.5 Special provisions applicable to the transport of self-reactive substances of Division 4.1, organic peroxides of Division 5.2 and substances stabilized by temperature control (other than self-reactive substances and organic peroxides)

7.1.5.1 All self-reactive substances, organic peroxides and polymerizing substances shall be protected from direct sunlight and all sources of heat, and placed in adequately ventilated areas.

NOTE: *Some substances which are transported under temperature control are prohibited from transport by certain modes.*

7.1.5.2 Where a number of packages are assembled in a freight container, closed road vehicle or unit load, the total quantity of substance, the type and number of packages and the stacking arrangement shall not create an explosion hazard.

7.1.5.3 *Temperature control provisions*

7.1.5.3.1 These provisions apply to certain self-reactive substances when required by 2.4.2.3.4, and certain organic peroxides when required by 2.5.3.4.1 and certain polymerizing substances when required by 2.4.2.5.2 or special provision 386 of Chapter 3.3 which may only be transported under conditions where the temperature is controlled.

7.1.5.3.2 These provisions also apply to the transport of substances for which:

(a) The proper shipping name as indicated in column 2 of the Dangerous Goods List of Chapter 3.2 or according to 3.1.2.6 contains the word “TEMPERATURE CONTROLLED”; and

(b) The self-accelerating decomposition temperature (SADT) or the self-accelerating polymerisation temperature (SAPT) determined for the substance (with or without chemical stabilization) as offered for transport is:

(i) 50 °C or less for single packagings and IBCs; or

(ii) 45 °C or less for portable tanks.

When chemical inhibition is not used to stabilize a reactive substance which may generate dangerous amounts of heat and gas, or vapour, under normal transport conditions, these substances need to be transported under temperature control. These provisions do not apply to substances which are stabilized by the addition of chemical inhibitors such that the SADT or the SAPT is greater than that prescribed in (b) (i) or (ii), above.

7.1.5.3.3 In addition, if a self-reactive substance or organic peroxide or a substance the proper shipping name of which contains the word "STABILIZED" and which is not normally required to be transported under temperature control is transported under conditions where the temperature may exceed 55 °C, it may require temperature control.

7.1.5.3.4 The "control temperature" is the maximum temperature at which the substance can be safely transported. It is assumed that during transport the temperature of the immediate surroundings of the package does not exceed 55 °C and attains this value for a relatively short time only during each period of 24 hours. In the event of loss of temperature control, it may be necessary to implement emergency procedures. The "emergency temperature" is the temperature at which such procedures shall be implemented.

7.1.5.3.5 Derivation of control and emergency temperatures

Type of receptacle	**SADT[a] /SAPT[a]**	**Control temperature**	**Emergency temperature**
Single packagings and IBCs	≤ 20 °C > 20 °C and < 35 °C > 35 °C	20 °C below SADT/SAPT 15 °C below SADT/SAPT 10 °C below SADT/SAPT	10 °C below SADT/SAPT 10 °C below SADT/SAPT 5 °C below SADT/SAPT
Portable tanks	≤ 45 °C	10 °C below SADT/SAPT	5 °C below SADT/SAPT

[a] *i.e. the SADT/SAPT of the substance as packed for transport.*

7.1.5.3.6 The control and emergency temperatures are derived using the table in 7.1.5.3.5 from the SADT or from the SAPT which are defined as the lowest temperatures at which self-accelerating decomposition or self-accelerating polymerization may occur with a substance in the packaging, IBC or portable tank as used in transport. An SADT or SAPT shall be determined in order to decide if a substance shall be subjected to temperature control during transport. Provisions for the determination of the SADT and SAPT are given in 2.4.2.3.4, 2.5.3.4.2 and 2.4.2.5.2 for self-reactive substances, organic peroxides and polymerizing substances and mixtures, respectively.

7.1.5.3.7 Control and emergency temperatures, where appropriate, are provided for currently assigned self-reactive substances in 2.4.2.3.2.3 and for currently assigned organic peroxide formulations in 2.5.3.2.4.

7.1.5.3.8 The actual transport temperature may be lower than the control temperature but shall be selected so as to avoid dangerous separation of phases.

7.1.5.4 ***Transport under temperature control***

NOTE: *Since the circumstances to be taken into account differ for the various modes of transport, only general guidance is provided.*

7.1.5.4.1 Maintenance of the prescribed temperature is an essential feature of the safe transport of substances stabilized by temperature control. In general, there shall be:

(a) Thorough inspection of the cargo transport unit prior to loading;

(b) Instructions to the carrier about the operation of the refrigeration system;

(c) Procedures to be followed in the event of loss of control;

(d) Regular monitoring of operating temperatures; and

(e) Provision of a back-up refrigeration system or spare parts.

7.1.5.4.2 Any control and temperature sensing devices in the refrigeration system shall be readily accessible and all electrical connections weather-proof. The temperature of air space within the cargo transport unit shall be measured by two independent sensors and the output shall be recorded so that temperature changes are readily detectable. The temperature shall be checked every four to six hours and logged. When substances having a control temperature of less than +25 °C are carried, the cargo transport unit shall be equipped with visible and audible alarms, powered independently of the refrigeration system, set to operate at or below the control temperature.

7.1.5.4.3 If during transport the control temperature is exceeded, an alert procedure shall be initiated involving any necessary repairs to the refrigeration equipment or an increase in the cooling capacity (e.g. by adding liquid or solid refrigerants). The temperature shall also be checked frequently and preparations made for implementation of the emergency procedures. If the emergency temperature is reached, the emergency procedures shall be initiated.

7.1.5.4.4 The suitability of a particular means of temperature control for transport depends on a number of factors. Factors to be considered include:

(a) The control temperature(s) of the substance(s) to be transported;

(b) The difference between the control temperature and the anticipated ambient temperature conditions;

(c) The effectiveness of the thermal insulation;

(d) The duration of transport; and

(e) Allowance of a safety margin for delays.

7.1.5.4.5 Suitable methods for preventing the control temperature being exceeded are, in order of increasing control capability:

(a) Thermal insulation; provided that the initial temperature of the substance(s) to be transported is sufficiently below the control temperature;

(b) Thermal insulation with coolant system; provided that:

(i) An adequate quantity of coolant (e.g. liquid nitrogen or solid carbon dioxide), allowing a reasonable margin for delay, is carried;

(ii) Liquid oxygen or air is not used as coolant;

(iii) There is a uniform cooling effect even when most of the coolant has been consumed; and

(iv) The need to ventilate the unit before entering is clearly indicated by a warning on the door(s) of the unit;

(c) Single mechanical refrigeration; provided that for substance(s) to be transported with a flash point lower than the sum of the emergency temperature plus 5 °C explosion-proof electrical fittings are used within the cooling compartment to prevent ignition of flammable vapours;

(d) Combined mechanical refrigeration system with coolant system; provided that:

(i) The two systems are independent of one another;

(ii) The provisions in (b) and (c) are complied with;

(e) Dual mechanical refrigeration system; provided that:

(i) Apart from the integral power supply unit, the two systems are independent of one another;

(ii) Each system alone is capable of maintaining adequate temperature control; and

(iii) For substance(s) to be transported with a flash point lower than the sum of the emergency temperature plus 5 °C explosion-proof electrical fittings are used within the cooling compartment to prevent ignition of flammable vapours.

7.1.6 *(Reserved).*

7.1.7 Special provisions applicable to the transport of Division 6.1 (toxic) and Division 6.2 (infectious) substances

7.1.7.1 *Division 6.1 (toxic) substances*

7.1.7.1.1 *Segregation from foodstuffs*

Substances marked as or known to be toxic (packing groups I, II and III) shall not be carried in the same railway wagon, lorry, hold of a ship, compartment of an aircraft or other cargo transport unit with substances marked as or known to be foodstuffs, feeds or other edible substances intended for consumption by humans or animals. Relaxation of this position may be allowed for substances of packing groups II and III provided the competent authority is satisfied that the packing and segregation are adequate to prevent the contamination of foodstuffs, feeds or other edible substances intended for consumption by humans or animals.

7.1.7.1.2 *Decontamination of cargo transport units*

A railway wagon, lorry, cargo space of a ship, compartment of an aircraft or other cargo transport unit which has been used to carry substances marked as or known to be toxic (packing groups I, II and III) shall, before re-use, be inspected for contamination. A railway wagon, lorry, hold of a ship, compartment of an aircraft or other cargo transport unit which has been contaminated shall not be returned to service until such contamination has been removed.

7.1.7.2 *Division 6.2 (infectious) substances*

7.1.7.2.1 *Responsibility of carrier*

Carriers and their staff shall fully understand all applicable regulations for the packing, labelling, transport and documentation of consignments of infectious substances. The carrier shall accept and expedite the transport of consignments conforming to the rules in force. If the carrier finds any error in the labelling or documentation, he shall immediately notify the consignor or consignee so that the appropriate corrective measures may be taken.

7.1.7.2.2 *Action to be taken in the event of damage or leakage*

Any person responsible for the carriage of packages containing infectious substances who becomes aware of damage to or leakage from such packages shall:

(a) Avoid handling the package or keep handling to a minimum;

(b) Inspect adjacent packages for contamination and put aside any that may have been contaminated;

(c) Inform the appropriate public health authority or veterinary authority, and provide information on any other countries of transit where persons may have been exposed to danger; and

(d) Notify the consignor and/or the consignee.

7.1.7.2.3 *Decontamination of cargo transport units*

A railway wagon, road vehicle, cargo space of a ship, compartment of an aircraft or other cargo transport unit which has been used to transport infectious substances shall be inspected for release of the substance before re-use. If the infectious substances were released during transport, the cargo transport unit shall be decontaminated before it is re-used. Decontamination may be achieved by any means which effectively inactivates the released infectious substance.

7.1.8 Special provisions applicable to the transport of radioactive material

7.1.8.1 *Segregation*

7.1.8.1.1 Packages, overpacks and freight containers containing radioactive material and unpackaged radioactive material shall be segregated during transport and during storage in transit:

(a) From workers in regularly occupied working areas by distances calculated using a dose criterion of 5 mSv in a year and conservative model parameters;

(b) From members of the the public, in areas where the public has regular access, by distances calculated using a dose criterion of 1 mSv in a year and conservative model parameters;

(c) From undeveloped photographic film by distances calculated using a radiation exposure criterion for undeveloped photographic film due to the transport of radioactive material for 0.1 mSv per consignment of such film; and

(d) From other dangerous goods in accordance with 7.1.2 and 7.1.3.2.

7.1.8.1.2 Category II-YELLOW or III-YELLOW packages or overpacks shall not be carried in compartments occupied by passengers, except those exclusively reserved for couriers specially authorized to accompany such packages or overpacks.

7.1.8.2 *Activity limits*

The total activity in a single hold or compartment of an inland waterway craft, or in another conveyance, for carriage of LSA material or SCO in Type IP-1, Type IP-2, Type IP-3 or unpackaged, shall not exceed the limits shown in Table 7.1.8.2. For SCO-III, the limits in Table 7.1.8.2 may be exceeded provided that the transport plan contains precautions which are to be employed during transport to obtain an overall level of safety at least equivalent to that which would be provided if the limits had been applied.

Table 7.1.8.2: Conveyance activity limits for LSA material and SCO in industrial packages or unpackaged

Nature of material	Activity limit for conveyances other than by inland waterway other than inland waterway craft	Activity limit for a hold or compartment of an inland waterway craft
LSA-I	No limit	No limit
LSA-II and LSA-III non-combustible solids	No limit	100 A_2
LSA-II and LSA-III combustible solids, and all liquids and gases	100 A_2	10 A_2
SCO	100 A_2	10 A_2

7.1.8.3 ***Stowage during transport and storage in transit***

7.1.8.3.1 Consignments shall be securely stowed.

7.1.8.3.2 Provided that its average surface heat flux does not exceed 15 W/m^2 and that the immediately surrounding cargo is not in sacks or bags, a package or overpack may be carried or stored among packaged general cargo without any special stowage provisions except as may be specifically required by the competent authority in an applicable certificate of approval.

7.1.8.3.3 Loading of freight containers and accumulation of packages, overpacks and freight containers shall be controlled as follows:

(a) Except under the condition of exclusive use, and for consignments of LSA-I material, the total number of packages, overpacks and freight containers aboard a single conveyance shall be so limited that the total sum of the transport indexes aboard the conveyance does not exceed the values shown in Table 7.1.8.3.3;

(b) The dose rate under routine conditions of transport shall not exceed 2 mSv/h at any point on the external surface of the vehicle or freight container, and 0.1 mSv/h at 2 m from the external surface of the vehicle or freight container, except for consignments transported under exclusive use by road or rail, for which the dose rate limits around the vehicle are set forth in 7.2.3.1.2 (b) and (c);

(c) The total sum of the criticality safety indexes in a freight container and aboard a conveyance shall not exceed the values shown in Table 7.1.8.4.2.

Table 7.1.8.3.3: TI limits for freight containers and conveyances not under exclusive use

Type of freight container or conveyance	**Limit on total sum of transport indexes in a freight container or aboard a conveyance**
Freight container	
Small freight container	50
Large freight container	50
Vehicle	50
Aircraft	
Passenger	50
Cargo	200
Inland waterway vessel	50
Seagoing vessel[a]	
(1) Hold, compartment or defined deck area:	
Packages, overpacks, small freight containers	50
Large freight containers	200
(2) Total vessel:	
Packages, overpacks, small freight containers	200
Large freight containers	no limit

[a] *Packages or overpacks carried in or on a vehicle which are in accordance with the provisions of 7.2.3.1.2 may be transported by vessels provided that they are no removed from the vehicle at any time while on board the vessel.*

7.1.8.3.4 Any package or overpack having either a transport index greater than 10, or any consignment having a criticality safety index greater than 50, shall be transported only under exclusive use.

7.1.8.4 *Additional requirements relating to transport and storage in transit of fissile material*

7.1.8.4.1 Any group of packages, overpacks, and freight containers containing fissile material stored in transit in any one storage area shall be so limited that the total sum of the criticality safety indexes in the group does not exceed 50. Each group shall be stored so as to maintain a spacing of at least 6 m from other such groups.

7.1.8.4.2 Where the total sum of the criticality safety indexes on board a conveyance or in a freight container exceeds 50, as permitted in Table 7.1.8.4.2, storage shall be such as to maintain a spacing of at least 6 m from other groups of packages, overpacks or freight containers containing fissile material or other conveyances carrying radioactive material.

Table 7.1.8.4.2: CSI limits for freight containers and conveyances containing fissile material

Type of freight container or conveyance	Limit on total sum of criticality safety indexes in a freight container or aboard a conveyance	
	Not under exclusive use	Under exclusive use
Freight container		
Small freight container	50	n.a.
Large freight container	50	100
Vehicle	50	100
Aircraft		
Passenger	50	n.a.
Cargo	50	100
Inland waterway vessel	50	100
Seagoing vessel[a]		
(1) Hold, compartment or defined deck area:		
Packages, overpacks, small freight containers	50	100
Large freight containers	50	100
(2) Total vessel:		
Packages, overpacks, small freight containers	200[b]	200[c]
Large freight containers	No limit[b]	No limit[c]

[a] *Packages of overpacks carried in or on a vehicle which are in accordance with the provisions of 7.2.3.1.2 may be transported by vessels provided that they are not removed from the vehicle at any time while on board the vessel. In that case the entries under the heading "under exclusive use" apply.*

[b] *The consignment shall be so handled and stowed that the total sum of CSI's in any group does not exceed 50, and stowed so as to maintain a spacing of at least 6 m from other groups.*

[c] *The consignment shall be so handled and stowed that the total sum of CSI's in any group does not exceed 100, and stowed so as to maintain a spacing of at least 6 m from other groups. For transport under exclusive use, the intervening space between groups may be occupied by other compatible cargo.*

7.1.8.4.3 Fissile material meeting one of the provisions (a) to (f) of 2.7.2.3.5 shall meet the following requirements:

(a) Only one of the provisions (a) to (f) of 2.7.2.3.5 is allowed per consignment;

(b) Only one approved fissile material in packages classified in accordance with 2.7.2.3.5 (f) is allowed per consignment unless multiple materials are authorized in the certificate of approval;

(c) Fissile material in packages classified in accordance with 2.7.2.3.5 (c) shall be transported in a consignment with no more than 45 g of fissile nuclides;

(d) Fissile material in packages classified in accordance with 2.7.2.3.5 (d) shall be transported in a consignment with no more than 15 g of fissile nuclides;

(e) Unpackaged or packaged fissile material classified in accordance with 2.7.2.3.5 (e) shall be transported under exclusive use on a conveyance with no more than 45 g of fissile nuclides.

7.1.8.5 *Damaged or leaking packages, contaminated packagings*

7.1.8.5.1 If it is evident that a package is damaged or leaking, or if it is suspected that the package may have leaked or been damaged, access to the package shall be restricted and a qualified person shall, as soon as possible, assess the extent of contamination and the resultant dose rate of the package. The scope of the assessment shall include the package, the conveyance, the adjacent loading and unloading areas, and, if necessary, all other material which has been carried in the conveyance. When necessary, additional steps for the protection of people property and the environment, in accordance with provisions established by the relevant competent authority, shall be taken to overcome and minimize the consequences of such leakage or damage.

7.1.8.5.2 Packages damaged or leaking radioactive contents in excess of allowable limits for normal conditions of transport may be removed to an acceptable interim location under supervision, but shall not be forwarded until repaired or reconditioned and decontaminated.

7.1.8.5.3 A conveyance and equipment used regularly for the transport of radioactive material shall be periodically checked to determine the level of contamination. The frequency of such checks shall be related to the likelihood of contamination and the extent to which radioactive material is transported.

7.1.8.5.4 Except as provided in 7.1.8.5.5, any conveyance, or equipment or part thereof which has become contaminated above the limits specified in 4.1.9.1.2 in the course of the transport of radioactive material, or which shows a dose rate in excess of 5 μSv/h at the surface, shall be decontaminated as soon as possible by a qualified person and shall not be re-used unless the following conditions are fulfilled:

(a) the non-fixed contamination shall not exceed the limits specified in 4.1.9.1.2;

(b) the dose rate resulting from the fixed contamination shall not exceed 5 μSv/h at the surface.

7.1.8.5.5 A freight container or conveyance dedicated to the transport of unpackaged radioactive material under exclusive use shall be excepted from the requirements of 4.1.9.1.4 and 7.1.8.5.4 solely with regard to its internal surfaces and only for as long as it remains under that specific exclusive use.

7.1.8.6 *Other requirements*

7.1.8.6.1 Where a consignment is undeliverable, the consignment shall be placed in a safe location and the appropriate competent authority shall be informed as soon as possible and a request made for instructions on further action.

7.1.9 Reporting of accidents or incidents involving dangerous goods in transport

7.1.9.1 Accidents and incidents involving the transport of dangerous goods shall be reported to the competent authority of the State in which they occurred in accordance with the reporting requirements of that State and applicable international law.

7.1.9.2 Information reported shall include at least the description of the goods as provided in 5.4.1.4, description of the accident/incident, date and location, estimated loss of dangerous goods, containment information (e.g., packaging or tank type, identification marks, capacity and quantity) and cause and type of any packaging or tank failure that resulted in a release of dangerous goods.

7.1.9.3 Certain types of dangerous goods, as determined by the competent authority or established under applicable international law, may be excepted from these requirements for reporting of accidents or incidents.

7.1.10 Retention of dangerous goods transport information

7.1.10.1 The carrier shall retain a copy of the dangerous goods transport document and additional information and documentation as specified in these Regulations, for a minimum period of three months.

7.1.10.2 When the documents are kept electronically or in a computer system, the carrier shall be capable of reproducing them in a printed form.

CHAPTER 7.2

MODAL PROVISIONS

7.2.1 Application and general provisions

7.2.1.1 This Chapter requires provisions applicable to dangerous goods transport operations by individual modes of transport. These provisions are in addition to those applicable to all modes of transport as provided in Chapter 7.1.

7.2.2 Special provisions applicable to the transport of portable tanks on vehicles

Portable tanks may only be transported on vehicles whose fastenings are capable, in conditions of maximum permissible loading of the portable tanks, of absorbing the forces specified in 6.7.2.2.12, 6.7.3.2.9 or 6.7.4.2.12, as appropriate.

7.2.3 Special provisions applicable to the transport of radioactive material

7.2.3.1 *Transport by rail and by road*

7.2.3.1.1 Rail and road vehicles carrying packages, overpacks or freight containers labelled with any of the labels shown in 5.2.2.2.2 as models No. 7A, 7B, 7C or 7E or carrying unpackaged LSA-I material, SCO-I or SCO-III, shall display the placard shown in Figure 5.3.1 (Model 7D) on each of:

(a) The two external lateral walls in the case of a rail vehicle;

(b) The two external lateral walls and the external rear wall in the case of a road vehicle.

In the case of a vehicle without sides the placards may be affixed directly on the cargo-carrying unit provided that they are readily visible; in the case of physically large tanks or freight containers, the placards on the tanks or freight containers shall suffice. In the case of vehicles which have insufficient area to allow the fixing of larger placards, the dimensions of the placard as described in Figure 5.3.1 may be reduced to 100 mm. Any placards which do not relate to the contents shall be removed.

7.2.3.1.2 For consignments under exclusive use, the dose rate shall not exceed:

(a) 10 mSv/h at any point on the external surface of any package or overpack, and may only exceed 2 mSv/h provided that:

(i) The vehicle is equipped with an enclosure which, during routine conditions of transport, prevents the access of unauthorized persons to the interior of the enclosure, and

(ii) Provisions are made to secure the package or overpack so that its position within the vehicle enclosure remains fixed during routine conditions of transport, and

(iii) There is no loading or unloading during the shipment;

(b) 2 mSv/h at any point on the outer surfaces of the vehicle, including the upper and lower surfaces, or, in the case of an open vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle; and

(c) 0.1 mSv/h at any point 2 m from the vertical planes represented by the outer lateral surfaces of the vehicle, or, if the load is transported in an open vehicle, at any point 2 m from the vertical planes projected from the outer edges of the vehicle.

7.2.3.1.3 In the case of road vehicles, no persons other than the driver and assistants shall be permitted in vehicles carrying packages, overpacks or freight containers bearing category II-YELLOW or III-YELLOW labels.

7.2.3.2 ***Transport by vessels***

7.2.3.2.1 Packages or overpacks having a surface dose rate greater than 2 mSv/h, unless being carried in or on a vehicle under exclusive use in accordance with Table 7.1.8.3.3, footnote (a), shall not be transported by vessel except under special arrangement.

7.2.3.2.2 The transport of consignments by means of a special use vessel which, by virtue of its design, or by reason of its being chartered, is dedicated to the purpose of carrying radioactive material, shall be excepted from the requirements specified in 7.1.8.3.3 provided that the following conditions are met:

(a) A radiation protection programme for the shipment shall be approved by the competent authority of the flag state of the vessel and, when requested, by the competent authority at each port of call;

(b) Stowage arrangements shall be predetermined for the whole voyage including any consignments to be loaded at ports of call en route; and

(c) The loading, carriage and unloading of the consignments shall be supervised by persons qualified in the transport of radioactive material.

7.2.3.3 ***Transport by air***

7.2.3.3.1 Type B(M) packages and consignments under exclusive use shall not be transported on passenger aircraft.

7.2.3.3.2 Vented Type B(M) packages, packages which require external cooling by an ancillary cooling system, packages subject to operational controls during transport, and packages containing liquid pyrophoric materials shall not be transported by air.

7.2.3.3.3 Packages or overpacks having a surface dose rate greater than 2 mSv/h shall not be transported by air except by special arrangement.

7.2.4 Security provisions for transport by road, rail and inland waterway

NOTE: These provisions are in addition to those applicable to all modes of transport as provided in Chapter 1.4.

7.2.4.1 Each crew member of road vehicles, trains and inland waterway craft transporting dangerous goods shall carry with them means of identification, which includes their photograph, during transport.

7.2.4.2 When appropriate and already fitted, the use of transport telemetry or other tracking methods or devices shall be used to monitor the movement of high consequence dangerous goods (see Table 1.4.1 in Chapter 1.4.).

7.2.4.3 The carrier shall ensure the application to vehicles and inland waterway craft transporting high consequence dangerous goods (see Table 1.4.1 in Chapter 1.4) of devices, equipment or arrangements to prevent the theft of the vehicle or inland waterway craft or its cargo and shall ensure that these are operational and effective at all times.

7.2.4.4 Safety inspections on cargo transport units shall cover appropriate security measures.

TABLE OF CORRESPONDENCE BETWEEN

PARAGRAPHS, TABLES AND FIGURES

IN

THE 2018 EDITION OF THE IAEA REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL

AND

THE TWENTY-SECOND REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS

NOTE: *Any revision of this Table of correspondence may be found on the UNECE Sustainable Transport Division website: https://unece.org/transport/dangerous-goods*

Correspondence between paragraphs

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