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**: The general provisions of this section only apply to the packing of goods of Classes 2, 6.2 and 7 as indicated in 4.1.1.16 (Class 2), 4.1.8.2 (Class 6.2), 4.1.9.1.5 (Class 7) and in the applicable packing instructions of 4.1.4 (packing instructions P201 and P202 for Class 2 and P621, IBC620 and LP621 for Class 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 carriage, including trans-shipment between transport units and between 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 might 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 packagings, IBCs and large packagings during carriage. These provisions apply, as appropriate, to new, reused, reconditioned or remanufactured packagings and to new, reused, repaired or remanufactured IBCs, and to new or reused 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; and

(b) shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods.

Where necessary, they shall be provided with a suitable inner coating or treatment.

4.1.1.3 Unless provided elsewhere in ADR, 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, 6.3.2, 6.5.4 or 6.6.5, as applicable. The packagings for which the test is not required are mentioned under 6.1.1.3.

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. For a filling temperature of 15 °C, the maximum degree of filling shall be determined as follows, unless otherwise provided, either:

(a)

Boiling point (initial boiling point) of the substance in °C	<60	≥60 <100	≥100 <200	≥200 <300	≥300
Degree of filling as a percentage of the capacity of the packaging	90	92	94	96	98

or

(b) $$\text{degree of filling} = \frac{98}{1 + \alpha\,(50 - t_F)}\ \%\ \text{of the capacity of the packaging.}$$

In this formula α represents the mean coefficient of cubic expansion of the liquid substance between 15 °C and 50 °C; that is to say, for a maximum rise in temperature of 35 °C,

α is calculated according to the formula : $\alpha = \frac{d_{15} - d_{50}}{35 \times d_{50}}$

d_{15} and d_{50} being the relative densities [1] of the liquid at 15 °C and 50 °C and t_F the mean temperature of the liquid at the time of filling.

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 carriage, they cannot break, be punctured or leak their contents into the outer packaging. 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.

4.1.1.6 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 or evolution of considerable heat;

(b) evolution of flammable, asphyxiant, oxidizing or toxic gases;

(c) the formation of corrosive substances; or

(d) the formation of unstable substances.

NOTE: *For mixed packing special provisions, see 4.1.10.*

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.

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[1] *Relative density (d) is considered to be synonymous with specific gravity (SG) and will be used throughout this Chapter.*

4.1.1.8 Liquids may only be filled into inner packagings which have an appropriate resistance to internal pressure that may be developed under normal conditions of carriage. Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other cause), the packaging may be fitted with a vent, provided that the gas emitted will not cause danger on account of its toxicity, its flammability, the quantity released, etc. 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 is in the attitude in which it is intended to be carried, leakages of liquid and the penetration of foreign matter are prevented under normal conditions of carriage.

4.1.1.9 New, remanufactured or reused packagings, including IBCs and large packagings, or reconditioned packagings and repaired IBCs shall be capable of passing the tests prescribed in 6.1.5, 6.3.2, 6.5.4 or 6.6.5, as applicable. Before being filled and handed over for carriage, 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 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 carriage. 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.

Metal IBCs intended for the carriage of liquids shall not be used to carry liquids having a vapour pressure of more than 110kPa (1.1 bar) at 50 °C or 130kPa (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 are subject to the same requirements as those for a filled packaging, unless adequate measures have been taken to nullify any hazard.

4.1.1.12 Every packagings, including IBCs, intended to contain liquids shall successfully undergo a suitable leakproofness test, and be capable of meeting the appropriate test level indicated in 6.1.5.4.3 or 6.5.4.7 for the various types of IBCs:

(a) before it is first used for carriage;

(b) after remanufacturing or reconditioning of any packaging, before it is re-used for carriage;

(c) after the repair or remanufacture of any IBC, before it is reused for carriage.

For this test the packaging, or IBC, need not have its closures fitted. The inner receptacle of a composite packaging or IBC may be tested without the outer packaging, provided the test results are not affected. This test is not required for:

- inner packagings of combination packagings or large packagings;

- inner receptacles of composite packagings (glass, porcelain or stoneware) marked with the symbol "RID/ADR" in accordance with 6.1.3.1 (a) (ii);

- light gauge metal packagings marked with the symbol "RID/ADR" in accordance with 6.1.3.1 (a) (ii).

4.1.1.13 Packagings, including IBCs, used for solids which may become liquid at temperatures likely to be encountered during carriage 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 sift-proof 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 carriage 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 carried.

4.1.1.16 Packagings, including IBCs and large packagings, marked in accordance with 6.1.3, 6.2.5.7, 6.2.5.8, 6.3.1, 6.5.2 or 6.6.3 but which were approved in a State which is not a Contracting Party to ADR may nevertheless be used for carriage under ADR.

4.1.1.17 ***Explosives, self-reactive substances and organic peroxides***

Unless specific provision to the contrary is made in ADR, the packagings, including IBCs and large packagings, used for goods of Class 1, self-reactive substances of Class 4.1 and

organic peroxides of Class 5.2 shall comply with the provisions for the medium danger group (packing group II).

4.1.1.18 ***Use of salvage packagings***

4.1.1.18.1 Damaged, defective, leaking or non-conforming packages, or dangerous goods that have spilled or leaked may be carried in salvage packagings mentioned in 6.1.5.1.11. This does not prevent the use of a bigger size packaging of appropriate type and performance level under the conditions of 4.1.1.18.2.

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.

4.1.2 Additional general provisions for the use of IBCs

4.1.2.1 When IBCs are used for the carriage of liquids with a flash-point of 61 °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 The periodic testing and inspection requirements for IBCs are provided in Chapter 6.5. An IBC shall not be filled and offered for carriage after the date of expiry of the last periodic test required by 6.5.4.14.3, or the date of expiry of the last periodic inspection required by 6.5.1.6.4. However, an IBC filled prior to the date of expiry of the last periodic test or inspection may be carried 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 carried 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.

Note*: For the particulars in the transport document, see 5.4.1.1.11.*

4.1.2.3 IBCs of type 31HZ2 shall be filled to at least 80% of the volume of the outer casing.

4.1.2.4 Except for routine maintenance of metal, rigid plastics and composite 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 marking 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 Section 4.1.4. They are subdivided in three sub-sections depending on the type of packagings to which they apply:

Sub-section 4.1.4.1 for packagings other than IBCs and large packagings; these packing instructions are designated by an alphanumeric code starting with the letter "P" or "R" for packagings specific to RID and ADR;

Sub-section 4.1.4.2 for IBCs; these are designated by an alphanumeric code starting with the letters "IBCs";

Sub-section 4.1.4.3 for large packagings; these are designated by an alphanumeric code starting with the letters "LP".

Generally, packing instructions specify that the general provisions of 4.1.1, 4.1.2 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, or "RR" for special provisions specific to RID and ADR;

"B" for IBCs or "BB" for special packing provisions specific to RID and ADR;

"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 shall not select a packaging without checking that the substance is compatible with the packaging material selected (e.g. glass receptacles are unsuitable for most fluorides). Where glass receptacles are permitted in the packing instructions porcelain, earthenware and stoneware packagings are also allowed.

4.1.3.2 Column (8) of Table A of Chapter 3.2 shows for each article or substance the packing instruction(s) that shall be used. Columns (9a) and (9b) indicate the special packing provisions and the mixed packing provisions (see 4.1.10) 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.

4.1.3.4 The following packagings shall not be used when the substances being carried are liable to become liquid during carriage:

Packagings

Drums:	1D and 1G
Boxes:	4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 and 4H2
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

IBCs

For substances of packing group I: All types of IBC
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

For the purposes of this paragraph, substances and mixtures of substances having a melting point equal to or less than 45 °C shall be treated as solids liable to become liquid during transport.

4.1.3.5 Where the packing instructions in this Chapter authorize the use of a particular type of outer packaging in a combination packaging (e.g. 4G), 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) may also be used under the same conditions and limitations applicable to the use of that type of outer 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 All cylinders, tubes, pressure drums, and bundles of cylinders conforming to packing instruction P200 and to the construction requirements of Chapter 6.2 are authorized for the carriage of any liquid or solid substance assigned to packing instructions P001 or P002 unless otherwise indicated in the packing instruction or by a special provision in Column (9a) of Table A of Chapter 3.2. The capacity of tubes and bundles of cylinders shall not exceed 1000 litres

4.1.3.7 Packagings or IBCs not specifically authorized in the applicable packing instruction shall not be used for the carriage of a substance or article unless specifically allowed under a temporary derogation agreed between Contracting Parties in accordance with 1.5.1.

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 carried empty, uncleaned and unpackaged, the competent authority of the country of origin[2] may approve such carriage. 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 carriage including trans-shipment between transport units and between 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 carriage, 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;

[2] *If the country of origin is not a contracting party to ADR, the competent authority of the first country contracting party to the ADR reached by the consignment.*

(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 carriage;

(e) They shall be fixed in cradles or crates or other handling devices or to the transport unit or container in such a way that they will not become loose during normal conditions of carriage.

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 attached to the transport document.

NOTE**:** *A large and robust article may include flexible fuel containment systems, military equipment, machinery or equipment containing dangerous goods above the limited quantities according to 3.4.6.*".

4.1.4 List of packing instructions

NOTE*: Although the following packing instructions use the same numbering system as used in the IMDG Code and the UN Model Regulations, readers should be aware that some of the details may be different in the case of ADR.*

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 the general provisions of **4.1.1** and **4.1.3** are met:				
Combination packagings:		**Maximum capacity/Net mass (see 4.1.3.3.)**		
Inner packagings	**Outer packagings**	**Packing group I**	**Packing group II**	**Packing group III**
Glass 10 *l* Plastics 30 *l* Metal 40 *l*	**Drums**			
	steel (1A2)	250 kg	400 kg	400 kg
	aluminium (1B2)	250 kg	400 kg	400 kg
	metal other than steel or aluminium (1N2)	250 kg	400 kg	400 kg
	plastics (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
	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 (3A2)	120 kg	120 kg	120 kg
	aluminium (3B2)	120 kg	120 kg	120 kg
	plastics (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*
metal other than steel or aluminium, non-removable head (1N1)		250 *l*	450 *l*	450 *l*
metal other than steel or aluminium, 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*

[a] *Only substances with a viscosity of more than 2 680 mm^2/s are authorized.*

P001	PACKING INSTRUCTION (LIQUIDS) (cont'd)		P001
Single packagings (cont'd)	**Maximum capacity/Net mass (see 4.1.3.3.)**		
Composite packagings	**Packing group I**	**Packing group II**	**Packing group III**
plastics receptacle with outer steel or aluminium drum (6HA1, 6HB1)	250 *l*	250 *l*	250 *l*
plastics receptacle with outer fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)	120 *l*	250 *l*	250 *l*
plastics receptacle with outer steel or aluminium crate or box or plastics receptacle with outer wooden, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)	60 *l*	60 *l*	60 *l*
glass receptacle with outer steel, aluminium, fibreboard, plywood, solid plastics or expanded plastics drum (6PA1, 6PB1, 6PG1, 6PD1, 6PH1 or 6PH2) or with outer steel or aluminium crate or box or with outer wooden or fibreboard box or with outer wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2)	60 *l*	60 *l*	60 *l*

Additional requirement:

For substances of Class 3, packing group III, which give off small quantities of carbon dioxide or nitrogen, the packagings shall be vented.

Special packing provisions:

PP1 For UN Nos. 1133, 1210, 1263 and 1866, substances of packing groups II and III may be carried in quantities of 5 litres or less per packaging in metal or plastics packagings which are not required to meet the performance tests of Chapter 6.1, provided that such packagings are carried:

(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; or

(b) as inner packagings of combination packagings with a maximum net mass of 40 kg.

PP2 For UN Nos. 3065 and 1170, wooden barrels (2C1 and 2C2) may be used.

PP4 For UN No. 1774, packagings shall meet the packing group II performance level.

PP5 For UN No. 1204, packagings shall be so constructed that explosion is not possible by reason of increased internal pressure. Cylinders, tubes and pressure drums shall not be used for these substances.

PP6 For UN Nos. 1851 and 3248, the maximum net quantity per package shall be 5 *l*.

PP10 For UN No. 1791, packing group II, the packaging shall be vented.

PP31 For UN No. 1131, packagings shall be hermetically sealed.

PP33 For UN No. 1308, packing groups I and II, only combination packagings with a maximum gross mass of 75 kg allowed.

PP81 For UN No. 1790 with more than 60% but not more than 85% hydrofluoric acid and UN No. 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.

Special packing provisions specific to RID and ADR

RR2 For UN No. 1261, removable head packagings are not permitted.

P002	PACKING INSTRUCTION (SOLIDS)	P002

The following packagings are authorized provided the general provisions of **4.1.1** and **4.1.3** are met:

Combination packagings:		**Maximum net mass (see 4.1.3.3)**		
Inner packagings	**Outer packagings**	**Packing group I**	**Packing group II**	**Packing group III**
	Drums			
Glass 10 kg	steel (1A2)	400 kg	400 kg	400 kg
Plastics [a] 50 kg	aluminium (1B2)	400 kg	400 kg	400 kg
Metal 50 kg	metal, other than steel	400 kg	400 kg	400 kg
Paper [a, b, c] 50 kg	or aluminium (1N2)			
Fibre [a, b, c] 50 kg	plastics (1H2)	400 kg	400 kg	400 kg
	plywood (1D)	400 kg	400 kg	400 kg
[a] *These inner packagings shall be sift-proof.*	fibre (1G)	400 kg	400 kg	400 kg
	Boxes			
	steel (4A)	400 kg	400 kg	400 kg
[b] *These inner packagings shall not be used when the substances being carried may become liquid during carriage (see 4.1.3.4).*	aluminium (4B)	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
[c] *These inner packagings shall not be used for substances of packing group I.*	**Jerricans**			
	steel (3A2)	120 kg	120 kg	120 kg
	aluminium (3B2)	120 kg	120 kg	120 kg
	plastics (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

[d] *These packagings shall not be used for substances of packing group I that may become liquid during carriage (see 4.1.3.4).*

[e] *These packagings shall not be used when substances being carried may become liquid during carriage (see 4.1.3.4).*

P002	PACKING INSTRUCTION (SOLIDS) (cont'd)		P002
	Maximum net mass (see 4.1.3.3.)		
Single packagings (cont'd):	**Packing group I**	**Packing group II**	**Packing group III**
Boxes			
steel (4A) [e]	Not allowed	400 kg	400 kg
aluminium (4B) [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 with outer steel, aluminium, plywood, fibre or plastics drum (6HA1, 6HB1, 6HG1 [e], 6HD1 [e], or 6HH1)	400 kg 75 kg	400 kg 75 kg	400 kg 75 kg
plastics receptacle with outer 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 with outer steel, aluminium plywood or fibre drum (6PA1, 6PB1, 6PD1 [e] or 6PG1 [e]) or with outer steel or aluminium crate or box or with outer wooden, or fibreboard box or with outer wickerwork hamper (6PA2, 6PB2, 6PC, 6PD2 [e], or 6PG2[e]) or with outer solid plastics or expanded plastics packaging (6PH2 or 6PH1 [e])			

[e] *These packagings shall not be used when the substances being carried may become liquid during carriage (see 4.1.3.4).*

Special packing provisions:

PP6 For UN No. 3249, the maximum net mass per package shall be 5 kg.

PP7 For UN No. 2000, celluloid may also be transported unpacked on pallets, wrapped in plastic film and secured by appropriate means, such as steel bands as a full load in closed vehicles or containers. Each pallet shall not exceed 1000 kg.

PP8 For UN No. 2002, packagings shall be so constructed that explosion is not possible by reason of increased internal pressure. Cylinders, tubes and pressure drums shall not be used for these substances.

PP9 For UN Nos. 3175, 3243 and 3244, packagings shall conform to a design type that has passed a leakproofness test at the packing group II performance level.

PP11 For UN No. 1309, packing group III, and UN No. 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 Nos. 1361, 2213 and UN No. 3077, 5H1, 5L1 and 5M1 bags are allowed when carried in closed vehicles or containers.

PP13 For articles classified under UN No. 2870, only combination packagings meeting the packing group I performance level are authorized.

PP14 For UN Nos. 2211, 2698 and 3314, packagings are not required to meet the performance tests in Chapter 6.1.

PP15 For UN Nos. 1324 and 2623, packagings shall meet the packing group III performance level.

PP20 For UN No. 2217, any sift-proof, tearproof receptacle may be used.

PP30 For UN No. 2471, paper or fibre inner packagings are not permitted.

PP34 For UN No. 2969 (as whole beans), 5H1, 5L1 and 5M1 bags are permitted.

PP37 For UN Nos. 2590 and 2212, 5M1 bags are permitted. Packages shall be carried in closed vehicles or containers or as stretch or shrink-wrapped unit loads.

PP38 For UN No. 1309, packing group II, bags are permitted only in closed vehicles or containers.

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 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 carriage.

Special packing provisions:

PP16 For UN No. 2800, batteries shall be protected from short circuits and shall be securely packed in strong outer packagings.

NOTE 1*: Non-spillable 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.*

NOTE 2: *For used batteries (UN No. 2800), see P801a.*

PP19 For UN Nos. 1364 and 1365, carriage as bales is authorized.

PP20 For UN Nos. 1363, 1386, 1408 and 2793 any sift-proof, tearproof receptacle may be used.

PP32 UN Nos. 2857 and 3358 may be carried unpackaged, in crates or in appropriate overpacks.

P099	PACKING INSTRUCTION	P099

Only packagings which are approved by the competent authority may be used.

P101	PACKING INSTRUCTION	P101

Only packagings which are approved by the competent authority of the country of origin may be used. If the country of origin is not a Contracting Party to the ADR, the packaging shall be approved by the competent authority of the first country Contracting Party to ADR reached by the consignment. The State's distinguishing sign for motor vehicles in international traffic of the country for which the authority acts, shall be marked on the transport documents as follows:

"**Packaging approved by the competent authority of...**" (see 5.4.1.2.1 (e))

P110(a)	PACKING INSTRUCTION P110(a)	P110(a)

RESERVED

NOTE*: This packing instruction in the UN Model Regulations is not admitted for carriage under ADR.*

P110(b)	PACKING INSTRUCTION	P110(b)
The following packagings are authorized, provided the general packing provisions of **4.1.1**, **4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Receptacles** metal wood rubber, conductive plastics, conductive **Bags** rubber, conductive plastics, conductive	**Intermediate packagings and arrangements** **Dividing partitions** metal wood plastics fibreboard	**Outer packagings and arrangements** **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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Bags** paper, waterproofed plastics textile, rubberized **Sheets** plastics textile, rubberized	**Intermediate packagings and arrangements** Not necessary	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibreboard (1G) plastics, removable head (1H2)
Special packing provision: **PP43** For UN No. 0159, inner packagings are not required when metal (1A2 or 1B2) or plastics (1H2) drums are used as outer packagings.		

P112(a)	PACKING INSTRUCTION (Solid wetted, 1.1D)	P112(a)
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Bags** paper, multiwall, water resistant plastics textile textile, rubberized woven plastics **Receptacles** metal plastics	**Intermediate packagings and arrangements** **Bags** plastics textile, plastic coated or lined **Receptacles** metal plastics	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (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 Nos. 0072 and 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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings and arrangements	Intermediate packagings and arrangements	Outer packagings and arrangements
Bags paper, kraft paper, multiwall, water resistant plastics textile textile, rubberized woven plastics	**Bags** (for UN No. 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) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

Special packing provisions:

PP26 For UN Nos. 0004, 0076, 0078, 0154, 0216, 0219 and 0386, packagings shall be lead free.

PP46 For UN Nos. 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 No. 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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings and arrangements	Intermediate packagings and arrangements	Outer packagings and arrangements
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	**Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (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 provisions:

PP26 For UN Nos. 0004, 0076, 0078, 0154, 0216, 0219 and 0386, packagings shall be lead free.

PP46 For UN No. 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 No. 0504, metal packagings shall not be used.

P113	PACKING INSTRUCTION	P113
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Bags** paper plastics textile, rubberized **Receptacles** fibreboard metal plastics wood	**Intermediate packagings and arrangements** Not necessary	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)
Additional requirement: The packaging shall be sift-proof.		
Special packing provisions: **PP49** For UN Nos. 0094 and 0305, no more than 50 g of substance shall be packed in an inner packaging. **PP50** For UN No. 0027, inner packagings are not necessary when drums are used as outer packagings. **PP51** For UN No. 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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Bags** plastics textile woven plastics **Receptacles** metal plastics	**Intermediate packagings and arrangements** **Bags** plastics textile, plastic coated or lined **Receptacles** metal plastics	**Outer packagings and arrangements** **Boxes** steel (4A) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)
Additional requirement: Intermediate packagings are not required if leakproof removable head drums are used as outer packagings.		
Special packing provisions: **PP26** For UN Nos. 0077, 0132, 0234, 0235 and 0236, packagings shall be lead free. **PP43** For UN No. 0342, inner packagings are not required when metal (1A2 or 1B2) or plastics (1H2) drums are used as outer packagings.		

P114(b)	PACKING INSTRUCTION (Solid dry)	P114(b)
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags paper, kraft plastics textile, sift-proof woven plastics, sift-proof **Receptacles** fibreboard metal paper plastics woven plastics, sift-proof	Not necessary	**Boxes** natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

Special packing provisions:

PP26 For UN Nos. 0077, 0132, 0234, 0235 and 0236, packagings shall be lead free.

PP50 For UN Nos. 0160 and 0161, inner packagings are not required if drums are used as outer packagings.

PP52 For UN Nos. 0160 and 0161, when metal drums (1A2 or 1B2) are used as outer packagings, metal packagings shall be so constructed that the risk of explosion, by reason of increased internal pressure from internal or external causes is prevented.

P115	PACKING INSTRUCTION	P115

The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings and arrangements	Intermediate packagings and arrangements	Outer packagings and arrangements
Receptacles plastics	**Bags** plastics in metal receptacles **Drums** metal	**Box**es natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

Special packing provisions:

PP45 For UN No. 0144, intermediate packagings are not required.

PP53 For UN Nos. 0075, 0143, 0495 and 0497, when boxes are used as outer packagings, 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 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 outer packagings 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 plastics 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 No. 0144, absorbent cushioning material shall be inserted.

PP56 For UN No. 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 No. 0144, fibreboard boxes (4G) may be used as outer packagings.

PP60 For UN No. 0144, aluminium drums, removable head (1B2) shall not be used.

P116	PACKING INSTRUCTION	P116

The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings and arrangements	Intermediate packagings and arrangements	Outer packagings and arrangements
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) paper, multiwall, water resistant (5M2) plastics, film (5H4) textile, sift-proof (5L2) textile, water resistant (5L3) **Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2) **Jerricans** steel, removable head (3A2) plastics, removable head (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 outer packagings.

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 No. 0081, inner packagings are not required when contained in rigid plastic which is impervious to nitric esters.

PP64 For UN No. 0331, inner packagings are not required when bags (5H2), (5H3) or (5H4) are used as outer packagings.

PP65 For UN Nos. 0082, 0241, 0331 and 0332, bags (5H2 or 5H3) may be used as outer packagings.

PP66 For UN No. 0081, bags shall not be used as outer packagings.

P130	PACKING INSTRUCTION	P130

The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Not necessary	Not necessary	**Boxes** steel (4A) aluminium (4B) 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, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (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 and 0502: 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 carriage. A negative result in Test Series 4 on an unpackaged article indicates that the article can be considered for carriage unpackaged. Such unpackaged articles may be fixed to cradles or contained in crates or other suitable handling devices.

P131	PACKING INSTRUCTION	P131
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags paper plastics **Receptacles** fibreboard metal plastics wood **Reels**	Not necessary	**Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (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	P132(a)
(Articles consisting of closed metal, plastics or fibreboard casings that contain a detonating explosive, or consisting of plastics-bonded detonating explosives)		
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Not necessary	Not necessary	**Boxes** steel (4A) aluminium (4B) 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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Receptacles** fibreboard metal plastics **Sheets** paper plastics	**Intermediate packagings and arrangements** Not necessary	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) 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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Receptacles** fibreboard metal plastics wood **Trays, fitted with dividing partitions** fibreboard plastics wood	**Intermediate packagings and arrangements** **Receptacles** fibreboard metal plastics wood	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) 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 the general packing provisions **of 4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags water resistant **Receptacles** fibreboard metal plastics wood **Sheets** fibreboard, corrugated **Tubes** fibreboard	Not necessary	**Boxes** steel (4A) aluminium (4B) 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, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

P135	PACKING INSTRUCTION	P135
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags paper plastics **Receptacles** fibreboard metal plastics wood **Sheets** paper plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) 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, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

P136	PACKING INSTRUCTION	P136
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags plastics textile Boxes fibreboard plastics wood **Dividing partitions in the outer packagings**	Not necessary	**Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

P137	PACKING INSTRUCTION	P137
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags plastics **Boxes** fibreboard **Tubes** fibreboard metal plastics **Dividing partitions in the outer packagings**	Not necessary	**Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (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 marked "THIS SIDE UP". 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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Bags** plastics	**Intermediate packagings and arrangements** Not necessary	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Bag**s plastics **Receptacles** fibreboard metal plastics wood **Reels** **Sheets** paper plastics	**Intermediate packagings and arrangements** Not necessary	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (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 Nos. 0065 and 0289, inner packagings are not required when they are in coils.		

P140	PACKING INSTRUCTION	P140

The following packagings are authorized, provided the general packing provisions **of 4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings and arrangements	Intermediate packagings and arrangements	Outer packagings and arrangements
Bags plastics **Reels** **Sheets** paper, kraft plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

Special packing provisions:

PP73 For UN No. 0105, no inner packagings are required if the ends are sealed.

PP74 For UN No. 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 No. 0101, steel or aluminium boxes or drums shall not be used.

P141	PACKING INSTRUCTION	P141

The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:

Inner packagings and arrangements	Intermediate packagings and arrangements	Outer packagings and arrangements
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) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

P142	PACKING INSTRUCTION	P142
The following packagings are authorized, provided the general packing provisions **of 4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags paper plastics **Receptacles** fibreboard metal plastics wood **Sheets** paper **Trays, fitted with dividing partitions** plastics	Not necessary	**Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)

P143	PACKING INSTRUCTION	P143
The following packagings are authorized, provided the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements	**Intermediate packagings and arrangements**	**Outer packagings and arrangements**
Bags paper, kraft plastics textile textile, rubberized **Receptacles** fibreboard metal plastics **Trays, fitted with dividing partitions** plastics wood	Not necessary	**Boxes** steel (4A) aluminium (4B) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plywood (1D) fibre (1G) plastics, removable head (1H2)
Additional requirement: Instead of the above inner and outer packagings, composite packagings (6HH2) (plastics receptacle with outer solid plastics 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 the general packing provisions of **4.1.1, 4.1.3** and special packing provisions of **4.1.5** are met:		
Inner packagings and arrangements **Receptacles** fibreboard metal plastics **Dividing partitions in the outer packagings**	**Intermediate packagings and arrangements** Not necessary	**Outer packagings and arrangements** **Boxes** steel (4A) aluminium (4B) natural wood, ordinary with metal liner (4C1) plywood (4D) with metal liner reconstituted wood (4F) with metal liner plastics, expanded (4H1) plastics, solid (4H2) **Drums** steel, removable head (1A2) aluminium, removable head (1B2) plastics, removable head (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.		

P200	PACKING INSTRUCTION	P200

Type of packagings: Cylinders, tubes, pressure drums and bundles of cylinders

Cylinders, tubes, pressure drums and bundles of cylinders are authorised provided the special packing provisions of **4.1.6** and the provisions listed below under (1) to (9) are met.

General

(1) Pressure receptacles shall be so closed and leakproof as to prevent escape of the gases;

(2) 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;

(3) 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 the classification code 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;

(e) the minimum test pressure of the pressure receptacles;

(f) the maximum working pressure of the pressure receptacles for compressed gases or the maximum filling ratio(s) for liquefied and dissolved gases;

(g) special packing provisions that are specific to a substance.

Test pressure and filling ratios

(4) The minimum test pressure required for is 1 MPa (10 bar);

(5) 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 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 provided that the above criterion is met, except where special packing provision "o" applies.

For high pressure liquefied gases for which data is not provided in the table, 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 kg/m^3)

P_h = minimum test pressure (in bar).

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} $bar.l.mol^{-1}.K^{-1}$ (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 for which filling data is not provided in the table, the maximum filling ratio shall be determined as follows:

$$FR = (0.0032 \times BP - 0.24) \times d_l$$

where FR = maximum filling ratio

BP = boiling point (in Kelvin)

d_l = density of the liquid at boiling point (in kg/l).

(d) For UN No. 1001 acetylene, dissolved, and UN No. 3374 acetylene, solvent free, see (9), special packing provision "p".

(6) Other test pressure and filling ratio may be used provided they satisfy the general requirements outlined in paragraphs (4) and (5) above;

Periodic inspections

(7) Refillable pressure receptacles shall be subjected to periodic inspections in accordance with the requirements of 6.2.1.6.

(8) If special provisions for certain substances do not appear in the tables below, periodic inspections shall be carried out:

(a) Every 5 years in the case of pressure receptacles intended for the carriage of gases of classification codes 1T, 1TF, 1TO, 1TC, 1TFC, 1TOC, 2T, 2TO, 2TF, 2TC, 2TFC, 2TOC, 4A, 4F and 4C;

(b) Every 5 years in the case of pressure receptacles intended for the carriage of substances from other classes;

(c) Every 10 years in the case of pressure receptacles intended for the carriage of gases of classification codes 1A, 1O, 1F, 2A, 2O and 2F.

By derogation from this paragraph, the periodic inspection of pressure receptacles which make use of composite materials (composite pressure receptacles) shall be carried out at intervals determined by the competent authority of the Contracting Party to ADR which has approved the technical code for the design and construction.

Special packing provisions

(9) Keys for the column "Special packing provisions":

Material compatibility (for gases see ISO 11114-1:1997 and ISO 11114-2:2000)

a: Aluminium alloy pressure receptacles are not authorized.

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 are used, only those resistant to hydrogen embrittlement shall be authorized.

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 gas tight plugs or caps which shall be made of material not liable to attack by the contents of the pressure receptacle.

Each cylinder within a bundle shall be fitted with an individual valve that shall be closed during carriage. After filling, the manifold shall be evacuated, purged and plugged.

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 have a taper threaded connection directly to the pressure receptacle and be capable of withstanding the test pressure of the pressure receptacle.

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.

Carriage in capsules is not allowed.

Each pressure receptacle shall be tested for leakage after filling.

Gas specific provisions

l: UN No. 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 total quantity 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: A pressure receptacle shall contain not more than 5 kg of the gas.

o: In no case shall the working pressure or filling ratio shown in the tables be exceeded.

p: For UN No. 1001 acetylene, dissolved, and UN No. 3374 acetylene, solvent free: cylinders shall be filled with a homogeneous monolithic porous mass; the working pressure and the quantity of acetylene shall not exceed the values prescribed in the approval or in ISO 3807-1:2000 or ISO 3807-2:2000, as applicable.

For UN No. 1001 acetylene, dissolved: cylinders shall contain a quantity of acetone or suitable solvent as specified in the approval (see ISO 3807-1:2000 or ISO 3807-2:2000, as applicable); cylinders fitted with pressure relief devices or manifolded together shall be carried vertically.

Alternatively, for UN No. 1001 acetylene, dissolved: cylinders which are not UN certified pressure receptacles may be filled with a non monolithic porous mass; the working pressure, the quantity of acetylene and the quantity of solvent shall not exceed the values prescribed in the approval. The maximum test period for periodic inspection of the cylinders shall not exceed five years.

A test pressure of 52 bar shall be applied only to cylinders conforming to ISO 3807-2:2000.

q: The valves 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 which shall be made of material not liable to attack by the contents of the pressure receptacle. 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 carriage, and the manifold outlet valve shall be fitted with a gas-tight plug or cap. Carriage in capsules is not allowed.

r: Allowed for carriage 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 carriage;

(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 for hydrocarbons contamination and not contaminated with oil. UN certified pressure receptacles shall be cleaned in accordance with ISO 11621:1997.

t: Other criteria may be used for filling of welded steel cylinders intended for the carriage of substances of UN No. 1965:

(a) with the agreement of the competent authorities of the countries where the carriage is carried out; and

(b) in compliance with the provisions of a national code or standard recognised by the competent authorities or standard EN 1439:1996 "Transportable refillable steel cylinders for liquefied petroleum Gases (LPG) – Procedures for checking before, during and after refilling".

When the criteria for filling are different from those in P200(5), the transport document shall include the statement "Carriage in accordance with packing instruction P200, special packing provision t" and the indication of the reference temperature used for the calculation of the filling ratio.

Periodic inspection

u: The interval between periodic tests may be extended to 10 years for aluminium alloy pressure receptacles. This derogation may only be applied to UN certified pressure receptacles when the alloy of the pressure receptacle has been subjected to stress corrosion testing as specified in ISO 7866:1999.

v: The interval between inspections for steel cylinders may be extended to 15 years:

(a) with the agreement of the competent authority (authorities) of the country (countries) where the periodic inspection and the carriage take place; and

(b) in accordance with the requirements of a technical code or a standard recognised by the competent authority, or standard EN 1440:1996 "Transportable refillable welded cylinders for liquefied petroleum gas (LPG) – Periodic requalification".

Requirements for N.O.S. entries 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 (5).

Toxic substances with an LC_{50} less than or equal to 200 ml/m^3 shall not be carried in tubes, pressure drums or MEGCs and shall meet the requirements of special packing provision "k".

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 carriage. If necessary, stabilisation or addition of an inhibitor shall be required.

Mixtures containing UN No. 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.

Requirements for substances not in Class 2

ab: Pressure receptacles shall satisfy the following conditions:

(i) The pressure test shall include an inspection of the inside of the pressure receptacles and check of accessories;

(ii) In addition resistance to corrosion shall be checked every two years by means of suitable instruments (e.g. ultrasound) and the condition of the accessories verified;

(iii) Wall thickness shall not be less than 3 mm.

ac: Tests and inspections shall be carried out under the supervision of an expert approved by the competent authority.

ad: Pressure receptacles shall satisfy the following conditions:

(i) Pressure receptacles shall be designed for a design pressure of not less than 2.1 MPa (21 bar) (gauge pressure);

(ii) In addition to the marks for refillable receptacles, the pressure receptacles shall bear the following particulars in clearly legible and durable characters:

- The UN number and the proper shipping name of the substance according to 3.1.2;
- The maximum permitted mass when filled and the tare of the pressure receptacle, including accessories fitted during filling, or the gross mass.

(10) The applicable requirements of this packing instruction are considered to have been complied with if the following standards, as relevant, are applied:

Applicable requirements	Reference	Title of document
(9)(p)	EN1801: 1998	Transportable gas cylinders – Filling conditions for single acetylene cylinders (including list of permissible porous masses)
(9)(p)	EN 12755: 2000	Transportable gas cylinders – Filling conditions for acetylene bundles

Table 1: COMPRESSED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar [b]	Working pressure, bar [b]	Special packing provisions
1002	AIR, COMPRESSED	1A		X	X	X	X	10			
1006	ARGON, COMPRESSED	1A		X	X	X	X	10			
1014	CARBON DIOXIDE AND OXYGEN MIXTURE, COMPRESSED	1O		X	X	X	X	10			
1016	CARBON MONOXIDE, COMPRESSED	1TF	3760	X	X	X	X	5			u
1023	COAL GAS, COMPRESSED	1TF		X	X	X	X	5			
1045	FLUORINE, COMPRESSED	1TOC	185	X			X	5	200	30	a, k, n, o
1046	HELIUM, COMPRESSED	1A		X	X	X	X	10			
1049	HYDROGEN, COMPRESSED	1F		X	X	X	X	10			d
1056	KRYPTON, COMPRESSED	1A		X	X	X	X	10			
1065	NEON, COMPRESSED	1A		X	X	X	X	10			
1066	NITROGEN, COMPRESSED	1A		X	X	X	X	10			
1071	OIL GAS, COMPRESSED	1TF		X	X	X	X	5			
1072	OXYGEN, COMPRESSED	1O		X	X	X	X	10			s
1612	HEXAETHYL TETRAPHOSPHATE AND COMPRESSED GAS MIXTURE	1T		X	X	X	X	5			z
1660	NITRIC OXIDE, COMPRESSED	1TOC	115	X			X	5	200	50	k, o
1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.	1TF		X	X	X	X	5			z
1954	COMPRESSED GAS, FLAMMABLE, N.O.S	1F		X	X	X	X	10			z
1955	COMPRESSED GAS, TOXIC, N.O.S.	1T		X	X	X	X	5			z
1956	COMPRESSED GAS, N.O.S.	1A		X	X	X	X	10			z
1957	DEUTERIUM, COMPRESSED	1F		X	X	X	X	10			d
1964	HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.	1F		X	X	X	X	10			z
1971	METHANE, COMPRESSED or NATURAL GAS, COMPRESSED with high methane content	1F		X	X	X	X	10			
1979	RARE GASES MIXTURE, COMPRESSED	1A		X	X	X	X	10			
1980	RARE GASES AND OXYGEN MIXTURE, COMPRESSED	1A		X	X	X	X	10			
1981	RARE GASES AND NITROGEN MIXTURE, COMPRESSED	1A		X	X	X	X	10			

Table 1: COMPRESSED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar [b]	Working pressure, bar [b]	Special packing provisions
2034	HYDROGEN AND METHANE MIXTURE, COMPRESSED	1F		X	X	X	X	10			d
2190	OXYGEN DIFLUORIDE, COMPRESSED	1TOC	2.6	X			X	5	200	30	a, k, n, o
2600	CARBON MONOXIDE AND HYDROGEN MIXTURE, COMPRESSED	1TF		X	X	X	X	5			d, u
3156	COMPRESSED GAS, OXIDIZING, N.O.S.	1O		X	X	X	X	10			z
3303	COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S.	1TO		X	X	X	X	5			z
3304	COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.	1TC		X	X	X	X	5			z
3305	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	1TFC		X	X	X	X	5			z
3306	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	1TOC		X	X	X	X	5			z

[a] *Not applicable for pressure receptacles made of composite materials.*

[b] *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	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
1001	ACETYLENE, DISSOLVED	4F		X			X	10	60		c, p
1005	AMMONIA, ANHYDROUS	2TC	4000	X	X	X	X	5	33	0.53	b, r
1008	BORON TRIFLUORIDE	2TC	387	X	X	X	X	5	225	0.715	
									300	0.86	
1009	BROMOTRIFLUORO-METHANE (REFRIGERANT GAS R 13B1)	2A		X	X	X	X	10	42	1.13	r
									120	1.44	r
									250	1.60	r
1010	1,2-BUTADIENE, STABILIZED or	2F		X	X	X	X	10	10	0.59	r
1010	1,3-BUTADIENE, STABILIZED or	2F		X	X	X	X	10	10	0.55	r
1010	MIXTURES OF 1,3-BUTADIENE AND HYDROCARBONS, STABILIZED, having a vapour pressure at 70 °C not exceeding 1.1 MPa (11 bar) and a density at 50 °C not lower than 0.525 kg/l	2F		X	X	X	X	10	10	0.50	r, z
1011	BUTANE	2F		X	X	X	X	10	10	0.51	r, v
1012	BUTYLENES MIXTURES or	2F		X	X	X	X	10	10	0.50	r, z
1012	1-BUTYLENE or	2F		X	X	X	X	10	10	0.53	
1012	CIS-2-BUTYLENE or	2F		X	X	X	X	10	10	0.55	
1012	TRANS-2 BUTYLENE	2F		X	X	X	X	10	10	0.54	
1013	CARBON DIOXIDE	2A		X	X	X	X	10	190	0.66	r
									250	0.75	r
1015	CARBON DIOXIDE AND NITROUS OXIDE MIXTURE	2A		X	X	X	X	10	250	0.75	r
1017	CHLORINE	2TC	293	X	X	X	X	5	22	1.25	a, r
1018	CHLORODIFLUORO-METHANE (REFRIGERANT GAS R 22)	2A		X	X	X	X	10	29	1.03	r
1020	CHLOROPENTAFLUORO-ETHANE (REFRIGERANT GAS R 115)	2A		X	X	X	X	10	25	1.08	r
1021	1-CHLORO-1,2,2,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 124)	2A		X	X	X	X	10	12	1.20	r
1022	CHLOROTRIFLUORO-METHANE (REFRIGERANT GAS R 13)	2A		X	X	X	X	10	100	0.83	r
									120	0.90	r
									190	1.04	r
									250	1.10	r
1026	CYANOGEN	2TF	350	X	X	X	X	5	100	0.70	r, u
1027	CYCLOPROPANE	2F		X	X	X	X	10	20	0.53	r

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
1028	DICHLORODIFLUORO-METHANE (REFRIGERANT GAS R 12)	2A		X	X	X	X	10	18	1.15	r
1029	DICHLOROFLUORO-METHANE (REFRIGERANT GAS R 21)	2A		X	X	X	X	10	10	1.23	r
1030	1,1-DIFLUOROETHANE (REFRIGERANT GAS R 152a)	2A		X	X	X	X	10	18	0.79	r
1032	DIMETHYLAMINE, ANHYDROUS	2F		X	X	X	X	10	10	0.59	b, r
1033	DIMETHYL ETHER	2F		X	X	X	X	10	18	0.58	r
1035	ETHANE	2F		X	X	X	X	10	95 120 300	0.25 0.29 0.39	r r r
1036	ETHYLAMINE	2F		X	X	X	X	10	10	0.61	b, r
1037	ETHYL CHLORIDE	2F		X	X	X	X	10	10	0.80	a, r
1039	ETHYL METHYL ETHER	2F		X	X	X	X	10	10	0.64	r
1040	ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1MPa (10 bar) at 50 °C	2TF	2900	X	X	X	X	5	15	0.78	l, r
1041	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9% but not more than 87% ethylene oxide	2F		X	X	X	X	10	190 250	0.66 0.75	r r
1043	FERTILIZER AMMONIATING SOLUTION with free ammonia	2A		X		X	X	5			b, z
1048	HYDROGEN BROMIDE, ANHYDROUS	2TC	2860	X	X	X	X	5	60	1.54	a, d, r
1050	HYDROGEN CHLORIDE, ANHYDROUS	2TC	2810	X	X	X	X	5	100 120 150 200	0.30 0.56 0.67 0.74	a, d, r a, d, r a, d, r a, d, r
1053	HYDROGEN SULPHIDE	2TF	712	X	X	X	X	5	55	0.67	d, r, u
1055	ISOBUTYLENE	2F		X	X	X	X	10	10	0.52	r
1058	LIQUEFIED GASES, non-flammable, charged with nitrogen, carbon dioxide or air	2A		X	X	X	X	10	Test pressure = 1.5 x working pressure		r

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
1060	METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED	2F		X	X	X	X	10			c, r, z
	Propadiene with 1% to 4% methylacetylene			X	X	X	X	10	22	0.52	c, r
	Mixture P1			X	X	X	X	10	30	0.49	c, r
	Mixture P2			X	X	X	X	10	24	0.47	c, r
1061	METHYLAMINE, ANHYDROUS	2F		X	X	X	X	10	13	0.58	b, r
1062	METHYL BROMIDE with not more than 2% chloropicrin	2T	850	X	X	X	X	5	10	1.51	a
1063	METHYL CHLORIDE (REFRIGERANT GAS R 40)	2F		X	X	X	X	10	17	0.81	a, r
1064	METHYL MERCAPTAN	2TF	1350	X	X	X	X	5	10	0.78	d, r, u
1067	DINITROGEN TETROXIDE (NITROGEN DIOXIDE)	2TOC	115	X			X	5	10	1.30	k
1069	NITROSYL CHLORIDE	2TC	35	X			X	5	13	1.10	k, r
1070	NITROUS OXIDE	2O		X	X	X	X	10	180	0.68	
									225	0.74	
									250	0.75	
1075	PETROLEUM GASES, LIQUEFIED	2F		X	X	X	X	10			v, z
1076	PHOSGENE	2TC	5	X		X	X	5	20	1.23	k, r
1077	PROPYLENE	2F		X	X	X	X	10	30	0.43	r
1078	REFRIGERANT GAS, N.O.S.	2A		X	X	X	X	10			r, z
	Mixture F1			X	X	X	X	10	12	1.23	
	Mixture F2			X	X	X	X	10	18	1.15	
	Mixture F3			X	X	X	X	10	29	1.03	
1079	SULPHUR DIOXIDE	2TC	2520	X	X	X	X	5	14	1.23	r
1080	SULPHUR HEXAFLUORIDE	2A		X	X	X	X	10	70	1.04	r
									140	1.33	r
									160	1.37	r
1081	TETRAFLUOROETHYLENE, STABILIZED	2F		X	X	X	X	10	200		m, o, r
1082	TRIFLUOROCHLOROETHY-LENE, STABILIZED	2TF	2000	X	X	X	X	5	19	1.13	r, u
1083	TRIMETHYLAMINE, ANHYDROUS	2F		X	X	X	X	10	10	0.56	b, r
1085	VINYL BROMIDE, STABILIZED	2F		X	X	X	X	10	10	1.37	a, r
1086	VINYL CHLORIDE, STABILIZED	2F		X	X	X	X	10	12	0.81	a, r
1087	VINYL METHYL ETHER, STABILIZED	2F		X	X	X	X	10	10	0.67	r

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
1581	CHLOROPICRIN AND METHYL BROMIDE MIXTURE with more than 2% chloropicrin	2T	850	X	X	X	X	5	10	1.51	a
1582	CHLOROPICRIN AND METHYL CHLORIDE MIXTURE	2T	[d]	X	X	X	X	5	17	0.81	a
1589	CYANOGEN CHLORIDE, STABILIZED	2TC	80	X			X	5	20	1.03	k
1741	BORON TRICHLORIDE	2TC	2541	X	X	X	X	5	10	1.19	r
1749	CHLORINE TRIFLUORIDE	2TOC	299	X	X	X	X	5	30	1.40	a
1858	HEXAFLUOROPROPYLENE (REFRIGERANT GAS R 1216)	2A		X	X	X	X	10	22	1.11	r
1859	SILICON TETRAFLUORIDE	2TC	450	X	X	X	X	5	200 300	0.74 1.10	
1860	VINYL FLUORIDE, STABILIZED	2F		X	X	X	X	10	250	0.64	a, r
1911	DIBORANE	2TF	80	X			X	5	250	0.07	d, k, o
1912	METHYL CHLORIDE AND METHYLENE CHLORIDE MIXTURE	2F		X	X	X	X	10	17	0.81	a, r
1952	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with not more than 9% ethylene oxide	2A		X	X	X	X	10	190 250	0.66 0.75	r r
1958	1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 114)	2A		X	X	X	X	10	10	1.30	r
1959	1,1-DIFLUOROETHYLENE (REFRIGERANT GAS R 1132a)	2F		X	X	X	X	10	250	0.77	r
1962	ETHYLENE	2F		X	X	X	X	10	225 300	0.34 0.37	
1965	HYDROCARBON GAS MIXTURE, LIQUEFIED,N.O.S	2F		X	X	X	X	10		[b]	r, t, v, z
	Mixture A							10	10	0.50	
	Mixture A01							10	15	0.49	
	Mixture A02							10	15	0.48	
	Mixture A0							10	15	0.47	
	Mixture A1							10	20	0.46	
	Mixture B1							10	25	0.45	
	Mixture B2							10	25	0.44	
	Mixture B							10	25	0.43	
	Mixture C							10	30	0.42	

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
1967	INSECTICIDE GAS, TOXIC, N.O.S.	2T		X	X	X	X	5			z
1968	INSECTICIDE GAS, N.O.S.	2A		X	X	X	X	10			r, z
1969	ISOBUTANE	2F		X	X	X	X	10	10	0.49	r, v
1973	CHLORODIFLUOROME-THANE AND CHLOROPENTAFLUORO-ETHANE MIXTURE with fixed boiling point, with approximately 49% chlorodifluoromethane (REFRIGERANT GAS R 502)	2A		X	X	X	X	10	31	1.05	r
1974	CHLORODIFLUORO-BROMOMETHANE (REFRIGERANT GAS R 12B1)	2A		X	X	X	X	10	10	1.61	r
1975	NITRIC OXIDE AND DINITROGEN TETROXIDE MIXTURE (NITRIC OXIDE AND NITROGEN DIOXIDE MIXTURE)	2TOC	115	X		X	X	5			k, z
1976	OCTAFLUOROCYCLO-BUTANE (REFRIGERANT GAS RC 318)	2.A		X	X	X	X	10	11	1.34	r
1978	PROPANE	2F		X	X	X	X	10	25	0.42	r, v
1982	TETRAFLUOROMETHANE (REFRIGERANT GAS R 14)	2A		X	X	X	X	10	200 300	0.62 0.94	
1983	1-CHLORO-2,2,2-TRIFLUOROETHANE (REFRIGERANT GAS R 133a)	2A		X	X	X	X	10	10	1.18	r
1984	TRIFLUOROMETHANE (REFRIGERANT GAS R 23)	2A		X	X	X	X	10	190 250	0.87 0.95	r r
2035	1,1,1-TRIFLUOROETHANE (REFRIGERANT GAS R 143a)	2F		X	X	X	X	10	35	0.75	r
2036	XENON	2A		X	X	X	X	10	130	1.24	
2044	2,2-DIMETHYLPROPANE	2F		X	X	X	X	10	10	0.53	r
2073	AMMONIA SOLUTION, relative density less than 0.880 at 15 °C in water,	4A									
	with more than 35% but not more than 40% ammonia			X	X	X	X	5	10	0.80	b
	with more than 40% but not more than 50% ammonia			X	X	X	X	5	12	0.77	b
2188	ARSINE	2TF	20	X			X	5	42	1.10	d, k
2189	DICHLOROSILANE	2TFC	314	X	X	X	X	5	10	0.90	
2191	SULPHURYL FLUORIDE	2T	3020	X	X	X	X	5	50	1.10	u

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
2192	GERMANE [c]	2TF	620	X	X	X	X	5	250	1.02	d, r
2193	HEXAFLUOROETHANE (REFRIGERANT GAS R 116)	2A		X	X	X	X	10	200	1.10	
2194	SELENIUM HEXAFLUORIDE	2TC	50	X			X	5	36	1.46	k, r
2195	TELLURIUM HEXAFLUORIDE	2TC	25	X			X	5	20	1.00	k, r
2196	TUNGSTEN HEXAFLUORIDE	2TC	160	X			X	5	10	2.70	a, k, r
2197	HYDROGEN IODIDE, ANHYDROUS	2TC	2860	X	X	X	X	5	23	2.25	a, d, r
2198	PHOSPHORUS PENTAFLUORIDE	2TC	190	X			X	5	200 300	0.90 1.34	k k
2199	PHOSPHINE [c]	2TF	20	X			X	5	225 250	0.30 0.45	d, k, r d, k, r
2200	PROPADIENE, STABILIZED	2F		X	X	X	X	10	22	0.50	r
2202	HYDROGEN SELENIDE, ANHYDROUS	2TF	2	X			X	5	31	1.60	k
2203	SILANE [c]	2F		X	X	X	X	10	225 250	0.32 0.36	d, q d, q
2204	CARBONYL SULPHIDE	2TF	1700	X	X	X	X	5	26	0.84	r, u
2417	CARBONYL FLUORIDE	2TC	360	X	X	X	X	5	200 300	0.47 0.70	
2418	SULPHUR TETRAFLUORIDE	2TC	40	X			X	5	30	0.91	k, r
2419	BROMOTRIFLUORO-ETHYLENE	2F		X	X	X	X	10	10	1.19	r
2420	HEXAFLUOROACETONE	2TC	470	X	X	X	X	5	22	1.08	r
2421	NITROGEN TRIOXIDE	2TOC	CARRIAGE PROHIBITED								
2422	OCTAFLUOROBUT-2-ENE (REFRIGERANT GAS R 1318)	2A		X	X	X	X	10	12	1.34	r
2424	OCTAFLUOROPROPANE (REFRIGERANT GAS R 218)	2A		X	X	X	X	10	25	1.09	r
2451	NITROGEN TRIFLUORIDE	2O		X	X	X	X	10	200 300	0.50 0.75	
2452	ETHYLACETYLENE, STABILIZED	2F		X	X	X	X	10	10	0.57	c, r
2453	ETHYL FLUORIDE (REFRIGERANT GAS R 161)	2F		X	X	X	X	10	30	0.57	r
2454	METHYL FLUORIDE (REFRIGERANT GAS R 41)	2F		X	X	X	X	10	300	0.36	r
2455	METHYL NITRITE	2A	CARRIAGE PROHIBITED								
2517	1-CHLORO-1,1-DIFLUOROETHANE (REFRIGERANT GAS R 142b)	2F		X	X	X	X	10	10	0.99	r

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
2534	METHYLCHLOROSILANE	2TFC	600	X	X	X	X	5			r, z
2548	CHLORINE PENTAFLUORIDE	2TOC	122	X			X	5	13	1.49	a, k
2599	CHLOROTRIFLUORO-METHANE AND TRIFLUOROMETHANE AZEOTROPIC MIXTURE with approximately 60% chlorotrifluoromethane (REFRIGERANT GAS R 503)	2A		X	X	X	X	10	31 42 100	0.11 0.20 0.66	r r r
2601	CYCLOBUTANE	2F		X	X	X	X	10	10	0.63	r
2602	DICHLORODIFLUORO-METHANE AND DIFLUOROETHANE AZEOTROPIC MIXTURE with approximately 74% dichlorodifluoromethane (REFRIGERANT GAS R 500)	2A		X	X	X	X	10	22	1.01	r
2676	STIBINE	2TF	20	X			X	5	20	1.20	k, r
2901	BROMINE CHLORIDE	2TOC	290	X	X	X	X	5	10	1.50	a
3057	TRIFLUOROACETYL CHLORIDE	2TC	10	X		X	X	5	17	1.17	k, r
3070	ETHYLENE OXIDE AND DICHLORODIFLUORO-METHANE MIXTURE with not more than 12,5% ethylene oxide	2A		X	X	X	X	10	18	1.09	r
3083	PERCHLORYL FLUORIDE	2TO	770	X	X	X	X	5	33	1.21	k, u
3153	PERFLUORO(METHYL VINYL ETHER)	2F		X	X	X	X	10	20	0.75	r
3154	PERFLUORO(ETHYL VINYL ETHER)	2F		X	X	X	X	10	10	0.98	r
3157	LIQUEFIED GAS, OXIDIZING, N.O.S.	2O		X	X	X	X	10			z
3159	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)	2A		X	X	X	X	10	22	1.04	r
3160	LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S.	2TF		X	X	X	X	5			r, z
3161	LIQUEFIED GAS, FLAMMABLE, N.O.S.	2F		X	X	X	X	10			r, z
3162	LIQUEFIED GAS, TOXIC, N.O.S.	2T		X	X	X	X	5			z
3163	LIQUEFIED GAS, N.O.S.	2A		X	X	X	X	10			r, z
3220	PENTAFLUOROETHANE (REFRIGERANT GAS R 125)	2A		X	X	X	X	10	49 36	0.95 0.72	r r

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

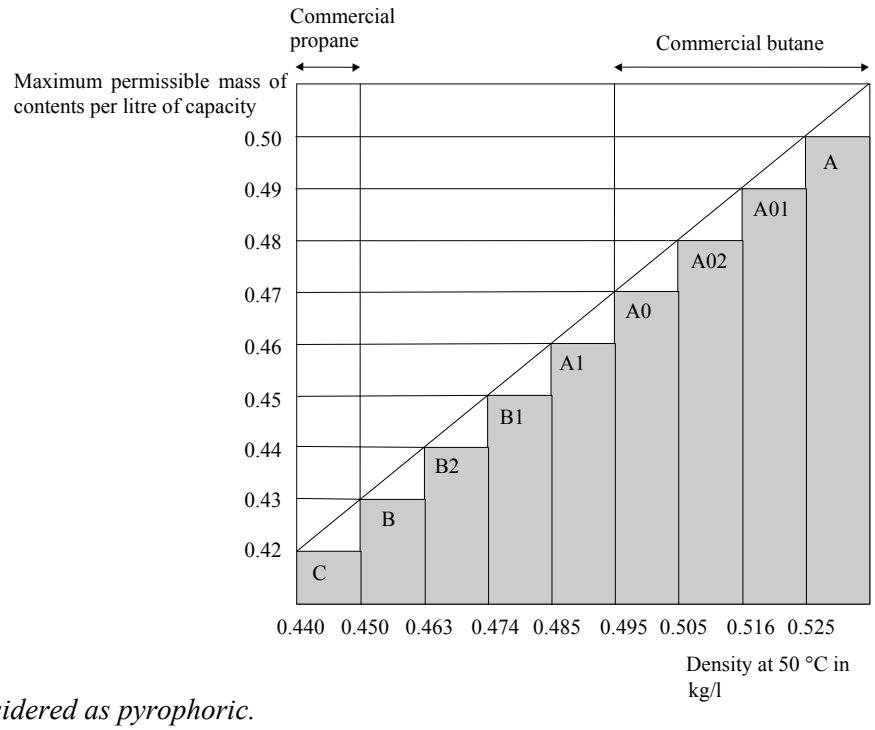
UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
3252	DIFLUOROMETHANE (REFRIGERANT GAS R 32)	2F		X	X	X	X	10	48	0.78	r
3296	HEPTAFLUOROPROPANE (REFRIGERANT GAS R 227)	2A		X	X	X	X	10	15	1.20	r
3297	ETHYLENE OXIDE AND CHLOROTETRAFLUORO-ETHANE MIXTURE with not more than 8.8% ethylene oxide	2A		X	X	X	X	10	10	1.16	r
3298	ETHYLENE OXIDE AND PENTAFLUOROETHANE MIXTURE with not more than 7.9% ethylene oxide	2A		X	X	X	X	10	26	1.02	r
3299	ETHYLENE OXIDE AND TETRAFLUOROETHANE MIXTURE with not more than 5.6% ethylene oxide	2A		X	X	X	X	10	17	1.03	r
3300	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87% ethylene oxide	2TF	More than 2900	X	X	X	X	5	28	0.73	r
3307	LIQUEFIED GAS, TOXIC, OXIDIZING, N.O.S.	2TO		X	X	X	X	5			z
3308	LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S.	2TC		X	X	X	X	5			r, z
3309	LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	2TFC		X	X	X	X	5			r, z
3310	LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	2TOC		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	4TC		X	X	X	X	5			b
3337	REFRIGERANT GAS R 404A (Pentafluoroethane, 1,1,1-trifluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 44% pentafluoroethane and 52% 1,1,1-trifluoroethane)	2A		X	X	X	X	10	36	0.82	r
3338	REFRIGERANT GAS R 407A (Difluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 20% difluoromethane and 40% pentafluoroethane)	2A		X	X	X	X	10	36	0.94	r

Table 2: LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Classification code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
3339	REFRIGERANT GAS R 407B (Difluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 10% difluoromethane and 70% pentafluoroethane	2A		X	X	X	X	10	38	0.93	r
3340	REFRIGERANT GAS R 407C (Difluoromethane, pentafluoroethane, and 1,1,1,2-tetrafluoroethane zeotropic mixture with approximately 23% difluoromethane and 25% pentafluoroethane)	2A		X	X	X	X	10	35	0.95	r
3354	INSECTICIDE GAS, FLAMMABLE, N.O.S	2F		X	X	X	X	10			r, z
3355	INSECTICIDE GAS, TOXIC, FLAMMABLE, N.O.S.	2TF		X	X	X	X	5			r, z
3374	ACETYLENE, SOLVENT FREE	2F		X			X	5	60		c, p

[a] *Not applicable for pressure receptacles made of composite materials.*

[b] *For mixtures of UN No. 1965, the maximum permissible filling mass per litre of capacity is as follows:*



[c] *Considered as pyrophoric.*

[d] *Considered to be toxic. The LC_{50} value still to be determined.*

Table 3: SUBSTANCES NOT IN CLASS 2

UN No.	Name and description	Class	Classification Code	LC_{50} ml/m^3	Cylinders	Tubes	Pressure drums	Bundles of cylinders	Test period, years [a]	Test pressure, bar	Filling ratio	Special packing provisions
1051	HYDROGEN CYANIDE, STABILIZED containing less than 3% water	6.1	TF1	140	X			X	5	100	0.55	k
1052	HYDROGEN FLUORIDE, ANHYDROUS	8	CT1	966	X		X	X	5	10	0.84	ab, ac
1745	BROMINE PENTAFLUORIDE	5.1	OTC	25	X		X	X	5	10	[b]	k, ab, ad
1746	BROMINE TRIFLUORIDE	5.1	OTC	180	X		X	X	5	10	[b]	k, ab, ad
1790	HYDROFLUORIC ACID, solution, with more than 85 % hydrofluoric acid	8	CT1	966	X		X	X	5	10	0.84	ab, ac
2495	IODINE PENTAFLUORIDE	5.1	OTC	120	X		X	X	5	10	[b]	k, ab, ad

[a] *Not applicable for pressure receptacles made of composite materials.*

[b] *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 tubes and pressure drums conforming to the construction, testing and filling requirements approved by the competent authority; (2) In addition, the following packagings are authorized provided that the general provisions of **4.1.1** and **4.1.3** are met. (a) For non-toxic gases, combination packagings with hermetically sealed inner packagings of glass or metal with a maximum capacity of 5 litres per package which meet the packing group III performance level; (b) For toxic gases, combination packagings with hermetically sealed inner packagings of glass or metal with a maximum capacity of 1 litre per package which meet the packing group III performance level.		

P202	PACKING INSTRUCTION	P202
RESERVED		

Type of packagings: Cryogenic receptacles

General instructions:

(1) The special packing provisions of 4.1.6 shall be met.

(2) The receptacles shall be so insulated that they cannot become coated with dew or hoar-frost.

(3) In the case of receptacles intended for the carriage of gases of classification code 3O, the material used to ensure the leakproofness of the joints or for the maintenance of the closures shall be compatible with the contents.

Particular instructions for closed cryogenic receptacles:

(4) The receptacles shall be fitted with safety valves.

(5) For refrigerated liquefied gases of classification codes 3A and 3O the degree of filling, at the filling temperature and at a pressure of 0.1 MPa (1 bar) shall not exceed 98% of the capacity.

(6) For refrigerated liquefied gases of classification code 3F 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 would reach 95% of the capacity at that temperature.

(7) Receptacles shall be subjected to periodic inspections in accordance with the provisions of 6.2.1.6.

(8) Periodic inspections shall be carried out every 10 years.
By derogation from this date, the periodic inspection of receptacles which make use of composite materials (composite receptacles) may be carried out at intervals determined by the competent authority of the Contracting Party to ADR which has approved the technical code for the design and construction.

Particular instructions for open cryogenic receptacles:

(9) Open cryogenic receptacles are not allowed for flammable refrigerated liquefied gases of classification code 3F, and UN No. 2187 carbon dioxide, refrigerated liquid and its mixtures.

(10) The receptacles shall be equipped with devices which prevent the liquid from splashing out.

(11) Glass receptacles shall be double-walled vacuum insulated and surrounded by an absorbent insulating material; they shall be protected by iron-wire baskets and placed in metal cases. The metal cases for the glass receptacles and the other receptacles shall be fitted with means of handling.

(12) The openings of the receptacles shall be fitted with devices allowing gases to escape, preventing any splashing out of the liquid, and so fixed that they cannot fall out.

(13) In the case of UN No. 1073 oxygen refrigerated liquid and mixtures thereof, the devices referred to above and the absorbent insulating material surrounding the glass receptacles shall be made of incombustible materials.

Reference to standards (*reserved*)

P204	PACKING INSTRUCTION	P204

This packing instruction applies to UN No. 1950 aerosols and UN No. 2037 receptacles, small, containing gas (gas cartridges)

(1) The special packing provisions of **4.1.6** shall be met when applicable.

(2) Receptacles shall be so closed and leakproof as to prevent escape of the gases.

(3) For UN No. 1950 aerosols and UN No. 2037 receptacles, small, containing gas (gas cartridges):

(a) the internal pressure at 50 °C shall exceed neither two-thirds of the test pressure nor 1.32 MPa (13.2 bar).
(b) they shall be so filled that at 50 °C the liquid phase does not exceed 95% of their capacity.
(c) they shall satisfy a tightness (leakproofness) test in a hot-water bath:

- The temperature of the bath and the duration of the test shall be such that the internal pressure of each receptacle reaches at least 90% of the internal pressure that would be reached at 55 °C;
- However, if the contents are sensitive to heat or if the receptacles are made of a plastics material which softens at this temperature, the temperature of the bath shall be from 20 °C to 30 °C; in addition, one receptacle out of every 2000 shall be tested at the temperature prescribed in the foregoing indent;
- No leakage or permanent deformation shall occur. The provision concerning permanent deformation is not applicable to receptacles which, being made of plastics material, soften.

The requirements of instruction P204 (3)(c) are deemed to be met if the following standards are complied with:

- for aerosol dispensers (UN No. 1950 aerosols):
  Annex to Council Directive 75/324/EEC [a] as amended by Commission Directive 94/1/EC[b];
- for UN No. 2037 gas cartridges containing UN No. 1965 hydrocarbon gas mixture, liquefied:
  EN 417:1992 Non-refillable metallic gas cartridges for liquefied petroleum gases, with or without a valve, for use with portable appliances - Construction, inspection, testing and marking.

(4) For UN No. 1950 aerosols, only non-pyrophoric and non-toxic gases may be used as propellants, as constituents of propellants, or as filler gases.

(5) All compressed and liquefied gases, except the pyrophoric gases and very toxic gases (gases with an LC50 lower than 200 ppm), shall be accepted as filling gases for UN No. 2037 gas cartridges.

(6) Aerosols and gas cartridges shall be placed in wooden boxes or strong fibreboard or metal boxes; UN No. 1950 aerosols made of glass or synthetic material and liable to shatter shall be separated from one another by interposed sheets of fibreboard or of another suitable material.

(7) A package shall not weigh more than 50 kg if fibreboard boxes are used or more than 75 kg if other packagings are used.

(8) In the case of carriage by full load, metal articles may also be packed as follows: the articles shall be grouped together in units on trays and held in position with an appropriate plastics cover; these units shall be stacked and suitably secured on pallets.

[a] *European Communities Council Directive 75/324/EEC of 20 May 1975 on the approximation of the laws of the Member States (of the European Communities) concerning packagings for aerosols, published in the Official Journal of the European Communities No. L147 of 9 June 1975.*

[b] *European Commission Directive 94/1/EC of 6 January 1994 to align with Directive 75/324/EEC on the approximation of the laws of the Member States (of the European Union) concerning aerosol packagings to technical progress, published in the Official Journal of the European Communities No. L23 of 28 January 1994.*

P205	PACKING INSTRUCTION	P205
This packing instruction applies to UN No. 1057 lighters or lighter refills		
(1)	The special packing provisions of **4.1.6** shall be met when applicable.	
(2)	The articles shall comply with the provisions of the country in which they were filled.	
(3)	Lighters and lighter refills shall be provided with protection against inadvertent discharge.	
(4)	The liquid portion of the gas shall not exceed 85% of the capacity of the receptacle at 15 °C.	
(5)	The receptacles, including the closures, shall be capable of withstanding an internal pressure of the liquefied petroleum gas at 55 °C.	
(6)	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 carriage.	
(7)	The lighters or lighter refills shall be tightly packed to prevent inadvertent operation of the release devices.	
(8)	Lighters shall contain not more than 10 g of liquefied petroleum gas. Lighter refills shall contain not more than 65 g of liquefied petroleum gas.	
(9)	The lighters and lighter refills shall be packed in strong outer packagings conforming to 6.1.4 consisting of natural wood boxes (4C1, 4C2), plywood boxes (4D) or reconstituted wood boxes (4F**)** with a maximum gross mass of 75 kg, or fibreboard boxes (4G) with a maximum gross mass of 40 kg. The packagings shall be tested and approved in accordance with Chapter 6.1 for packing group II. Nevertheless, if these packagings have a maximum gross mass of not more than 2 kg, compliance with the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.5 to 4.1.1.7.	

P206	PACKING INSTRUCTION	P206
This packing instruction applies to UN No. 3150 devices, small, hydrocarbon gas powered or hydrocarbon gas refills for small devices		
(1)	The special packing provisions of **4.1.6** when applicable shall be met.	
(2)	The articles shall comply with the provisions of the country in which they were filled.	
(3)	The devices and refills shall be packed in outer packagings conforming to 6.1.4 tested and approved in accordance with Chapter 6.1 for packing group II.	

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 vessel made from tubing and having welded heads.
Primary containment of the fuel within this vessel shall consist of a welded aluminium bladder having a maximum internal volume of 46 litres.
The outer vessel shall have a minimum design gauge pressure of 1 275 kPa and a minimum burst gauge pressure of 2 755 kPa.
Each vessel shall be leak checked during manufacture and before dispatch 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 unit and package is 42 litres;

(2) Aluminium pressure vessel.
Primary containment of the fuel within this vessel shall consist of a welded vapour tight fuel compartment with an elastomeric bladder having a maximum internal volume of 46 litres.
The pressure vessel shall have a minimum design gauge pressure of 2 860 kPa and a minimum burst gauge pressure of 5 170 kPa.
Each vessel shall be leak-checked during manufacture and before dispatch 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 unit and package is 42 litres.

P302	PACKING INSTRUCTION	P302

This instruction applies to UN No. 3269.

The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met:

Combination packagings which meet the packing group II or III performance level according to the criteria for Class 3, applied to the base material.
The base material and the activator (organic peroxide) shall be each separately packed in inner packagings.
The components may be placed in the same outer packaging provided they will not interact dangerously in the event of a leakage.
The activator shall have a maximum quantity of 125 ml per inner packaging if liquid, and 500 g per inner packaging if solid.

P400	PACKING INSTRUCTION	P400

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met (see also the Table in 4.1.4.4):

(1) Steel cylinders, tubes and pressure drums, which shall comply with the appropriate requirements in the Table of 4.1.4.4. Valves shall be protected with steel valve protection caps or collars or the cylinders, tubes or pressure drums shall be overpacked in strong wood, fibreboard or plastics boxes. Cylinders, tubes and pressure drums shall be secured to prevent movement in the box and shall be packaged and carried so that the pressure relief devices remain in the vapour space during normal conditions of handling and carriage;

(2) Boxes (4A, 4B, 4C1, 4C2, 4D, 4F or 4G), drums (1A2, 1B2, 1N2, 1D or 1G) or jerricans (3A2 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 threaded closures with gaskets. 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 (1A2, 1B2 or 1N2), jerricans (3A2 or 3B2) or boxes (4A or 4B) with a maximum net mass of 150 kg each with hermetically sealed inner metal cans not more than 4 litre capacity each, with threaded closures fitted with gaskets. 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.

P401	PACKING INSTRUCTION	P401

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met (see also the Table in 4.1.4.4):

(1) Steel cylinders, tubes and pressure drums, which shall comply with the appropriate requirements in the Table of 4.1.4.4. Valves shall be protected with steel valve protection caps or collars or the cylinders, tubes or pressure drums shall be overpacked in strong wood, fibreboard or plastics boxes. Cylinders, tubes and pressure drums shall be secured to prevent movement in the box and shall be packaged and carried so that the pressure relief devices remain in the vapour space during normal conditions of handling and carriage;

	Inner packaging	**Outer packaging**
(2) Combination packagings with inner packagings of glass metal or plastics which have threaded closures surrounded in inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents.	1 *l*	30 kg maximum net mass

P402	PACKING INSTRUCTION	P402

The following packagings are authorized, provided that the general provisions of **4.1.1** and **4.1.3** are met (see also the Table in 4.1.4.4):

(1) Steel cylinders, tubes and pressure drums, which shall comply with the appropriate requirements in the Table of 4.1.4.4. Valves shall be protected with steel valve protection caps or collars or the cylinders, tubes or pressure drums shall be overpacked in strong wood, fibreboard or plastics boxes. Cylinders, tubes and pressure drums shall be secured to prevent movement in the box and shall be packaged and carried so that the pressure relief devices remain in the vapour space during normal conditions of handling and carriage;

	Maximum net mass	
	Inner packaging	**Outer packaging**
(2) Combination packagings with inner packagings of glass, metal or plastics which have threaded closures surrounded in inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents.	10 kg (glass) 15 kg (metal or plastics)	125 kg 125 kg

(3) Steel drums (1A1) with a maximum capacity of 250 litres.

(4) Composite packagings consisting of a plastics receptacle with outer steel drum or aluminium (6HA1 or 6HB1) with a maximum capacity of 250 litres.

Special packing provision specific to RID and ADR

RR4 For UN No. 3130, the openings of receptacles shall be tightly closed by means of two devices in series, one of which shall be screwed or secured in an equivalent manner.

P403	PACKING INSTRUCTION	P403
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 2 kg Plastics 15 kg Metal 20 kg Inner packagings shall have threaded closures	**Drums** steel (1A2) aluminium (1B2) metal, other than steel or aluminium (1N2) plastics (1H2) plywood (1D) fibre (1G) **Boxes** steel (4A) aluminium (4B) natural wood (4C1) natural wood with sift proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) expanded plastics (4H1) solid plastics (4H2) **Jerricans** steel (3A2) aluminium (3B2) plastics (3H2)	 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 250 kg 250 kg 250 kg 125 kg 125 kg 60 kg 250 kg 120 kg 120 kg 120 kg
Single packagings:		**Maximum net mass**
Drums steel(1A1, 1A2) aluminium (1B1, 1B2) metal other than steel or aluminium (1N1, 1N2) plastics (1H1, 1H2) **Jerricans** steel (3A1, 3A2) aluminium (3B1, 3B2) plastics (3H1, 3H2) **Composite packagings** plastics receptacle with outer steel or aluminium drums (6HA1 or 6HB1) plastics receptacle with outer fibre, plastics or plywood drums (6HG1, 6HH1 or 6HD1) plastics receptacle with outer steel or aluminium crate or box or with outer wooden, plywood, fibreboard or solid plastics boxes (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)		 250 kg 250 kg 250 kg 250 kg 120 kg 120 kg 120 kg 250 kg 75 kg 75 kg
Additional requirement: Packagings shall be hermetically sealed.		

P404	PACKING INSTRUCTION	P404

This instruction applies to pyrophoric solids: UN Nos.: 1383, 1854, 1855, 2005, 2008, 2441, 2545, 2546, 2846, 2881, 3052, 3200 and 3203.

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: (1A2, 1B2, 1N2, 1H2, 1D, 4A, 4B, 4C1, 4C2, 4D, 4F or 4H2)

Inner packagings: Metal packagings with a capacity of not more than 15kg each. Inner packagings shall be hermetically sealed and have threaded closures;

(2) Metal packagings: (1A1, 1A2, 1B1, 1N1, 1N2, 3A1, 3A2, 3B1 and 3B2)
Maximum gross mass: 150 kg;

(3) Composite packagings: Plastics receptacle with outer steel or aluminium drum (6HA1 or 6HB1)
Maximum gross mass: 150 kg.

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 UN No. 1381, phosphorus, wet:

(a) Combination packagings

Outer packagings: (4A, 4B, 4C1, 4C2, 4D or 4F)
Maximum net mass: 75 kg

Inner packagings:

(i) hermetically sealed metal cans, with a maximum net mass of 15kg; 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 UN No. 1381, 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 carried 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, 1H2 or 3H2)

inner packagings: water-resistant packagings;

(2) Plastics, plywood or fibreboard drums (1H2, 1D or 1G) or boxes (4A, 4B, 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 with outer steel or aluminium drums (6HA1 or 6HB1), plastics receptacle with outer fibre, plastics or plywood drums (6HG1, 6HH1 or 6HD1), plastics receptacle with outer steel or aluminium crate or box or with outer wooden, 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 overpressure or pressure build-up of more than 300 kPa (3 bar).

Special packing provisions:

PP24 UN Nos. 2852, 3364, 3365, 3366, 3367, 3368 and 3369 shall not be carried in quantities of more than 500 g per package.

PP25 For UN No. 1347, the quantity carried shall not exceed 15 kg per package.

PP26 For UN Nos. 1310, 1320, 1321, 1322, 1344, 1347, 1348, 1349, 1517, 2907, 3317 and 3344 packagings shall be lead free.

PP78 UN No. 3370 shall not be carried 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: Combination packagings comprising securely closed inner packagings to prevent accidental ignition under normal conditions of transport. The maximum net mass of the outer packagings shall not exceed 45 kg except for fibreboard boxes which shall not exceed 30 kg.		
Additional requirement: Matches shall be tightly packed.		
Special packing provision: **PP27** UN No. 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: Outer packagings with 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 during carriage. Packagings shall conform to the packing group II performance level; (2) For batteries: Batteries may be carried unpacked or in protective enclosures (e.g. in fully enclosed or wooden slatted crates). The terminals shall not support the weight of other batteries or materials packed with the batteries.		
Additional requirement: 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 plastics inner 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 Plastics[a] 30 kg Metal 40 kg Paper[a, b] 10 kg Fibre[a, b] 10 kg [a] *These packagings shall be sift-proof.* [b] *These inner packagings shall not be used when the substances being carried may become liquid during carriage.*	**Drums** steel (1A2) aluminium (1B2) metal other than steel or aluminium (1N2) plastics (1H2) plywood (1D) fibre (1G) [a] **Boxes** steel (4A) aluminium (4B) natural wood (4C1) natural wood with sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G)[a] expanded plastics (4H1) solid plastics (4H2) **Jerricans** steel (3A2) aluminium (3B2) plastics (3H2)	 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 60 kg 400 kg 120 kg 120 kg 120 kg	 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 400 kg 60 kg 400 kg 120 kg 120 kg 120 kg
Single packagings:			
Drums steel (1A1 or 1A2) aluminium (1B1 or 1B2) metal other than steel or aluminium (1N1 or 1N2) plastics (1H1 or 1H2) **Jerricans** steel (3A1 or 3A2) aluminium (3B1 or 3B2) plastics (3H1 or 3H2)		 400 kg 400 kg 400 kg 400 kg 120 kg 120 kg 120 kg	 400 kg 400 kg 400 kg 400 kg 120 kg 120 kg 120 kg

P410	PACKING INSTRUCTION (cont'd)	P410
Single packagings (cont'd):	**Packing group II**	**Packing group III**
Boxes		
steel (4A)[c]	400 kg	400 kg
aluminium (4B)[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 packagings		
plastics receptacle with outer steel, aluminium, plywood, fibre or plastics drum (6HA1, 6HB1, 6HG1, 6HD1, or 6HH1)	400 kg	400 kg
plastics receptacle with outer steel or aluminium crate or box, or outer wooden, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)	75 kg	75 kg
glass receptacle with outer steel, aluminium, plywood or fibre drum (6PA1, 6PB1, 6PD1 or 6PG1) or outer steel or aluminium crate or box or with outer wooden or fibreboard box or with outer wickerwork hamper (6PA2, 6PB2, 6PC, 6PD2, or 6PG2) or with outer solid or expanded plastics packaging (6PH1 or 6PH2)	75 kg	75 kg

[c] *These packagings shall not be used when the substances being carried may become liquid during carriage.*

[d] *These packagings shall only be used for packing group II substances when carried in a closed vehicle or container.*

Special packing provisions:

PP39 For UN No. 1378, for metal packagings a venting device is required.

PP40 For UN Nos. 1326, 1352, 1358, 1395, 1396, 1436, 1437, 1871, 2805 and 3182, packing group II, bags are not allowed.

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: (1) Fibreboard box with a maximum gross mass of 30 kg; (2) Other packagings, provided that explosion is not possible by reason of increased internal pressure. Maximum net mass shall not exceed 30 kg.		

P500	PACKING INSTRUCTION	P500
This instruction applies to UN No. 3356.		
The general provisions of **4.1.1** and **4.1.3** shall be met. Packagings shall conform to the packing group II performance level. The generator(s) shall be carried 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, 4C1, 4C2, 4D, 4H2) or drums (1A2, 1B2, 1N2, 1H2, 1D) or jerricans (3A2, 3B2, 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) aluminium (1B1) metal other than steel or aluminium (1N1) plastics (1H1)	250 *l*
Jerricans steel (3A1) aluminium (3B1) plastics (3H1)	60 *l*
Composite packagings	
plastics receptacle with outer steel or aluminium drum (6HA1, 6HB1)	250 *l*
plastics receptacle with outer fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)	250 *l*
plastics receptacle with outer steel or aluminium crate or box or plastics receptacle with outer wooden, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)	60 *l*
glass receptacle with outer steel, aluminium, fibre, plywood, solid plastics or expanded plastics drum (6PA1, 6PB1, 6PG1, 6PD1, 6PH1 or 6PH2) or with outer steel or aluminium crate or box or with outer wooden or fibreboard box or with outer wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2)	60 *l*

Additional requirements:

1. Packagings shall have a maximum filling degree of 90%.

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* Metal 5 *l* Plastics 5 *l*	**Drums** steel (1A2) aluminium (1B2) metal other than steel or aluminium (1N2) plastics (1H2) plywood (1D) fibre (1G)	 125 kg 125 kg 125 kg 125 kg 125 kg 125 kg
	Boxes steel (4A) aluminium (4B) natural wood (4C1) natural wood with sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) expanded plastics (4H1) solid plastics (4H2)	 125 kg 125 kg 125 kg 125 kg 125 kg 125 kg 125 kg 60 kg 125 kg
Single packagings:		**Maximum capacity**
Drums steel (1A1) aluminium (1B1) plastics (1H1)		250 *l*
Jerricans steel (3A1) aluminium (3B1) plastics (3H1)		60 *l*
Composite packagings		
plastics receptacle with outer steel or aluminium drum (6HA1, 6HB1)		250 *l*
plastics receptacle with outer fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)		250 *l*
plastics receptacle with outer steel or aluminium crate or box or plastics receptacle with outer wooden, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)		60 *l*
glass receptacle with outer steel, aluminium, fibre, plywood, solid plastics or expanded plastics drum (6PA1, 6PB1, 6PG1, 6PD1, 6PH1 or 6PH2) or with outer steel or aluminium crate or box or with outer wooden or fibreboard box or with outer wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2)		60 *l*
Special packing provision:		
PP28 For UN No. 1873, only glass inner packagings and glass inner receptacles are authorized respectively for combination packagings and composite packagings.		

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. Metal 5 kg Plastics 5 kg	**Drums** steel (1A2) aluminium (1B2) metal other than steel or aluminium (1N2) plastics (1H2) plywood (1D) fibre (1G) **Boxes** steel (4A) aluminium (4B) natural wood (4C1) natural wood with sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) fibreboard (4G) expanded plastics (4H1) solid plastics (4H2)	 125kg 125kg 125kg 125kg 125kg 125kg 125 kg 125 kg 125 kg 125 kg 125 kg 125 kg 40 kg 60 kg 125 kg
Single packagings:		
Metal drums (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2) with a maximum net mass of 250 kg. Fibreboard (1G) or plywood drums (1D) fitted with inner liners with a maximum net mass of 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)	Glass receptacles with a maximum capacity of 5 litres in 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 outer packagings	75 kg
(2)	Plastics receptacles with a maximum capacity of 30 litres in 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 outer packagings	75 kg
(3)	Metal receptacles with a maximum capacity of 40 litres in 1G, 4F or 4G outer packagings	125 kg
(4)	Metal receptacles with a maximum capacity of 40 litres in 1A2, 1B2, 1N2, 1H2, 1D, 4A, 4B, 4C1, 4C2, 4D, 4H2 outer packagings	225 kg
Single packagings:		**Maximum capacity**
Drums		
steel, non-removable head (1A1)		250 *l*
steel, removable head (1A2)		250 *l*
aluminium, non-removable head (1B1)		250 *l*
aluminium, removable head (1B2)		250 *l*
metal other than steel or aluminium, non-removable head (1N1)		250 *l*
metal other than steel or aluminium, removable head (1N2)		250 *l*
plastics, non-removable head (1H1)		250 *l*
plastics, removable head (3H2)		250 *l*
Jerricans		
steel, non-removable head (3A1)		60 *l*
steel, removable head (3A2)		60 *l*
aluminium, non-removable head (3B1)		60 *l*
aluminium, removable head (3B2)		60 *l*
plastics, non-removable head (3H1)		60 *l*
plastics, removable head (3H2)		60 *l*
Composite packagings:		
plastics receptacle with outer steel or aluminium drum (6HA1, 6HB1)		250 *l*
plastics receptacle with outer fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)		120 *l*
plastics receptacle with outer steel or aluminium crate or box or plastics receptacle with outer wooden, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)		60 *l*
glass receptacle with outer steel, aluminium, fibre, plywood, solid plastics or expanded plastics drum (6PA1, 6PB1, 6PG1, 6PD1, 6PH1 or 6PH2) or with outer steel or aluminium crate or box or with outer wooden fibreboard box or with outer wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2)		60 *l*
Special packing provisions:		
PP10 For UN No. 2014 PG II and UN No. 2984 PG III, the packaging shall be vented.		
PP29 For UN No. 2014, maximum degree of filling shall be 90%.		

P520	PACKING INSTRUCTION	P520

This instruction applies to organic peroxides of Class 5.2 and self-reactive substances of Class 4.1

The packagings listed below are authorized provided the general provisions of **4.1.1** and **4.1.3** and special provisions of **4.1.7.1** 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 4.1.7.1.3, 2.2.41.4 and 2.2.52.4. 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, 4C1, 4C2, 4D, 4F, 4G, 4H1 and 4H2), drums (1A2, 1B2, 1G, 1H2 and 1D), jerricans (3A2, 3B2 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	200 [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 / 100 kg for boxes.*

[c] *Viscous substances 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 maximum contents 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 risk label 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 Nos. 3221, 3222, 3223, 3224, 3231, 3232, 3233 and 3234, a smaller packaging than that allowed by packing methods OP5 or OP6 respectively shall be used (see 4.1.6 and 2.2.41.4).

PP22 UN No. 3241, 2-Bromo-2-nitropropane-1, 3-diol, shall be packed in accordance with packing method OP6.

P600	PACKING INSTRUCTION	P600

This instruction applies to UN Nos. 1700, 2016 and 2017.

The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met:

Outer packagings (1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 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 carriage.

Maximum net mass: 75 kg

P601	PACKING INSTRUCTION	P601

The following packagings are authorized provided the general provisions of **4.1.1** and **4.1.3** are met and the packagings are hermetically sealed:

(1) Combination packagings consisting of glass inner packagings not exceeding 1 litre in capacity packed with absorbent material sufficient to absorb the entire contents and inert cushioning material placed in metal receptacles which are individually packed in 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings with a maximum gross mass of 15 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 carriage;

(2) Combination packagings consisting of metal inner packagings or additionally, for UN No. 1744 only, in 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 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 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 carriage;

(3) Combination packagings:

Outer packagings: Plastic or steel drums, removable head (1A2 or 1H2) tested in accordance with the test requirements in 6.1.5 as combination packagings as assembled for carriage;

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 0.3 MPa (gauge pressure);

(b) The design and production leakproofness tests shall be conducted at a test pressure of 30 kPa;

(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

P601	PACKING INSTRUCTION *(cont'd)*	P601

(3) *Combination packagings: (cont'd)*

(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 carriage; 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;

(g) The complete packaging shall be visually inspected to the satisfaction of the competent authority at least every 3 years;

(h) The outer and inner packaging shall bear in clearly legible and durable characters:

(i) the date (month, year) of the initial test and the latest periodic test and inspection;

(ii) The stamp of the expert who carried out the test and inspection;

(4) Cylinders, tubes and pressure drums, which shall comply with the appropriate requirements of the Table of 4.1.4.4.

Special packing provision specific to RID and ADR:

RR3 Only receptacles which satisfy one of the special requirements (PR) listed in 4.1.4.4 shall be used.

P602	PACKING INSTRUCTION	P602

The following packagings are authorised provided the general provisions of **4.1.1** and **4.1.3** are met and the packagings are hermetically sealed:

(1) Combination packagings consisting of glass inner packagings packed with absorbent material sufficient to absorb the entire contents and inert cushioning material placed in metal receptacles which are individually packed in 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings with a maximum gross mass of 50 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 carriage. Inner packagings shall not exceed 1 litre in capacity;

(2) Combination packagings consisting of metal inner packagings individually packed with absorbent material sufficient to absorb the entire contents and inert cushioning material in 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 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 carriage. Inner packagings shall not exceed 5 litres in capacity;

(3) Drums and composite packagings (1A1, 1B1, 1N1, 1H1 or 6HA1), subject to the following conditions:

(a) The hydraulic pressure test shall be conducted at a pressure of at least 0.3 MPa (gauge pressure);

(b) The design and production leakproofness tests shall be conducted at a test pressure of 30 kPa; 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 carriage; and
(ii) provided with a cap seal;

(4) Cylinders, tubes and pressure drums with a minimum test pressure of 1MPa (10 bar) (gauge pressure) conforming to the provisions of packing instruction P200. No cylinder, tube or pressure drum may be equipped with any pressure relief device. Cylinders, tubes and pressure drums shall have their valves protected.

P620	PACKING INSTRUCTION	P620

This instruction applies to UN Nos. 2814 and 2900.

The following packagings are authorized provided 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 individually wrapped so as to prevent contact between them;

(b) An outer packaging of adequate strength for its capacity, mass and intended use. The smallest external dimension shall be at least 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) Lyophilized substances:

Primary receptacles shall be flame-sealed glass ampoules or rubber-stoppered glass vials fitted with metal seals;

(b) Liquid or solid substances:

(i) 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 reinforced with adhesive tape;

(ii) 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 6.3.1.1. 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;

(iii) 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 in accordance with the requirements of P200. The primary receptacle and the secondary packaging shall maintain their integrity at the temperature of the liquid nitrogen.

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 and temperatures in the range -40 °C to +55 °C.

P621	PACKING INSTRUCTION	P621
This instruction applies to UN No. 3291.		
The following packagings are authorized provided the general provisions of **4.1.1** and **4.1.3** and the special provisions of **4.1.8** are met: (1) Rigid, leakproof packagings meeting the requirements of Chapter 6.1 for solids, at the packing group II performance level, provided there is sufficient absorbent material to absorb the entire amount of liquid present and the packaging is capable of retaining liquids; (2) For packages containing larger quantities of liquid, rigid packagings meeting the requirements of Chapter 6.1 at 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.		

P650	PACKING INSTRUCTION	P650

This packing instruction applies to UN No. 3373.

General provisions

Diagnostic specimens shall be packed in good quality packagings, which shall be strong enough to withstand the shocks and loadings normally encountered during carriage, including trans-shipment between transport units and between 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 so as to prevent any loss of contents when prepared for carriage which might be caused under normal conditions of carriage, by vibration, or by changes in temperature, humidity or pressure.

Primary receptacles shall be packed in secondary packagings in such a way that, under normal conditions of carriage, 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 substantially impair the protective properties of the cushioning material or of the outer packaging.

For carriage each package shall be clearly and durably marked with the words "DIAGNOSTIC SPECIMENS". Packages containing substances carried in refrigerated liquid nitrogen shall, in addition, bear a label conforming to model No. 2.2.

The completed package shall be capable of successfully passing the drop test in 6.3.2.5 as specified in 6.3.2.3 and 6.3.2.4 except that the height of the drop shall not be less than 1.2 m.

If any substances have leaked and been spilled in a vehicle or container, it may not be reused until after it has been thoroughly cleaned and, if necessary, disinfected or decontaminated. Any other goods and articles carried in the same vehicle or container shall be examined for possible contamination.

For liquids

The primary receptacle(s) shall be leakproof and shall not contain more than 500 ml.

There shall be absorbent material placed between the primary receptacle and the secondary packaging; if several fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them. The absorbent material, such as cotton wool, shall be in sufficient quantity to absorb the entire contents of the primary receptacles and there shall be a secondary packaging which shall be leakproof.

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 (0.95 bar).

The outer packaging shall not contain more than 4 litres.

For solids

The primary receptacle(s) shall be siftproof and shall not contain more than 500 g.

If several fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them and there shall be a secondary packaging which shall be leakproof.

The outer packaging shall not contain more than 4 kg.

Provided that diagnostic specimens are packed in accordance with this packing instruction, no other requirements of ADR shall apply.

P800	PACKING INSTRUCTION	P800

This instruction applies to UN Nos. 2809 and 2803.

The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met:

(1) Cylinders in accordance with P200; or

(2) Steel flasks or bottles with threaded closures with a capacity not exceeding 2.5 *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 (1A2)	400 kg
metal other than steel or aluminium (1N2)	400 kg
plastics (1H2)	400 kg
plywood (1D)	400 kg
fibre (1G)	400 kg
Boxes	
steel (4A)	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 No. 2803, when it is necessary to carry gallium at low temperatures in order to maintain it in a completely solid state, the above packagings may be overpack ed 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 new and used batteries assigned to UN Nos. 2794, 2795 or 3028.		
The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met: (1) Rigid outer packagings; (2) Wooden slatted crates; (3) Pallets.		
Additional requirements: 1. Batteries shall be protected against short circuits. 2. Batteries stacked shall be adequately secured in tiers separated by a layer of non conductive material. 3. Battery terminals shall not support the weight of other superimposed elements. 4. Batteries shall be packaged or secured to prevent inadvertent movement. Any cushioning material used shall be inert.		

P801a	PACKING INSTRUCTION	P801a
This instruction applies to used batteries of UN Nos. 2794, 2795, 2800 and 3028.		
Stainless steel or solid plastics battery boxes of a capacity of up to 1 m^3 are authorized provided the following provisions are met: (a) The battery boxes shall be resistant to the corrosive substances contained in the storage batteries; (b) Under normal conditions of carriage, no corrosive substance shall leak from the battery boxes and no other substance (e.g. water) shall enter the battery boxes. No dangerous residues of corrosive substances contained in the storage batteries shall adhere to the outside of the battery boxes; (c) The battery boxes shall not be loaded with storage batteries to a height greater than the height of their sides; (d) No storage battery containing substances or other dangerous goods which may react dangerously with one another shall be placed in a battery box; (e) The battery boxes shall be either: (i) covered; or (ii) carried in closed or sheeted vehicles or containers.		

P802	PACKING INSTRUCTION	P802

The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met:

(1) Combination packagings:
Outer packagings: 1A2, 1B2, 1N2, 1H2, 1D, 4A, 4B, 4C1, 4C2, 4D, 4F, or 4H2;
maximum net mass: 75 kg.
Inner packagings: glass or plastics; maximum capacity: 10 litres;

(2) Combination packagings:
Outer packagings: 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2;
maximum net mass: 125 kg.
Inner packagings: metal; maximum capacity: 40 litres;

(3) Composite packagings: Glass receptacle with outer steel, aluminium, plywood or solid plastics drum (6PA1, 6PB1, 6PD1, or 6PH2) or with outer steel or aluminium crate or box or with outer wooden box or with outer wickerwork hamper (6PA2, 6PB2, 6PC or 6PD2); maximum capacity: 60 litres;

(4) Austenitic steel drums (1A1) with a maximum capacity of 250 litres;

(5) Cylinders and pressure drums conforming to the provisions of packing instruction P200.

P803	PACKING INSTRUCTION	P803

This instruction applies to UN No. 2028.

The following packagings are authorized, provided 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, 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 carriage.

P900	PACKING INSTRUCTION	P900

(RESERVED)

P901	PACKING INSTRUCTION	P901

This instruction applies to UN No. 3316.

The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met:

Packagings conforming to the performance level consistent with the packing group assigned to the kit as a whole (see 3.3.1, special provision 251).
Maximum quantity of dangerous goods per outer packaging: 10 kg.

Additional requirement:

Dangerous goods in kits shall be packed in inner packagings which shall not exceed either 250 ml or 250 g and shall be protected from other materials in the kit.

P902	PACKING INSTRUCTION	P902
This instruction applies to UN No. 3268.		
The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met: Packagings conforming to the packing group III performance level. The packagings shall be designed and constructed to prevent movement of the articles and inadvertent operation during normal conditions of carriage. The articles may also be carried unpackaged in dedicated handling devices, vehicles or containers when moved from where they are manufactured to an assembly plant.		
Additional requirement: Any pressure vessel shall be in accordance with the requirements of the competent authority for the substance(s) contained in the pressure vessel(s).		

P903	PACKING INSTRUCTION	P903
This instruction applies to UN Nos. 3090 and 3091.		
The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met: Packagings conforming to the packing group II performance level. When lithium cells and batteries are packed with equipment, they shall be packed in inner fibreboard packagings that meet the requirements for packing group II. When lithium cells and batteries included in Class 9 are contained in equipment, the equipment shall be packed in strong outer packagings in such a manner as to prevent accidental operation during carriage.		
Additional requirement: Batteries shall be protected against short circuit.		

P903a	PACKING INSTRUCTION	P903a
This instruction applies to used cells and batteries of UN Nos. 3090 and 3091.		
The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met: Packagings conforming to the packing group II performance level. Non-approved packagings shall, however, be permitted provided that: - they meet the general provisions of 4.1.1 and 4.1.3; - the cells and batteries are packed and stowed so as to prevent any risk of short circuits; - the packages weigh not more than 30 kg.		
Additional requirement: Batteries shall be protected against short circuit.		

P904	PACKING INSTRUCTION	P904

This instruction applies to UN No. 3245.

The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met:

(1) Packagings according to packing instruction P001 or P002 conforming to the packing group III performance level;

(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) a watertight primary receptacle(s);

(ii) a watertight secondary packaging which is leakproof;

(iii) absorbent material in sufficient quantity to absorb the entire contents placed between the primary receptacle(s) and the secondary packaging; if several primary receptacles are placed in a single secondary packaging, they shall be individually wrapped so as to prevent contact between them;

(b) An outer packaging of adequate strength for its capacity, mass and intended use, and with a minimum external dimension of 100 mm;

(3) For substances consigned in liquid nitrogen: Plastics primary receptacles capable of withstanding very low temperatures 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 in accordance with the requirements of P200. The primary receptacle and the secondary packaging shall maintain their integrity at the temperature of the liquid nitrogen.

P905	PACKING INSTRUCTION	P905

This instruction applies to UN Nos. 2990 and 3072.

Any suitable packaging is authorized, provided 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.

When the life saving appliances are constructed to incorporate or are contained in rigid outer weatherproof casings (such as for lifeboats), they may be carried 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) Non-flammable, non-toxic gases 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 Classes 3, 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 and 3152.

The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met:

(1) For liquids and solids containing or contaminated with PCBs or polyhalogenated biphenyls or terphenyls: Packagings in accordance with P001 or P002, as appropriate;

(2) For transformers and condensers and other devices: Leakproof packagings which are capable of containing, in addition to the devices, at least 1.25 times the volume of the liquid PCBs or polyhalogenated biphenyls or terphenyls 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 devices. 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.

Notwithstanding the above, liquids and solids not packaged in accordance with P001 and P002 and unpackaged transformers and condensers may be carried 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.

Additional requirement:

Adequate provisions shall be taken to seal the transformers and condensers to prevent leakage during normal conditions of carriage.

R001	PACKING INSTRUCTION		R001
The following packagings are authorized provided the general provisions of **4.1.1** and **4.1.3** are met:			
Light gauge metal packagings	**Maximum capacity/maximum net mass**		
	Packing group I	**Packing group II**	**Packing group III**
steel, non-removable head (0A1)	Not allowed	40 *l* / 50 kg	40 *l* / 50 kg
steel, removable head (0A2) [a]	Not allowed	40 *l* / 50 kg	40 *l* / 50 kg
[a] *Not allowed for UN No. 1261 NITROMETHANE.*			
***NOTE 1**: This instruction applies to solids and liquids (provided the design type is tested and marked appropriately).* ***NOTE 2**: For Class 3, packing group II, these packagings may be used only for substances with no subsidiary risk and a vapour pressure of not more than 110 kPa at 50 °C and for slightly toxic pesticides.*			

4.1.4.2 Packing instructions concerning the use of IBCs

IBC01	PACKING INSTRUCTION	IBC01
The following IBCs are authorized, provided the general provisions of **4.1.1**, **4.1.2** and **4.1.3** are met: Metal (31A, 31B and 31N).		
Additional requirement: Only liquids with a vapour pressure less than or equal to 110 kPa at 50 °C, or 130 kPa at 55 °C, are authorized.		
Special packing provision specific to RID and ADR: **BB1** For UN No. 3130, the openings of receptacles for this substance shall be tightly closed by means of two devices in series, one of which shall be screwed or secured in an equivalent manner.		

BC02	PACKING INSTRUCTION	IBC02
The following IBCs are authorized, provided 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).		
Additional requirement: Only liquids with a vapour pressure less than or equal to 110 kPa at 50 °C, or 130 kPa at 55 °C, are authorized.		
Special packing provisions: **B5** For UN Nos. 1791, 2014, 2984 and 3149, IBCs shall be provided with a device to allow venting during carriage. The inlet to the venting device shall be sited in the vapour space of the IBC under maximum filling conditions during carriage. **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 carried 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.		

IBC03	PACKING INSTRUCTION	IBC03

The following IBCs are authorized, provided 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, 31HA2, 31HB2, 31HN2, 31HD2 and 31HH2).

Additional requirement:

Only liquids with a vapour pressure less than or equal to 110 kPa at 50 °C, or 130 kPa at 55 °C, are authorized.

Special packing provision:

B8 The pure form of this substance shall not be carried 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.

IBC04	PACKING INSTRUCTION	IBC04

The following IBCs are authorized, provided 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).

IBC05	PACKING INSTRUCTION	IBC05

The following IBCs are authorized, provided 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).

IBC06	PACKING INSTRUCTION	IBC06

The following IBCs are authorized, provided 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, 31HZ1 and 31HZ2).

Additional requirement:

Composite IBCs 11HZ2 and 21HZ2 shall not be used when the substances being carried may become liquid during carriage.

Special packing provisions:

B12 For UN No. 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 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, 31HZ1 and 31HZ2);

(4) Wooden (11C, 11D and 11F).

Additional requirement:

Liners of wooden IBCs shall be sift-proof.

IBC08	PACKING INSTRUCTION	IBC08

The following IBCs are authorized, provided 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, 31HZ1 and 31HZ2);

(4) Fibreboard (11G);

(5) Wooden (11C, 11D and 11F);

(6) Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 and 13M2).

Special packing provisions:

B3 Flexible IBCs shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-restistant 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. 1363, 1364, 1365, 1386, 1841, 2211, 2217, 2793 and 3314, IBCs are not required to meet the IBC testing requirements of Chapter 6.5.

IBC99	PACKING INSTRUCTION	IBC99

Only IBCs which are approved by the competent authority may be used.

IBC100	PACKING INSTRUCTION	IBC100

This instruction applies to UN Nos. 0082, 0241, 0331 and 0332.

The following IBCs are authorized, provided 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:

B9 For UN No. 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 No. 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.

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 the general provisions of **4.1.1**, **4.1.2** and **4.1.3** and special provisions of **4.1.7.2** are met. 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 temper-ature**	**Emer-gency temper-ature**
3109	**ORGANIC PEROXIDE, TYPE F, LIQUID** tert-Butyl hydroperoxide, not more than 72% with water	31A	1 250		
	tert-Butyl peroxyacetate, not more than 32% in diluent type A	31A 31HA1	1 250 1 000		
	tert-Butyl peroxy-3,5,5-trimethylhexanoate, not more than 32% 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 in water	31H1	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 42% in diluent type A	31H1	1 000		
	Dilauroyl peroxide, not more than 42%, stable dispersion, in water	31HA1	1 000		
	Isopropyl cumyl 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 31HA1 31A	1 500 1 500 1 500		
3119	**ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED**				
	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 peroxypivalate, not more than 27% in diluent type B	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
	Di-(2-ethylhexyl) peroxydicarbonate, not more than 52%, stable dispersion, in water	31A	1 250	-20 °C	-10 °C
	Dimyristyl peroxydicarbonate, not more than 42%, stable dispersion, in water	31HA1	1 000	+15 °C	+20 °C

IBC520	PACKING INSTRUCTION (cont'd)				IBC520
3119 *(cont'd)*	Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 38% 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
	1,1,3,3-Tetramethylbutyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1 250	- 5 °C	+ 5 °C

Additional requirements:

1. IBCs shall be provided with a device to allow venting during carriage. The inlet to the pressure-relief device shall be sited in the vapour space of the IBC under maximum filling conditions during carriage.

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 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 the general provisions of **4.1.1**, **4.1.2** and **4.1.3** and the special provisions of **4.1.8** 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 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) Fibreboard (50G)	Not allowed	Not allowed	Maximum capacity: 3 m^3

LP02	**PACKING INSTRUCTION (SOLIDS)**			**LP02**
The following large packagings are authorized provided the general provisions 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 10kg Plastics[b] 50kg Metal 50 kg Paper[a, b] 50 kg Fibre[a, b] 50 kg	Steel (50A) Aluminium (50B) Metal other than steel or aluminium (50N) Rigid plastics (50H) Natural wood (50C) Plywood (50D) Reconstituted wood (50F) Fibreboard (50G)	Not allowed	Not allowed	Maximum capacity: 3 m^3
[a] *These inner packagings shall not be used when the substances being carried may become liquid during carriage.*				
[b] *These inner packagings shall be sift-proof.*				

LP99	**PACKING INSTRUCTION**	**LP99**
Only large packagings which are approved by the competent authority may be used (see 4.1.3.7).		

LP101	PACKING INSTRUCTION	LP101
The following packagings are authorized, provided 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) 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 and 0502: 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 carriage. A negative result in Test Series 4 on an unpackaged article indicates that the article can be considered for carriage unpackaged. Such unpackaged articles may be fixed to cradles or contained in crates or other suitable handling devices.		

LP102	PACKING INSTRUCTION	LP102
The following packagings are authorized, provided 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) Fibreboard (50G)

LP621	PACKING INSTRUCTION	LP621
This instruction applies to UN No. 3291.		
The following large packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** and the special provisions of **4.1.8** 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 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.		

LP902	PACKING INSTRUCTION	LP902
This instruction applies to UN No. 3268.		
The following packagings are authorized, provided the general provisions of **4.1.1** and **4.1.3** are met: Packagings conforming to the packing group III performance level. The packagings shall be designed and constructed to prevent movement of the articles and inadvertent operation during normal conditions of carriage. The articles may also be carried unpackaged in dedicated handling devices, vehicles, or containers when moved from where they are manufactured to an assembly plant.		
Additional requirement: Any pressure vessel shall be in accordance with the requirements of the competent authority for the substance(s) contained in the pressure vessel(s).		

4.1.4.4 ***Particular requirements applicable to the use of pressure receptacles for substances other than those of Class 2***

When cylinders, tubes or pressure drums are used as packaging for substances assigned to packing instructions P400, P401, P402 or P601, they shall be constructed, tested, filled and marked according to the corresponding requirements (PR1 to PR7) as mentioned in the table below for each UN number.

TABLE

LIST OF PARTICULAR REQUIREMENTS (PR)
FOR GAS CYLINDERS AND RECEPTACLES

Requirement code	UN Nos.	Applicable construction, testing, filling and marking requirements
PR1	1366 1370 1380 1389 1391 1411 1421 1928 2003 2445 2845 2870 3049 3050 3051 3052 3053 3076 3129 3130 3148 3194 3203 3207 3254	The substances classified under these UN numbers shall be packed in hermetically closing metal receptacles which are not affected by the contents and have a capacity of not more than 450 litres. The receptacles shall be subjected to the initial test and periodic tests every five years at a pressure of not less than 1MPa (10 bar) (gauge pressure). The receptacles shall not be filled to more than 90% of their capacity; however, a space of at least 5% shall remain empty for safety when the liquid is at an average temperature of 50 °C. During carriage, the liquid shall be under a layer of inert gas the gauge pressure of which shall be not less than 50 kPa (0.5 bar). The receptacles shall carry a data plate with the following particulars entered in a durable form: - substance or substances [a] accepted for carriage; - tare [b] of the receptacle, including accessories; - test pressure [b] (gauge pressure); - date (month, year) of the last test undergone; - stamp of the expert who carried out the test; - capacity [b] of the receptacle; - maximum mass of filling allowed [b]

[a] *The name may be replaced by a generic description covering substances of a similar nature and also compatible with the characteristics of the receptacle.*

[b] *The units of measurement to be added each time after the numerical values*.

Requirement code	UN Nos.	Applicable construction, testing, filling and marking requirements
PR2	1183 1242 1295 2988	The substances classified under these UN number shall be packed in corrosion-resistant steel receptacles with a maximum capacity of 450 litres. The closing device of the receptacle shall be protected by a cap. The receptacles shall be subjected to the initial test and periodic tests every five years at a pressure of not less than 0.4 MPa (4 bar) (gauge pressure). The maximum permissible mass of filling per litre of capacity for trichlorosilane, ethyldichlorosilane and methyldichlorosilane shall not exceed 1.14 kg, 0.93 kg or 0.95 kg respectively, if the filling is carried out by mass; if the filling is by volume, the degree of filling shall not exceed 85%. The receptacles shall also carry a plate showing the following particulars in a durable form: - description of the substance(s) accepted for carriage, or for chlorosilanes : "chlorosilanes, Class 4.3"; - tare[b] of the receptacle, including accessories; - test pressure[b] (gauge pressure); - date (month, year) of the last test undergone; - stamp of the expert who carried out the test; - capacity[b] of the receptacle; - maximum degree of filling allowed by mass[b] for each substance accepted for carriage.

[b] *The units of measurement to be added each time after the numerical values*.

Requirement code	UN Nos.	Applicable construction, testing, filling and marking requirements
PR3	1092 1251 1259 1605 1613 1994 3294	The substances classified under these UN numbers shall be packed in metal receptacles fitted with completely leakproof closing devices which shall, if necessary, be secured against mechanical damage by protective caps. Steel receptacles of a capacity not exceeding 150 litres shall have a minimum wall thickness of 3 mm, and larger steel receptacles and receptacles made of other materials shall have walls at least thick enough to guarantee equivalent mechanical strength. The maximum capacity of receptacles permitted shall be 250 litres. The mass of the contents shall be not more than 1 kg of liquid per litre of capacity. Before being used for the first time, the receptacles shall undergo a hydraulic pressure test at a pressure of not less than 1 MPa (10 bar) (gauge pressure). The pressure test shall be repeated every five years and shall include a meticulous inspection of the inside of the receptacle and a check of the tare. The receptacles shall bear the following particulars in clearly legible and durable characters: - substance or substances [a] accepted for carriage; - the name of the owner of the receptacle; - the tare [b] of the receptacle, including such fittings and accessories as valves, protective caps, etc; - the date (month, year) of the initial test and of the most recent test, and the stamp of the expert who carried out the test; - the maximum permissible mass of the contents of the receptacle in kg; - the internal pressure (test pressure) to be applied in the hydraulic pressure test.

[a] *The name may be replaced by a generic description covering substances of a similar nature and also compatible with the characteristics of the receptacle.*

[b] *The units of measurement to be added each time after the numerical values*.

Requirement code	UN Nos.	Applicable construction, testing, filling and marking requirements
PR4	1185	This substance shall be packed in steel receptacles of sufficient thickness, which shall be closed by a screw-threaded bung and a screw-threaded protective cap or equivalent device leakproof both to liquid and to vapour. The receptacles shall initially and periodically, at least every five years, be tested at a pressure of at least 1 MPa (10 bar) (gauge pressure) in accordance with 6.2.1.5 and 6.2.1.6. The mass of the contents shall not exceed 0.67 kg per litre of capacity. A package shall not weigh more than 75 kg. Receptacles shall bear, in clearly legible and durable characters: - the name or mark of the manufacturer and the number of the receptacle; - the word "ethyleneimine"; - the tare [b] of the receptacle and its maximum permitted mass[b] when filled; - the date (month and year) of the initial test and of the most recent test undergone; - the stamp of the expert who carried out the tests and examinations.

[b] *The units of measurement to be added each time after the numerical values*.

Requirement code	UN Nos.	Applicable construction, testing, filling and marking requirements
PR5	2480 2481	The substances classified under this UN number shall be packed in receptacles made of pure aluminium having a wall thickness of not less than 5 mm or in receptacles of stainless steel. The receptacles shall be fully welded. They shall initially and periodically, at least every five years, be tested at a pressure of at least 0.5 MPa (5 bar) (gauge pressure) in accordance with 6.2.1.5 and 6.2.1.6. They shall be so closed as to be leakproof by means of two closures one above the other, one of which shall be screw-threaded or secured in an equally effective manner. The degree of filling shall be not more than 90 %. Drums weighing more than 100 kg shall be fitted with rolling hoops or stiffening ribs. The receptacles shall bear, in clearly legible and durable characters: - the name or mark of the manufacturer and the number of the receptacle; - substance or substances [a] accepted for carriage; - the tare [b] of the receptacle and its maximum permitted mass when filled; - the date (month and year) of the initial test and of the most recent test undergone; - the stamp of the expert who carried out the tests and examinations.

[a] *The name may be replaced by a generic description covering substances of a similar nature and also compatible with the characteristics of the receptacle.*

[b] *The units of measurement to be added each time after the numerical values*.

Requirement code	UN Nos.	Applicable construction, testing, filling and marking requirements
PR6	1744	Bromine containing less than 0.005% water, or between 0.005% and 0.2% water, provided that in the latter case measures are taken to prevent corrosion of the lining of the receptacles, may be carried in receptacles satisfying the following conditions: (a) The receptacles shall be made of steel and be equipped with a leakproof lining made of lead or of some other material affording equivalent protection and with a hermetic closure; receptacles made of monel metal or nickel, or with a nickel lining, shall also be permitted; (b) The capacity of the receptacles shall not exceed 450 litres; (c) The receptacles shall not be filled to more than 92% of their capacity or more than 2.86 kg per litre of capacity; (d) The receptacles shall be welded and designed for a calculation pressure of not less than 2.1 MPa (21 bar) gauge pressure. The materials and workmanship shall in other respects meet the relevant requirements of Chapter 6.2. The initial test of unlined steel receptacles shall be subject to the requirements of 6.2.1.5; (e) The closures shall project as little as possible from the receptacle and be fitted with protective caps. The closures and caps shall be fitted with gaskets made of a material not capable of being attacked by bromine. The closures shall be in the upper part of the receptacles in such a manner that they can in no case be in permanent contact with the liquid phase; (f) The receptacles shall be provided with fittings enabling them to stand stably upright, and with lifting attachments (rings, flanges, etc.) at the top, which shall be tested at twice the working load. Before being put into service, the receptacles shall be subjected to a leakproofness test at a pressure of at least 200 kPa (2 bar) gauge pressure. The leakproofness test shall be repeated every two years and shall be accompanied by an internal inspection of the receptacle and a check of its tare. The test and the inspection shall be carried out under the supervision of an expert approved by the competent authority. The receptacles shall bear, in clearly legible and durable characters: - the name or the mark of the manufacturer and the number of the receptacle, - the word "Bromine", - tare [b] mass of the receptacle and the permissible maximum mass [b] of the filled receptacle, - date (month, year) of the initial test and of the latest periodical test, - stamp of the expert who carried out the tests and examinations.

[b] *The units of measurement to be added each time after the numerical values*.

Requirement code	UN No.	Applicable construction, testing, filling and marking requirements
PR7	1614	Liquid hydrogen cyanide, stabilized, when completely absorbed by an inert porous material, shall be packed in metal receptacles of a capacity of not more than 7.5 litres, placed in wooden cases in such a manner that they cannot come into contact with one another. Such combination packagings shall comply with the following conditions: (1) the receptacles shall be tested at a pressure of not less than 0.6 MPa (6 bar) (gauge pressure); (2) the receptacles shall be entirely filled with the porous material which shall not shake down or form dangerous spaces even after prolonged use or under impact, even at temperatures of up to 50 °C; (3) the date of filling shall be durably marked on the lid of each receptacle; (4) combination packagings shall be tested and approved, in accordance with 6.1.5.21 for packing group I; (5) a package shall not weigh more than 120 kg.

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 carriage including foreseeable changes in temperature, humidity and pressure;

(b) The complete package can be handled safely in normal conditions of carriage; and

(c) The packages will withstand any loading imposed on them by foreseeable stacking to which they will be subject during carriage 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 carriage, shall have been classified in accordance with the procedures detailed in 2.2.1.

4.1.5.4 Class 1 goods shall be packed in accordance with the appropriate packing instruction shown in Column (8) of Table A of Chapter 3.2, as detailed in 4.1.4.

4.1.5.5 Packagings, including IBCs and large packagings shall conform to the requirements of Chapter 6.1, 6.5 or 6.6, respectively, and shall meet the test requirements of 6.1.5, 6.5.4 or 6.6.5, respectively, for packing group II, subject to 4.1.1.13, 6.1.2.4 and 6.5.1.4.4. Packagings other than metal packagings meeting the test criteria of packing group I may be used. To avoid unnecessary confinement, metal packagings of packing group I shall not be used.

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 carriage.

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 carriage. 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 carriage, 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 carriage. A negative result in Test Series 4 on an unpackaged article indicates that the article can be considered for carriage 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 carriage.

Where such large explosive articles are as part of their operational safety and suitability tests subjected to test regimes that meet the intentions of ADR and such tests have been successfully undertaken, the competent authority may approve such articles to be carried in accordance with ADR.

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 (1A2, 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 packaging has been approved by a competent authority regardless of whether the packaging complies with the packing instruction assignment in Column (8) of Table A of Chapter 3.2.

4.1.6 Special packing provisions for goods of Class 2

4.1.6.1 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 "Materials of receptacles" and the requirements of the relevant packing instructions of 4.1.4.

4.1.6.2 A change of use of a refillable receptacle shall include emptying, purging and evacuation operations to the extent necessary for safe operation (see also table of standards at the end of this section).

***NOTE 1**: Refillable receptacles for the transport of gases of Class 2 shall be periodically inspected according to the periodicity set out in the relevant packing instructions (P200 or P203) and according to the provisions detailed in 6.2.1.6 "Periodic inspection".*

***NOTE 2**: Receptacles ready for shipment shall be marked and labelled according to the provisions set out in chapter 5.2.*

4.1.6.3 Receptacles except open cryogenic 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 receptacles shall be firmly secured therein. Unless otherwise specified in the relevant packing instructions, receptacles may be enclosed in outer packagings either singly or in groups.

4.1.6.4 Valves (cocks) shall be effectively protected from damage which could cause gas release if the receptacle falls, and during carriage and stacking. This requirement is deemed to be complied with if one or more of the following conditions are fulfilled (see also table of standards at the end of this section):

(a) Valves are placed inside the neck of the receptacle and protected by a screw-threaded plug;

(b) Valves are protected by caps. Caps shall possess vent-holes of sufficient cross-sectional area to evacuate gases if leakage occurs at the valves;

(c) Valves are protected by shrouds or guards;

(d) Valves are designed and constructed in such a way that their ability to withstand damage without leakage of product has been demonstrated;

(e) Valves are placed inside a protective frame;

(f) Receptacles are carried in protective boxes or frames.

4.1.6.5 Receptacles may be carried after the expiry of the time-limit set for the periodic test prescribed for the purpose of undergoing the test.

4.1.6.6 Non-refillable pressure receptacles shall:

(a) be carried 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 LC_{50} less than or equal to 200 ml/m^3; and

(d) not be repaired after being put into service.

4.1.6.7 Pressure 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.

4.1.6.8 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; and

(c) unless the required certification, retest, and filling markings are legible.

4.1.6.9 Charged pressure receptacles shall not be offered for carriage:

(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; and

(d) unless the required certification, retest, and filling markings are legible.

4.1.6.10 Requirements of the following packing provisions are considered to have been complied with if the following standards, as relevant, are applied:

Applicable paragraphs	**Reference**	**Title of document**
4.1.6.2	EN 1795:1997	Gas cylinders (excluding LPG) - Procedures for change of gas service.
4.1.6.4	EN 962:1996/A2:2000	Valve protection caps and valve guards for industrial and medical gas cylinders - Design, construction and tests
4.1.6.4 (d)	Annex A of EN849:1996/A2:2001	Transportable gas cylinders – Cylinder valves: Specifications and type testing – Amendment 2

4.1.7 Special packing provisions for organic peroxides (Class 5.2) and self-reactive substances of Class 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*

4.1.7.1.1 Packagings for organic peroxides and self-reactive substances shall meet the requirements of Chapter 6.1 or of Chapter 6.6 at the packing group II performance level. To avoid unnecessary confinement, metal packagings meeting the test criteria of packing group I shall not be used.

4.1.7.1.2 The packing methods for organic peroxides and self-reactive substances are listed in packing instruction 520 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 2.2.41.4 and 2.2.52.4.

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 20.4.3 (b) (resp. 20.4.2 (b)) of the Manual of Tests and Criteria 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 20.4.3 (c) (resp. 20.4.2 (c)) of the Manual of Tests and Criteria 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 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 the table of 2.2.52.4 and indicated with the letter "N" in the "Packing Method" column of that table may be carried in IBCs in accordance with packing instruction IBC520.

4.1.7.2.2 Other organic peroxides and self-reactive substances of type F may be carried 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 carriage 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 20.4.3 (f) [resp. 20.4.2 (f)] of the Manual of Tests and Criteria, exit box F of Figure 20.1 (b) of the Manual;

(b) To prove the compatibility of all materials normally in contact with the substance during carriage;

(c) To determine, when applicable, the control and emergency temperatures associated with the carriage 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 carriage of the substance.

If the country of origin is not a Contracting Party to ADR, the classification and transport conditions shall be recognized by the competent authority of the first country Contracting Party to ADR reached by the consignment.

4.1.7.2.3 Emergencies to be taken into account are self-accelerating decomposition and fire engulfment. To prevent explosive rupture of metal or composite 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 (Class 6.2)

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 carriage.

4.1.8.2 The definitions in 1.2.1 and the general packing provisions of 4.1.1.1 to 4.1.1.16, except 4.1.1.3, 4.1.1.9 to 4.1.1.12 and 4.1.1.15 apply to infectious substances packages. However, liquids shall be filled into packagings, including IBCs, which have an appropriate resistance to the internal pressure that may develop under normal conditions of carriage.

4.1.8.3 For UN No. 2814 and UN No. 2900, an itemized list of contents shall be enclosed between the secondary packaging and the outer packaging.

4.1.8.4 Before an empty packaging is returned to the consignor, or sent elsewhere, it shall be thoroughly disinfected or sterilized and any label or marking indicating that it had contained an infectious substance shall be removed or obliterated.

4.1.8.5 The provisions of this section do not apply to UN No. 3373 Diagnostic specimens (see packing instruction P650).

4.1.9 Special packing provisions for Class 7

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 2.2.7.7.1.

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 other items except such articles and documents as are necessary for the use of the radioactive material. This requirement shall not preclude the carriage of low specific activity material or surface contaminated objects with other items. The carriage of such articles and documents in a package, or of low specific activity material or surface contaminated objects with other items may be permitted provided that there is no interaction between them and the packaging or its radioactive contents that would reduce the safety of the package.

4.1.9.1.4 Except as provided in 7.5.11, CV33, the level of non-fixed contamination on the external and internal surfaces of overpacks, containers, tanks and intermediate bulk containers shall not exceed the limits specified in 4.1.9.1.2.

4.1.9.1.5 Radioactive material with a subsidiary risk shall be carried in packagings, IBCs or tanks 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 risk.

4.1.9.2 ***Requirements and controls for carriage of LSA material and SCO***

4.1.9.2.1 The quantity of LSA material or SCO in a single Industrial package Type 1 (Type IP-1), Industrial package Type 2 (Type IP-2), Industrial package Type 3 (Type IP-3), or object or collection of objects, whichever is appropriate, shall be so restricted that the external radiation level at 3 m from the unshielded material or object or collection of objects does not exceed 10 mSv/h.

4.1.9.2.2 LSA material and SCO which is or contains fissile material shall meet the applicable requirements of 7.5.11, CV33 and 6.4.11.1.

4.1.9.2.3 LSA material and SCO in groups LSA-I and SCO-I may be carried unpackaged under the following conditions:

(a) All unpackaged material other than ores containing only naturally occurring radionuclides shall be carried in such a manner that under routine conditions of carriage there will be no escape of the radioactive contents from the vehicle nor will there be any loss of shielding;

(b) Each vehicle shall be under exclusive use, except when only carrying SCO-I on which the contamination on the accessible and the inaccessible surfaces is not greater than ten times the applicable level specified in 2.2.7.5; and

(c) For SCO-I where it is suspected that non-fixed contamination exists on inaccessible surfaces in excess of the values specified in 2.2.7.5 (a)(i), measures shall be taken to ensure that the radioactive material is not released into the vehicle.

4.1.9.2.4 LSA material and SCO, except as otherwise specified in 4.1.9.2.3, shall be packaged in accordance with the table below:

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 4.1.9.2.3, LSA-I material and SCO-I may be carried unpackaged.*

4.1.10 Special provisions for mixed packing

4.1.1.10.1 When mixed packing is permitted in accordance with the provisions of this section, different dangerous goods or dangerous goods and other goods may be packed together in combination packagings conforming to 6.1.4.2.1, provided that they do not react dangerously with one another and that all other relevant provisions of this Chapter are complied with.

NOTE 1*: See also 4.1.1.5 and 4.1.1.6.*

NOTE 2*: For goods of Class 7, see 4.1.9.*

4.1.10.2 Except for packages containing Class 1 goods only or Class 7 goods only, if wooden or fibreboard boxes are used as outer packagings, a package containing different goods packed together shall not weigh more than 100 kg.

4.1.10.3 Unless otherwise prescribed by a special provision applicable according to 4.1.10.4, dangerous goods of the same class and the same classification code may be packed together.

4.1.10.4 When indicated for a given entry in Column (9b) of Table A of Chapter 3.2, the following special provisions shall apply to the mixed packing of the goods assigned to that entry with other goods in the same package.

MP 1 May only be packed together with goods of the same type within the same compatibility group.

MP 2 Shall not be packed together with other goods.

MP 3 Mixed packing of UN No. 1873 with UN No. 1802 is permitted.

MP 4 Shall not be packed together with goods of other classes or with goods which are not subject to the requirements of ADR. However, if this organic peroxide is a hardener or compound system for Class 3 substances, mixed packing is permitted with these substances of Class 3.

MP 5 UN No. 2814 and UN No. 2900 may be packed together in a combination packaging in conformity with P620. They shall not be packed together with other goods; this does not apply to UN No. 3373 diagnostic specimens packed

in accordance with P650 or to substances added as coolants, e.g. ice, dry ice or refrigerated liquid nitrogen.

MP 6 Shall not be packed together with other goods. This does not apply to substances added as coolants, e.g. ice, dry ice or refrigerated liquid nitrogen.

MP 7 May - in quantities not exceeding 5 litres per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes when mixed packing is also permitted for these; or
- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 8 May - in quantities not exceeding 3 litres per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes when mixed packing is also permitted for these; or
- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 9 May be packed together in an outer packaging for combination packagings in accordance with 6.1.4.21:

- with other goods of Class 2;
- with goods of other classes, when the mixed packing is also permitted for these; or
- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 10 May - in quantities not exceeding 5 kg per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes, when mixed packing is also permitted for these; or
- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 11 May - in quantities not exceeding 5 kg per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes (except substances of packing group I or II of Class 5.1) when mixed packing is also permitted for these; or
- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 12 May - in quantities not exceeding 5 kg per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes (except substances of packing group I or II of Class 5.1) when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

Packagings shall not weigh more than 45 kg. If fibreboard boxes are used as outer packagings however, a package shall not weigh more than 27 kg.

MP 13 May - in quantities not exceeding 3 kg per inner packaging and per package - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes, when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 14 May - in quantities not exceeding 6 kg per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes, when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 15 May - in quantities not exceeding 3 litres per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes, when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 16 May - in quantities not exceeding 3 litres per inner packaging and per package - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes, when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 17 May - in quantities not exceeding 0.5 litre per inner packaging and 1 litre per package - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of other classes, except Class 7, when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 18 May - in quantities not exceeding 0.5 kg per inner packaging and 1 kg per package - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods or articles of other classes, except Class 7, when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR,

provided they do not react dangerously with one another.

MP 19 May - in quantities not exceeding 5 litres per inner packaging - be packed together in a combination packaging conforming to 6.1.4.21:

- with goods of the same class covered by other classification codes or with goods of other classes, when mixed packing is also permitted for these; or

- with goods which are not subject to the requirements of ADR, provided they do not react dangerously with one another.

MP 20 May be packed together with substances covered by the same UN number.

Shall not be packed together with goods and articles of Class 1 having different UN numbers.

Shall not be packed together with goods of other classes or with goods which are not subject to the requirements of ADR.

MP 21 May be packed together with articles covered by the same UN number.

Shall not be packed together with goods of Class 1 having different UN numbers, except for

(a) their own means of initiation, provided that

(i) the means of initiation will not function under normal conditions of carriage; or

(ii) such means have at least two effective protective features which prevent explosion of an article in the event of accidental functioning of the means of initiation; or

(iii) when such means do not have two effective protective features (i.e. means of initiation assigned to compatibility group B), in the

opinion of the competent authority of the country of origin[3], the accidental functioning of the means of initiation does not cause the explosion of an article under normal conditions of carriage;

(b) articles of compatibility groups C, D and E.

Shall not be packed together with goods of other classes or with goods which are not subject to the requirements of ADR.

When goods are packed together in accordance with this special provision, account shall be taken of a possible amendment of the classification of packages in accordance with 2.2.1.1. For the description of the goods in the transport document, see 5.4.1.2.1 (b).

MP 22 May be packed together with articles covered by the same UN number.

Shall not be packed together with goods of Class 1 having different UN numbers, except for

(a) their own means of initiation, provided that the means of initiation will not function under normal conditions of carriage;

(b) articles of compatibility groups C, D and E.

Shall not be packed together with goods of other classes or with goods which are not subject to the requirements of ADR.

When goods are packed together in accordance with this special provision, account shall be taken of a possible amendment of the classification of packages in accordance with 2.2.1.1. For the description of the goods in the transport document, see 5.4.1.2.1 (b).

MP 23 May be packed together with articles covered by the same UN number.

Shall not be packed together with goods and articles of Class 1 having different UN numbers; however, exception is made for their own means of initiation, provided that the means of initiation will not function under normal conditions of carriage.

Shall not be packed together with goods of other classes or with goods which are not subject to the requirements of ADR.

When goods are packed together in accordance with this special provision, account shall be taken of a possible amendment of the classification of packages in accordance with 2.2.1.1. For the description of the goods in the transport document, see 5.4.1.2.1 (b).

MP 24 May be packed together with goods with the UN numbers shown in the table below, under the following conditions:

[3] *If the country of origin is not a Contracting Party to ADR, the approval shall require validation by the competent authority of the first country Contracting Party to ADR reached by the consignment.*

- if a letter A is indicated in the table, the goods with those UN numbers may be included in the same package without any special limitation of mass;

- if a letter B is indicated in the table, the goods with those UN numbers may be included in the same package up to a total mass of 50 kg of explosive substances.

When goods are packed together in accordance with this special provision, account shall be taken of a possible amendment of the classification of packages in accordance with 2.2.1.1. For the description of the goods in the transport document, see 5.4.1.2.1 (b).

UN No.	0012	0014	0027	0028	0044	0054	0160	0161	0186	0191	0194	0195	0197	0238	0240	0312	0333	0334	0335	0336	0337	0373	0405	0428	0429	0430	0431	0432
0012		A																										
0014	A																											
0027				B	B		B	B																				
0028			B		B		B	B																				
0044			B	B			B	B																				
0054									B	B	B	B	B	B	B	B						B	B	B	B	B	B	B
0160			B	B	B			B																				
0161			B	B	B		B																					
0186						B				B	B	B	B	B	B	B						B	B	B	B	B	B	B
0191						B			B		B	B	B	B	B	B						B	B	B	B	B	B	B
0194						B			B	B		B	B	B	B	B						B	B	B	B	B	B	B
0195						B			B	B	B		B	B	B	B						B	B	B	B	B	B	B
0197						B			B	B	B	B		B	B	B						B	B	B	B	B	B	B
0238						B			B	B	B	B	B		B	B						B	B	B	B	B	B	B
0240						B			B	B	B	B	B	B		B						B	B	B	B	B	B	B
0312						B			B	B	B	B	B	B	B							B	B	B	B	B	B	B
0333																		A	A	A	A							
0334																	A		A	A	A							
0335																	A	A		A	A							
0336																	A	A	A		A							
0337																	A	A	A	A								
0373						B			B	B	B	B	B	B	B	B							B	B	B	B	B	B
0405						B			B	B	B	B	B	B	B	B						B		B	B	B	B	B
0428						B			B	B	B	B	B	B	B	B						B	B		B	B	B	B
0429						B			B	B	B	B	B	B	B	B						B	B	B		B	B	B
0430						B			B	B	B	B	B	B	B	B						B	B	B	B		B	B
0431						B			B	B	B	B	B	B	B	B						B	B	B	B	B		B
0432						B			B	B	B	B	B	B	B	B						B	B	B	B	B	B	

CHAPTER 4.2

USE OF PORTABLE TANKS AND UN CERTIFIED MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs)

NOTE 1: *For fixed tanks (tank-vehicles), demountable tanks and tank-containers and tank-swap bodies, with shells made of metallic materials, and battery-vehicles and multiple element gas containers (MEGCs), see Chapter 4.3; for fibre-reinforced plastics tanks, see Chapter 4.4; for vacuum operated waste tanks, see Chapter 4.5.*

NOTE 2*: Portable tanks and UN certified MEGCs marked in accordance with the applicable provisions of Chapter 6.7 but which were approved in a State which is not a Contracting Party to ADR may nevertheless be used for carriage under ADR..*

4.2.1 General provisions for the use of portable tanks for the carriage of substances of Classes 3 to 9

4.2.1.1 This section provides general provisions applicable to the use of portable tanks for the carriage of substances of Classes 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 7, 8 and 9. In addition to these general provisions, portable tanks shall conform to the design, construction, inspection and testing requirements detailed in 6.7.2. Substances shall be carried in portable tanks conforming to the applicable portable tank instruction identified in Column (10) of the Table A of Chapter 3.2 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 Table A of Chapter 3.2 and described in 4.2.5.3.

4.2.1.2 During carriage, 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 carriage only when the necessary steps have been taken to prevent their dangerous decomposition, transformation or polymerization during carriage. 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 carriage. When substances are carried at elevated temperatures in either liquid or solid state, the shell shall be thermally insulated to meet this condition.

4.2.1.5 Empty portable tanks not cleaned and not gas-free shall comply with the same provisions as portable tanks filled with the previous substance.

4.2.1.6 Substances shall not be carried in the same or in adjoining compartments of shells when they may react dangerously with each other (see definition for "dangerous reaction" in 1.2.1).

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 carried 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 filled 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 instruction or special provisions in 4.2.5.2.6 or 4.2.5.3 and Column (10) or (11) of Table A of Chapter 3.2.

4.2.1.9.2 The maximum degree of filling (in %) for general use is determined by the formula:

$$\text{Degree of filling} = \frac{97}{1 + (t_r - t_f)}$$

4.2.1.9.3 The maximum degree of filling (in %) for liquids of Class 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 carriage (t_r) (both in °C). For liquids carried 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 provisions 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 carriage (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 carriage.

4.2.1.9.5.1 The maximum degree of filling (in %) for liquids carried under elevated temperature conditions is determined by the 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 carriage respectively.

4.2.1.9.6 Portable tanks shall not be offered for carriage:

(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 carriage 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 carried 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 6.7.3.13.4 need not be provided with a means of closing off the forklift pockets.

4.2.1.10 ***Additional provisions applicable to the carriage of Class 3 substances in portable tanks***

4.2.1.10.1 All portable tanks intended for the carriage 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, open venting systems may be used if allowed according to Chapter 4.3.

4.2.1.11 ***Additional provisions applicable to the carriage of Classes 4.1, 4.2 or 4.3 substances (other than Class 4.1 self-reactive substances) in portable tanks***

(Reserved)

NOTE*: For Class 4.1 self-reactive substances, see 4.2.1.13.1.*

4.2.1.12 ***Additional provisions applicable to the carriage of Class 5.1 substances in portable tanks***

(Reserved)

4.2.1.13 ***Additional provisions applicable to the carriage of Class 5.2 substances and Class 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 carriage;

(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 carriage 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 carriage 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 carriage of organic peroxides or self-reactive substances with a 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
= 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 the 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 °C.

4.2.1.13.14 The marking 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 carried in portable tanks.

4.2.1.14 ***Additional provisions applicable to the carriage of Class 6.1 substances in portable tanks***

(Reserved)

4.2.1.15 ***Additional provisions applicable to the carriage of Class 7 substances in portable tanks***

4.2.1.15.1 Portable tanks used for the carriage of radioactive material shall not be used for the carriage of other goods.

4.2.1.15.2 The degree of filling for portable tanks shall not exceed 90% or, alternatively, any other value approved by the competent authority.

4.2.1.16 ***Additional provisions applicable to the carriage of Class 8 substances in portable tanks***

4.2.1.16.1 Pressure-relief devices of portable tanks used for the carriage of Class 8 substances shall be inspected at intervals not exceeding one year.

4.2.1.17 ***Additional*** **provisions applicable to the carriage of Class 9 substances in portable tanks**

(Reserved)

4.2.2 General provisions for the use of portable tanks for the carriage of non-refrigerated liquefied gases

4.2.2.1 This section provides general provisions applicable to the use of portable tanks for the carriage of non-refrigerated liquefied gases.

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 shall be carried 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 Table A of Chapter 3.2 and described in 4.2.5.3.

4.2.2.3 During carriage, 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 carriage only when the necessary steps have been taken to prevent their dangerous decomposition, transformation or polymerization during carriage. 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 carried 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 provisions 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 portable tank shall be inspected to ensure that it is authorized for the non-refrigerated liquefied gas to be carried and that the portable tank is not loaded with non-refrigerated liquefied gases 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. During filling, the temperature of the non-refrigerated liquefied gas 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 carried.

4.2.2.8 Portable tanks shall not be offered for carriage:

(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 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 6.7.4.12.4 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 carriage of refrigerated liquefied gases

4.2.3.1 This section provides general provisions applicable to the use of portable tanks for the carriage 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 carried 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 Table A of Chapter 3.2 and described in 4.2.5.3.

4.2.3.3 During carriage, 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 carried 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 provisions as portable tanks filled with the previous substance.

4.2.3.6 *Filling*

4.2.3.6.1 Prior to filling the portable tank shall be inspected to ensure that it is authorized for the refrigerated liquefied gas to be carried and that the portable tank is not loaded with refrigerated liquefied gases 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. 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 carriage 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 carriage 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 carried (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.

4.2.3.8 Portable tanks shall not be offered for carriage:

(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 carried 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 carriage, 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 UN certified 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 carriage of non-refrigerated gases referred to in 6.7.5.

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 packing instruction P200 of 4.1.4.1 and in 6.2.1.5.

4.2.4.3 During carriage, 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 carried 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 carried and that the applicable provisions of ADR 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 of 4.1.4.1 for the specific gas being filled into each element. In no case shall an 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 carriage. Toxic gases (gases of groups T, TF, TC, TO, TFC and TOC) shall only be carried 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 filler 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 markings are legible.

4.2.4.6 Charged MEGCs shall not be offered for carriage;

(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 markings 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 carried in portable tanks. Each portable tank instruction is identified by an alpha-numeric code (e.g. T1). Column (10) of Table A of Chapter 3.2 indicates the portable tank instruction that shall be used for each substance permitted for carriage in a portable tank. When no portable tank instruction appears in Column (10) for a specific dangerous goods entry then carriage 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 Table A of Chapter 3.2. Each portable tank special provision is identified by an alpha-numeric code (e.g. TP1). A listing of the portable tank special provisions is provided in 4.2.5.3.

4.2.5.2 *Portable tank instructions*

4.2.5.2.1 Portable tank instructions apply to dangerous goods of Classes 2 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 in this Chapter and the general requirements in Chapter 6.7.

4.2.5.2.2 For substances of Classes 3 to 9, the portable tank instructions indicate the applicable minimum test pressure, the minimum shell thickness (in reference steel), bottom opening requirements and pressure relief requirements. In portable tank instruction T23, self-reactive substances of Class 4.1 and Class 5.2 organic peroxides permitted to be carried 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, the requirements for the openings below liquid level, pressure-relief requirements and maximum filling density requirements for non-refrigerated liquefied gases permitted for carriage 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) of Table A of Chapter 3.2 for a specific dangerous goods entry additional portable tanks which possess higher minimum 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 carriage 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, T6, 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, T6, 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*

T1 - T22	**PORTABLE TANK INSTRUCTIONS**			**T1 - T22**
These portable tank instructions apply to liquid and solid substances of Classes 3 to 9. The general provisions of Section 4.2.1 and the requirements of Section 6.7.2 shall be met.				
Portable tank instruction	**Minimum test pressure (bar)**	**Minimum shell thickness (in mm-reference steel) (see 6.7.2.4)**	**Pressure-relief requirements (see 6.7.2.8)**	**Bottom opening requirements (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	6mm	Normal	Not allowed
T10	4	6mm	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	6mm	Normal	Not allowed
T14	6	6mm	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	6mm	Normal	See 6.7.2.6.3
T18	10	6mm	See 6.7.2.8.3	See 6.7.2.6.3
T19	10	6mm	See 6.7.2.8.3	Not allowed
T20	10	8mm	See 6.7.2.8.3	Not allowed
T21	10	10mm	Normal	Not allowed
T22	10	10mm	See 6.7.2.8.3	Not allowed

T23 **PORTABLE TANK INSTRUCTION** **T23**

This portable tank instruction applies to self-reactive substances of Class 4.1 and organic peroxides of Class 5.2. The general provisions of Section 4.2.1 and the requirements of Section 6.7.2 shall be met. The additional provisions specific to self-reactive substances of Class 4.1 and organic peroxides of Class 5.2 in 4.2.1.13 shall also be met.

UN No.	Substance	Minimum test pressure (bar)	Minimum shell thickness (mm-reference steel)	Bottom opening requi-rements	Pressure-relief requi-rements	Degree of filling	Control tempe-rature	Emergency tempe-rature
3109	ORGANIC PEROXIDE, TYPE F, LIQUID tert-Butyl hydro-peroxide [a], not more than 72% with water Cumyl hydro-peroxide, not more than 90% in diluent type A Di-tert-butyl peroxide, not more than 32% in diluent type A Isopropyl cumyl hydro-peroxide, not more than 72% in diluent type A p-Menthyl hydro-peroxide, not more than 72% in diluent type A Pinanyl hydro-peroxide, not more than 56% in diluent type A	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		
3110	ORGANIC PEROXIDE TYPE F, SOLID Dicumyl peroxide [b]	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		

[a] *Provided that steps have been taken to achieve the safety equivalence of 65% tert-Butyl hydroperoxide and 35% water.*

[b] *Maximum quantity per portable tank: 2000 kg.*

This portable tank instruction applies to self-reactive substances of Class 4.1 and organic peroxides of Class 5.2. The general provisions of Section 4.2.1 and the requirements of Section 6.7.2 shall be met. The additional provisions specific to self-reactive substances of Class 4.1 and organic peroxides of Class 5.2 in 4.2.1.13 shall also be met.

UN No.	Substance	Minimum test pressure (bar)	Minimum shell thickness (mm-reference steel)	Bottom opening requi-rements	Pressure-relief requi-rements	Degree of filling	Control tempe-rature	Emergency tempe-rature
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	[c]	[c]
	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						0 °C	+5 °C
	Peroxyacetic acid, distilled, type F, stabilized [d]						+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	[c]	[c]

[c] *As approved by the competent authority.*

[d] *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 the Manual of Tests and Criteria, paragraph 20.4.3 (f).*

T23 **PORTABLE TANK INSTRUCTION (cont'd)** **T23**

This portable tank instruction applies to self-reactive substances of Class 4.1 and organic peroxides of Class 5.2. The general provisions of Section 4.2.1 and the requirements of Section 6.7.2 shall be met. The additional provisions specific to self-reactive substances of Class 4.1 and organic peroxides of Class 5.2 in 4.2.1.13 shall also be met.

UN No.	Substance	Minimum test pressure (bar)	Minimum shell thickness (mm-reference steel)	Bottom opening requi-rements	Pressure-relief requi-rements	Degree of filling	Control tempe-rature	Emergency tempe-rature
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	[c]	[c]
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	[c]	[c]

T50 **PORTABLE TANK INSTRUCTION** **T50**

This portable tank instruction applies to non-refrigerated liquefied gases. 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	Openings below liquid level	Pressure-relief requirements (see 6.7.3.7)	Maximum filling density (kg/l)
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

[c] *As approved by the competent authority.*

T50 **PORTABLE TANK INSTRUCTION (cont'd)** **T50**

This portable tank instruction applies to non-refrigerated liquefied gases. 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	Openings below liquid level	Pressure-relief requirements (see 6.7.3.7)	Maximum filling density (kg/l)
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
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

T50 **PORTABLE TANK INSTRUCTION (cont'd)** **T50**

This portable tank instruction applies to non-refrigerated liquefied gases. 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	Openings below liquid level	Pressure-relief requirements (see 6.7.3.7)	Maximum filling density (kg/l)
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
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

T50	PORTABLE TANK INSTRUCTION (cont'd)				T50
This portable tank instruction applies to non-refrigerated liquefied gases. 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**	**Openings below liquid level**	**Pressure-relief requirements (see 6.7.3.7)**	**Maximum filling density (kg/l)**
1067	Dinitrogen tetroxide	7.0 7.0 7.0 7.0	Not Allowed	See 6.7.3.7.3	1.30
1075	Petroleum gases, 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
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

T50 **PORTABLE TANK INSTRUCTION (cont'd)** **T50**

This portable tank instruction applies to non-refrigerated liquefied gases. 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	Openings below liquid level	Pressure-relief requirements (see 6.7.3.7)	Maximum filling density (kg/l)
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
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

T50 **PORTABLE TANK INSTRUCTION (cont'd)** **T50**

This portable tank instruction applies to non-refrigerated liquefied gases. 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	Openings below liquid level	Pressure-relief requirements (see 6.7.3.7)	Maximum filling density (kg/l)
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 1,1-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
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	0.95
3252	Difluoromethane (Refrigerant gas R 32)	43.0 39.0 34.4 30.5	Allowed	Normal	0.78

T50 **PORTABLE TANK INSTRUCTION (cont'd)** **T50**

This portable tank instruction applies to non-refrigerated liquefied gases. 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	Openings below liquid level	Pressure-relief requirements (see 6.7.3.7)	Maximum filling density (kg/l)
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
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	0.84
3338	Refrigerant gas R 407A	31.3 28.1 25.1 22.4	Allowed	Normal	0.95
3339	Refrigerant gas R 407B	33.0 29.6 26.5 23.6	Allowed	Normal	0.95
3340	Refrigerant gas R 407C	29.9 26.8 23.9 21.3	Allowed	Normal	0.95

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 alpha numeric code beginning with the letters "TP" (tank provision) and are assigned to specific substances in Column (11) of Table A of 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 For liquids carried under elevated temperature conditions the degree of filling prescribed in 4.2.1.9.5.1 shall not be exceeded.

$$(\text{Degree of filling} = 95\,\frac{d_r}{d_f})$$

TP4 The degree of filling shall not exceed 90% or, alternatively, any other value approved by the competent authority (see 4.2.1.15.2).

TP5 *(Reserved)*

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 carried. 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 may be reduced to 1.5 bar when the flash point of the substances carried is greater than 0 °C.

TP9 A substance under this description shall only be carried 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.

TP12 This substance is highly corrosive to steel.

TP13 Self-contained breathing apparatus shall be provided when this substance is carried.

TP16 The tank shall be fitted with a special device to prevent under-pressure and excess pressure during normal carriage 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 carriage.

TP19 The calculated shell thickness shall be increased by 3 mm. Shell thickness shall be verified ultrasonically at intervals midway between periodic hydraulic tests.

TP20 This substance shall only be carried 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 Carriage permitted under special conditions prescribed by the competent authorities.

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 carried. 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 carried in tanks without an inhibitor provided that it is maintained at a temperature equal to or above 32.5 °C.

TP26 When carried 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.

CHAPTER 4.3

USE OF FIXED TANKS (TANK-VEHICLES), DEMOUNTABLE TANKS, TANK-CONTAINERS AND TANK SWAP BODIES WITH SHELLS MADE OF METALLIC MATERIALS, AND BATTERY-VEHICLES AND MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs)

***NOTE**: For portable tanks see Chapter 4.2; for fibre-reinforced plastics tanks, see Chapter 4.4; for vacuum operated waste tanks, see Chapter 4.5.*

4.3.1 Scope

4.3.1.1 Provisions which take up the whole width of the page apply both to fixed tanks (tank-vehicles), demountable tanks and battery-vehicles, and to tank-containers, tank swap bodies and MEGCs. Provisions contained in a single column apply only to:

- fixed tanks (tank-vehicles), demountable tanks and battery-vehicles (left-hand column);
- tank-containers, tank swap bodies and MEGCs (right-hand column).

4.3.1.2 These provisions apply to:

fixed tanks (tank-vehicles), demountable tanks and battery-vehicles	tank-containers, tank swap bodies and MEGCs

used for the carriage of gaseous, liquid, powdery or granular substances.

4.3.1.3 Section 4.3.2 lists the provisions applicable to fixed tanks (tank-vehicles), demountable tanks, tank-containers and tank swap bodies, intended for the carriage of substances of all classes, and to battery-vehicles and MEGCs intended for the carriage of gases of Class 2. Sections 4.3.3 and 4.3.4 contain special provisions adding to or amending the provisions of Section 4.3.2.

4.3.1.4 For requirements concerning the construction, equipment, type approval, tests and marking, see Chapter 6.8.

4.3.1.5 For transitional measures concerning the application of this Chapter, see:

1.6.3.	1.6.4.

4.3.2 Provisions applicable to all classes

4.3.2.1 *Use*

4.3.2.1.1 A substance subject to ADR may be carried in fixed tanks (tank-vehicles), demountable tanks, battery-vehicles, tank-containers, tank swap bodies and MEGCs only when provision is made for a tank code according to 4.3.3.1.1 and 4.3.4.1.1 in Column (12) of Table A in Chapter 3.2.

4.3.2.1.2 The required type of tank, battery-vehicle and MEGC is given in code form in Column (12) of Table A in Chapter 3.2. The identification codes appearing there are made up of letters or numbers in a given order. The explanations for reading the four parts of the code are given in

4.3.3.1.1 (when the substance to be carried belongs to Class 2) and in 4.3.4.1.1 (when the substance to be carried belongs to Classes 3 to 9) [1].

4.3.2.1.3 The required type according to 4.3.2.1.2 corresponds to the least stringent construction requirements which are acceptable for the dangerous substance in question unless otherwise prescribed in this Chapter or in Chapter 6.8. It is possible to use tanks corresponding to codes prescribing a higher minimum calculation pressure, or more stringent requirements for filling or discharge openings or for safety valves/devices (see 4.3.3.1.1 for Class 2 and 4.3.4.1.1 for Classes 3 to 9).

4.3.2.1.4 For certain substances, tanks, battery-vehicles or MEGCs are subject to additional provisions which are included as special provisions in Column (13) of Table A in Chapter 3.2.

4.3.2.1.5 Tanks, battery-vehicles and MEGCs shall not be loaded with any dangerous substances other than those for the carriage of which they have been approved according to 6.8.2.3.1 and which, in contact with the materials of the shell, gaskets, equipment and protective linings, are not liable to react dangerously with them (see "dangerous reaction" in 1.2.1), to form dangerous products or appreciably to weaken these materials [2].

4.3.2.1.6 Foodstuffs shall not be carried in tanks used for dangerous substances unless the necessary steps have been taken to prevent any harm to public health.

4.3.2.2 ***Degree of filling***

4.3.2.2.1 The following degrees of filling shall not be exceeded in tanks intended for the carriage of liquids at ambient temperatures:

(a) for flammable substances without additional risks (e.g. toxicity or corrosivity), in tanks with a venting system or with safety valves (even where preceded by a bursting disc):

$$\text{Degree of filling} = \frac{100}{1 + \alpha\,(50 - t_F)}\ \%\ \text{of capacity}$$

(b) for toxic or corrosive substances (whether flammable or not) in tanks with a venting system or with safety valves (even where preceded by a bursting disc):

$$\text{Degree of filling} = \frac{98}{1 + \alpha\,(50 - t_F)}\ \%\ \text{of capacity}$$

(c) for flammable substances and for slightly toxic or corrosive substances (whether flammable or not) in hermetically closed tanks without a safety device:

$$\text{Degree of filling} = \frac{97}{1 + \alpha\,(50 - t_F)}\ \%\ \text{of capacity}$$

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[1] *An exception is made for tanks intended for the carriage of substances of classes 5.2 or 7 (see 4.3.4.1.3).*

[2] *It may be necessary to consult the manufacturer of the substance and the competent authority for guidance on the compatibility of the substance with the materials of the tank, battery-vehicle or MEGC.*

(d) for highly toxic, toxic, highly corrosive or corrosive substances (whether flammable or not) in hermetically closed tanks without a safety device:

$$\text{Degree of filling} = \frac{95}{1 + \alpha\,(50 - t_F)}\ \%\ \text{of capacity}$$

4.3.2.2.2 In these formulae, α is the mean coefficient of cubical expansion of the liquid between 15 °C and 50 °C, i.e. for a maximum variation in temperature of 35 °C.

α is calculated by the formula:

$$\alpha = \frac{d_{15} - d_{50}}{35 d_{50}}$$

where d_{15} and d_{50} are the relative densities of the liquid at 15 °C and 50 °C respectively.
t_F is the mean temperature of the liquid during filling.

4.3.2.2.3 The provisions of 4.3.2.2.1 (a) to (d) above shall not apply to tanks whose contents are, by means of a heating device, maintained at a temperature above 50 °C during carriage. In this case the degree of filling at the outset shall be such, and the temperature so regulated, that the tank is not full to more than 95% of its capacity and that the filling temperature is not exceeded, at any time during carriage.

4.3.2.2.4 Where shells intended for the carriage of liquids [3] are not divided by partitions or surge plates into sections of not more than 7 500 litres capacity, they shall be filled to not less than 80% or not more than 20% of their capacity.

4.3.2.3 ***Operation***

4.3.2.3.1 The thickness of the walls of the shell shall not, throughout its use, fall below the minimum figure prescribed in:

6.8.2.1.17 to 6.8.2.1.21.	6.8.2.1.17 to 6.8.1.20.

4.3.2.3.2

During carriage tank-containers/MEGCs shall be loaded on the carrying vehicle in such a way as to be adequately protected by the fittings of the carrying vehicle or of the tank-container/MEGC itself against lateral and longitudinal impact and against overturning 4. If the tank-containers/MEGCs, including the service equipment, are so constructed as to withstand impact or overturning they need not be protected in this way.

[3] *Under this provision, substances whose kinematic viscosity at 20 °C is below 2 680 mm²/s shall be deemed to be liquids.*

[4] *Examples of protection of shells:*

- *protection against lateral impact may, for example, consist of longitudinal bars protecting the shell on both sides at the level of the median line;*
- *protection against overturning may, for example, consist of reinforcing rings or bars fixed transversally in relation to the frame;*
- *protection against rear impact, may, for example, consist of a bumper or frame.*

4.3.2.3.3 During filling and discharge of tanks, battery-vehicles and MEGCs, appropriate measures shall be taken to prevent the release of dangerous quantities of gases and vapours. Tanks, battery-vehicles and MEGCs shall be closed so that the contents cannot spill out uncontrolled. The openings of bottom-discharge tanks shall be closed by means of screw-threaded plugs, blank flanges or other equally effective devices. The leakproofness of the closures of the tanks, and of the battery-vehicles and MEGCs shall be checked by the filler after the tank is filled. This applies in particular to the upper part of the dip tube.

4.3.2.3.4 Where several closure systems are fitted in series, that nearest to the substance being carried shall be closed first.

4.3.2.3.5 No dangerous residue of the filling substance shall adhere to the outside of the tank during carriage.

4.3.2.3.6 Substances which may react dangerously with each other shall not be carried in adjoining compartments of tanks.

Substances which may react dangerously with each other may be carried in adjoining compartments of tanks, when these compartments are separated by a partition with a wall thickness equal to or greater than that of the tank itself. They may also be carried separated by an empty space or an empty compartment between loaded compartments.

4.3.2.4 ***Empty tanks, battery-vehicles and MEGCs, uncleaned***

NOTE*: For empty tanks, battery-vehicles and MEGCs, uncleaned, special provisions TU1, TU2, TU4, TU16 and TU35 of 4.3.5 may apply.*

4.3.2.4.1 No dangerous residue of the filling substance shall adhere to the outside of the tank during carriage.

4.3.2.4.2 To be accepted for carriage, empty tanks, battery-vehicles and MEGCs, uncleaned, shall be closed in the same manner and be leakproof to the same degree as if they were full.

4.3.2.4.3 Where empty tanks, battery-vehicles and MEGCs, uncleaned, are not closed in the same manner and are not leakproof to the same degree as if they were full and where the provisions of ADR cannot be complied with, they shall be carried, with due regard to adequate safety, to the nearest suitable place where cleaning or repair can be carried out. Carriage is adequately safe if suitable measures have been taken to ensure equivalent safety commensurate with the provisions of ADR and to prevent the uncontrolled release of the dangerous goods.

4.3.2.4.4 Empty fixed tanks (tank-vehicles), demountable tanks, battery-vehicles, tank-containers, tank swap bodies and MEGCs, uncleaned, may also be carried after the expiry of the periods established in 6.8.2.4.2 and 6.8.2.4.3 for undergoing the inspection.

4.3.3 Special provisions applicable to Class 2

4.3.3.1 *Coding and hierarchy of tanks*

4.3.3.1.1 *Coding of tanks, battery-vehicles and MEGCs*

The four parts of the codes (tank codes) given in Column (12) of Table A in Chapter 3.2 have the following meanings:

Part	Description	Tank Code
1	Types of tank, battery-vehicle or MEGC	C = tank, battery-vehicle or MEGC for compressed gases; P = tank, battery-vehicle or MEGC for liquefied gases or dissolved gases; R = tank for refrigerated liquefied gases.
2	Calculation pressure	X = value of the minimum relevant test pressure according to the table in 4.3.3.2.5; or 22 = minimum calculation pressure in bar.
3	Openings (see 6.8.2.2 and 6.8.3.2)	B = tank with bottom filling or discharge openings with 3 closures; or battery-vehicle or MEGC with openings below the surface of the liquid or for compressed gases; C = tank with top filling or discharge openings with 3 closures with only cleaning openings below the surface of the liquid; D = tank with top filling or discharge openings with 3 closures; or battery-vehicle or MEGC with no openings below the surface of the liquid.
4	Safety valves/devices	N = tank, battery-vehicle or MEGC with safety valve according to 6.8.3.2.9 or 6.8.3.2.10 which is not hermetically closed; H = hermetically closed tank, battery-vehicle or MEGC (see 1.2.1);

NOTE 1*: The special provision TU17 indicated in Column (13) of Table A in Chapter 3.2 for certain gases means that the gas may only be carried in a battery-vehicle or MEGC.*

NOTE 2*: The pressures indicated on the tank itself or on the panel shall be not less than the value of "X" or the minimum calculation pressure.*

4.3.3.1.2 *Hierarchy of tanks*

Tank code	Other tank code(s) permitted for the substances under this code
C*BN	C#BN, C#CN, C#DN, C#BH, C#CH, C#DH
C*BH	C#BH, C#CH, C#DH
C*CN	C#CN, C#DN, C#CH, C#DH
C*CH	C#CH, C#DH
C*DN	C#DN, C#DH
C*DH	C#DH
P*BN	P#BN, P#CN, P#DN, P#BH, P#CH, P#DH
P*BH	P#BH, P#CH, P#DH
P*CN	P#CN, P#DN, P#CH, P#DH
P*CH	P#CH, P#DH
P*DN	P#DN, P#DH
P*DH	P#DH
R*BN	R#BN, R#CN, R#DN
R*CN	R#CN, R#DN
R*DN	R#DN

The figure represented by "#" shall be equal to or greater than the figure represented by "*".

NOTE: *This hierarchy does not take any special provisions into account (see 4.3.5 and 6.8.4) for each entry.*

4.3.3.2 ***Filling conditions and test pressures***

4.3.3.2.1 The test pressure for tanks intended for the carriage of compressed gases shall be at least 1.5 times the working pressure as defined in 1.2.1 for pressure receptacles.

4.3.3.2.2. The test pressure for tanks intended for the carriage of:

- high pressure liquefied gases; and
- dissolved gases

shall be such that, when the shell is filled to the maximum filling ratio, the pressure reached in the shell by the substance at 55 °C for tanks with thermal insulation or 65 °C for tanks without thermal insulation does not exceed the test pressure.

4.3.3.2.3 The test pressure for tanks intended for the carriage of low pressure liquefied gases will be:

(a) If the tank is equipped with thermal insulation, at least equal to the vapour pressure, reduced by 0.1 MPa (1 bar) of the liquid at 60 °C, but not less than 1 MPa (10 bar);

(b) If the tank is not equipped with thermal insulation, at least equal to the vapour pressure, reduced by 0.1 MPa (1 bar), of the liquid at 65 °C, but not less than 1 MPa (10 bar).

The maximum permissible mass of contents per litre of capacity is calculated as follows:

Maximum permissible mass of contents per litre of capacity = 0.95 × density of the liquid phase at 50 °C (in kg/l)

Moreover the vapour phase shall not disappear below 60 °C.

If the shells are not more than 1.5 m in diameter, the values of the test pressure and maximum filling ratio conforming to packing instruction P200 in 4.1.4.1 shall be applicable.

4.3.3.2.4 The test pressure for tanks intended for the carriage of refrigerated liquefied gases shall be not less than 1.3 times the maximum allowable working pressure and indicated on the tank but not less than 300 kPa (3 bar) (gauge pressure); for tanks with vacuum insulation the test pressure shall be not less than 1.3 times the maximum allowable working pressure increased by 100 kPa (1 bar).

4.3.3.2.5 *Table of gases and gas mixtures which may be carried in fixed tanks (tank-vehicles), battery-vehicles, demountable tanks, tank-containers or MEGCs indicating the minimum test pressure for tanks and as far as applicable the filling ratio*

In the case of gases and gas mixtures classified under n.o.s. entries, the values of the test pressure and the filling ratio shall be prescribed by the expert approved by the competent authority.

When tanks for compressed or high pressure liquefied gases have been subjected to a test pressure lower than shown in the table, and the tanks are fitted with thermal insulation, a lower maximum load may be prescribed by the expert approved by the competent authority, provided that the pressure reached in the tank by the substance at 55 °C does not exceed the test pressure stamped on the tank.

	Name	**Classification code**	**Minimum test pressure for tanks**				**Maximum permissible mass of contents per litre of capacity**
			With thermal insulation		**Without thermal insulation**		
			MPa	**bar**	**MPa**	**bar**	**kg**
1001	Acetylene, dissolved	4 F	only in battery-vehicles and MEGCs composed of receptacles				
1002	Air, compressed	1 A	see 4.3.3.2.1				
1003	Air, refrigerated liquid	3 O	see 4.3.3.2.4				
1005	Ammonia, anhydrous	2 TC	2.6	26	2.9	29	0.53
1006	Argon, compressed	1 A	see 4.3.3.2.1				
1008	Boron trifluoride	2 TC	22.5 30	225 300	22.5 30	225 300	0.715 0.86
1009	Bromotrifluoromethane (Refrigerant gas R13B1)	2 A	12	120	 4.2 12 25	 42 120 250	1.50 1.13 1.44 1.60
1010	1,3-butadiene, stabilized or 1,2-butadiene, stabilized or mixtures of 1,3-butadiene and hydrocarbons, stabilized	2 F	1 1 1	10 10 10	1 1 1	10 10 10	0.55 0.59 0.50

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
1011	Butane	2 F	1	10	1	10	0.51
1012	1-butylene or trans-2-butylene or cis-2-butylene or butylenes mixture	2 F	1 1 1 1	10 10 10 10	1 1 1 1	10 10 10 10	0.53 0.54 0.55 0.50
1013	Carbon dioxide	2 A	19 22.5	190 225	 19 25	 190 250	0.73 0.78 0.66 0.75
1014	Carbon dioxide and oxygen mixtures compressed	1 O	see 4.3.3.2.1				
1015	Carbon dioxide and nitrous oxide mixture	2 A	see 4.3.3.2.2 or 4.3.3.2.3				
1016	Carbon monoxide, compressed	1 TF	see 4.3.3.2.1				
1017	Chlorine	2 TC	1.7	17	1.9	19	1.25
1018	Chlorodifluoromethane (Refrigerant gas R22)	2 A	2.4	24	2.6	26	1.03
1020	Chloropentafluoroethane (Refrigerant gas R115)	2 A	2	20	2.3	23	1.08
1021	1-chloro-1,2,2,2- tetrafluoroethane (Refrigerant gas R124)	2 A	1	10	1.1	11	1.2
1022	Chlorotrifluoromethane (Refrigerant gas R13)	2 A	12 22.5	120 225	 10 12 19 25	 100 120 190 250	0.96 1.12 0.83 0.90 1.04 1.10
1023	Coal gas, compressed	1 TF	see 4.3.3.2.1				
1026	Cyanogen	2 TF	10	100	10	100	0.70
1027	Cyclopropane	2 F	1.6	1.6	1.8	1.8	0.53
1028	Dichlorodifluoromethane (Refrigerant gas R12)	2 A	1.5	15	1.6	16	1.15
1029	Dichlorofluoromethane (Refrigerant gas R21)	2 A	1	10	1	10	1.23

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
1030	1,1-difluoroethane (Refrigerant gas R152a)	2 F	1.4	14	1.6	16	0.79
1032	Dimethylamine, anhydrous	2 F	1	10	1	10	0.59
1033	Dimethyl ether	2 F	1.4	14	1.6	16	0.58
1035	Ethane	2 F	12	120	 9.5 12 30	 95 120 300	0.32 0.25 0.29 0.39
1036	Ethylamine	2 F	1	10	1	10	0.61
1037	Ethyl chloride	2 F	1	10	1	10	0.8
1038	Ethylene, refrigerated liquid	3 F	see 4.3.3.2.4				
1039	Ethyl methyl ether	2 F	1	10	1	10	0.64
1040	Ethylene oxide with nitrogen up to a total pressure of 1MPa (10 bar) at 50 °C	2 TF	1.5	15	1.5	15	0.78
1041	Ethylene oxide and carbon dioxide mixture, with more than 9% but not more than 87% ethylene oxide	2 F	2.4	24	2.6	26	0.73
1046	Helium, compressed	1 A	see 4.3.3.2.1				
1048	Hydrogen bromide, anhydrous	2 TC	5	50	5.5	55	1.54
1049	Hydrogen, compressed	1 F	see 4.3.3.2.1				
1050	Hydrogen chloride, anhydrous	2 TC	12	120	 10 12 15 20	 100 120 150 200	0.69 0.30 0.56 0.67 0.74
1053	Hydrogen sulphide	2 TF	4.5	45	5	50	0.67
1055	Isobutylene	2 F	1	10	1	10	0.52
1056	Krypton, compressed	1 A	see 4.3.3.2.1				

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
1058	Liquefied gases, non flammable, charged with nitrogen, carbon dioxide or air	2 A	1.5 × filling pressure see 4.3.3.2.2 or 4.3.3.2.3				
1060	Methylacetylene and propadiene mixture, stabilized:	2 F	see 4.3.3.2.2 or 4.3.3.2.3				
	mixture P1 mixture P2 propadiene with 1% to 4% methylacetylene		2.5 2.2 2.2	25 22 22	2.8 2.3 2.2	28 23 22	0.49 0.47 0.50
1061	Methylamine, anhydrous	2 F	1	10	1.1	11	0.58
1062	Methyl bromide with not more than 2% chloropicrin	2 T	1	10	1	10	1.51
1063	Methyl chloride (Refrigerant gas R40)	2 F	1.3	13	1.5	15	0.81
1064	Methyl mercaptan	2 TF	1	10	1	10	0.78
1065	Neon, compressed	1 A	see 4.3.3.2.1				
1066	Nitrogen, compressed	1 A	see 4.3.3.2.1				
1067	Dinitrogen tetroxide (nitrogen dioxide)	2 TOC	only in battery-vehicles and MEGCs composed of receptacles				
1070	Nitrous oxide	2 O	22.5	225	 18 22.5 25	 180 225 250	0.78 0.68 0.74 0.75
1071	Oil gas, compressed	1 TF	see 4.3.3.2.1				
1072	Oxygen, compressed	1 O	see 4.3.3.2.1				
1073	Oxygen, refrigerated liquid	3 O	see 4.3.3.2.4				
1076	Phosgene	2 TC	only in battery-vehicles and MEGCs composed of receptacles				
1077	Propylene	2 F	2.5	25	2.7	27	0.43

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
1078	Refrigerant gases, n.o.s. such as: mixture F1 mixture F2 mixture F3	2 A	 1 1.5 2.4	 10 15 24	 1.1 1.6 2.7	 11 16 27	 1.23 1.15 1.03
	other mixtures		see 4.3.3.2.2 or 4.3.3.2.3				
1079	Sulphur dioxide	2 TC	1	10	1.2	12	1.23
1080	Sulphur hexafluoride	2 A	12	120	 7 14 16	 70 140 160	1.34 1.04 1.33 1.37
1082	Trifluorochloroethylene, stabilized	2 TF	1.5	15	1.7	17	1.13
1083	Trimethylamine, anhydrous	2 F	1	10	1	10	0.56
1085	Vinyl bromide, stabilized	2 F	1	10	1	10	1.37
1086	Vinyl chloride, stabilized	2 F	1	10	1.1	11	0.81
1087	Vinyl methyl ether, stabilized	2 F	1	10	1	10	0.67
1581	Chloropicrin and methyl bromide mixture with more than 2% chloropicrin	2 T	1	10	1	10	1.51
1582	Chloropicrin and methyl chloride mixture	2 T	1.3	13	1.5	15	0.81
1612	Hexaethyl tetraphosphate and compressed gas mixture	1 T	see 4.3.3.2.1				
1749	Chlorine trifluoride	2 TOC	3	30	3	30	1.40
1858	Hexafluoropropylene (Refrigerant gas R 1216)	2A	1.7	17	1.9	19	1.11
1859	Silicon tetrafluoride	2 TC	20 30	200 300	20 30	200 300	0.74 1.10
1860	Vinyl fluoride, stabilized	2 F	12 22.5	120 225	 25	 250	0.58 0.65 0.64
1912	Methyl chloride and methylene chloride mixture	2 F	1.3	13	1.5	15	0.81

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
1913	Neon, refrigerated liquid	3 A	see 4.3.3.2.4				
1951	Argon, refrigerated liquid	3 A	see 4.3.3.2.4				
1952	Ethylene oxide and carbon dioxide mixture, with not more than 9% ethylene oxide	2 A	19 25	190 250	19 25	190 250	0.66 0.75
1953	Compressed gas, toxic, flammable, n.o.s.[a]	1 TF	see 4.3.3.2.1 or 4.3.3.2.2				
1954	Compressed gas, flammable n.o.s.	1 F	see 4.3.3.2.1 or 4.3.3.2.2				
1955	Compressed gas, toxic, n.o.s.[a]	1 T	see 4.3.3.2.1 or 4.3.3.2.2				
1956	Compressed gas, n.o.s.	1 A	see 4.3.3.2.1 or 4.3.3.2.2				
1957	Deuterium, compressed	1 F	see 4.3.3.2.1				
1958	1,2-dichloro-1,1,2,2-tetrafluoroethane (Refrigerant gas R114)	2 A	1	10	1	10	1.3
1959	1,1-difluoroethylene (Refrigerant gas R1132a)	2 F	12 22.5	120 225	 25	 250	0.66 0.78 0.77
1961	Ethane, refrigerated liquid	3 F	see 4.3.3.2.4				
1962	Ethylene	2 F	12 22.5	120 225	 22.5 30	 225 300	0.25 0.36 0.34 0.37
1963	Helium, refrigerated liquid	3 A	see 4.3.3.2.4				
1964	Hydrocarbon gas mixture, compressed, n.o.s.	1 F	see 4.3.3.2.1 or 4.3.3.2.2				

[a] *Allowed if LC_{50} equal to or greater than 200 ppm.*

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
1965	Hydrocarbon gas mixture, liquefied, n.o.s.	2 F					
	Mixture A		1	10	1	10	0.50
	Mixture A01		1.2	12	1.4	14	0.49
	Mixture A02		1.2	12	1.4	14	0.48
	Mixture A0		1.2	12	1.4	14	0.47
	Mixture A1		1.6	16	1.8	18	0.46
	Mixture B1		2	20	2.3	23	0.45
	Mixture B2		2	20	2.3	23	0.44
	Mixture B		2	20	2.3	23	0.43
	Mixture C		2.5	25	2.7	27	0.42
	Other mixtures		see 4.3.3.2.2 or 4.3.3.2.3				
1966	Hydrogen, refrigerated liquid	3 F	see 4.3.3.2.4				
1967	Insecticide gas, toxic, n.o.s.[a]	2 T	see 4.3.3.2.2 or 4.3.3.2.3				
1968	Insecticide gas, n.o.s.	2 A	see 4.3.3.2.2 or 4.3.3.2.3				
1969	Isobutane	2 F	1	10	1	10	0.49
1970	Krypton, refrigerated liquid	3 A	see 4.3.3.2.4				
1971	Methane, compressed or natural gas, compressed with high methane content	1 F	see 4.3.3.2.1				
1972	Methane, refrigerated liquid or natural gas, refrigerated liquid with high methane content	3 F	see 4.3.3.2.4				
1973	Chlorodifluoromethane and chloropentafluoroethane mixture with fixed boiling point, with approximately 49% chlorodifluoromethane (Refrigerant gas R502)	2 A	2.5	25	2.8	28	1.05
1974	Chlorodifluorobromomethane (Refrigerant gas R12B1)	2 A	1	10	1	10	1.61
1976	Octafluorocyclobutane (Refrigerant gas RC318)	2 A	1	10	1	10	1.34
1977	Nitrogen, refrigerated liquid	3 A	see 4.3.3.2.4				
1978	Propane	2 F	2.1	21	2.3	23	0.42

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
1979	Rare gases mixture, compressed	1 A	see 4.3.3.2.1				
1980	Rare gases and oxygen mixture, compressed	1 A	see 4.3.3.2.1				
1981	Rare gases and nitrogen mixture, compressed	1 A	see 4.3.3.2.1				
1982	Tetrafluoromethane (Refrigerant gas R14)	2 A	20 30	200 300	20 30	200 300	0.62 0.94
1983	1-chloro-2,2,2-trifluoroethane (Refrigerant gas R133a)	2 A	1	10	1	10	1.18
1984	Trifluoromethane (Refrigerant gas R23)	2 A	19 25	190 250	 19 25	 190 250	0.92 0.99 0.87 0.95
2034	Hydrogen and methane mixture, compressed	1 F	see 4.3.3.2.1				
2035	1,1,1-trifluoroethane (Refrigerant gas R143a)	2 F	2.8	28	3.2	32	0.79
2036	Xenon	2 A	12	120	 13	 130	1.30 1.24
2044	2,2-dimethylpropane	2 F	1	10	1	10	0.53
2073	Ammonia solutions, relative density less than 0.880 at 15 °C in water, with more than 35% and not more than 40% ammonia with more than 40% and not more than 50% ammonia	4 A	 1 1.2	 10 12	 1 1.2	 10 12	 0.80 0.77
2187	Carbon dioxide, refrigerated liquid	3 A	see 4.3.3.2.4				
2189	Dichlorosilane	2 TFC	1	10	1	10	0.90
2191	Sulfuryl fluoride	2 T	5	50	5	50	1.1
2193	Hexafluoroethane (Refrigerant gas R116)	2 A	16 20	160 200	 20	 200	1.28 1.34 1.10
2197	Hydrogen iodide, anhydrous	2 TC	1.9	19	2.1	21	2.25

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
2200	Propadiene, stabilized	2 F	1.8	18	2.0	20	0.50
2201	Nitrous oxide, refrigerated liquid	3 O	see 4.3.3.2.4				
2203	Silane [b]	2 F	22.5 25	225 250	22.5 25	225 250	0.32 0.36
2204	Carbonyl sulphide	2 TF	2.7	27	3.0	30	0.84
2417	Carbonyl fluoride	2 TC	20 30	200 300	20 30	200 300	0.47 0.70
2419	Bromotrifluoroethylene	2 F	1	10	1	10	1.19
2420	Hexafluoroacetone	2 TC	1.6	16	1.8	18	1.08
2422	Octafluorobut-2-ene (Refrigerant gas R1318)	2 A	1	10	1	10	1.34
2424	Octafluoropropane (Refrigerant gas R218)	2 A	2.1	21	2.3	23	1.07
2451	Nitrogen trifluoride	2 O	20 30	200 300	20 30	200 300	0.50 0.75
2452	Ethylacetylene, stabilized	2 F	1	10	1	10	0.57
2453	Ethyl fluoride (Refrigerant gas R161)	2 F	2.1	21	2.5	25	0.57
2454	Methyl fluoride (Refrigerant gas R41)	2 F	30	300	30	300	0.36
2517	1-chloro-1,1-difluoroethane (Refrigerant gas R142b)	2 F	1	10	1	10	0.99
2591	Xenon, refrigerated liquid	3 A	see 4.3.3.2.4				
2599	Chlorotrifluoromethane and trifluoromethane, azeotropic mixture with approximately 60% chlorotrifluoromethane (Refrigerant gas R503)	2 A	3.1 4.2 10	31 42 100	3.1 4.2 10	31 42 100	0.11 0.21 0.76 0.20 0.66
2600	Carbon monoxide and hydrogen mixture, compressed	1 TF	see 4.3.3.2.1				

[b] *Considered as pyrophoric.*

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
2601	Cyclobutane	2 F	1	10	1	10	0.63
2602	Dichlorodifluoromethane and difluoro-1,1 ethane, azeotropic mixture with approximately 74% dichlorodifluoromethane (Refrigerant gas R500)	2 A	1.8	18	2	20	1.01
2901	Bromine chloride	2 TOC	1	10	1	10	1.50
3057	Trifluoroacetyl chloride	2 TC	1.3	13	1.5	15	1.17
3070	Ethylene oxide and dichlorodifluoromethane mixture with not more than 12.5% ethylene oxide	2 A	1.5	15	1.6	16	1.09
3083	Perchloryl fluoride	2 TO	2.7	27	3.0	30	1.21
3136	Trifluoromethane, refigerated liquid	3 A	See 4.3.3.2.4				
3138	Ethylene, acetylene propylene in mixture, refrigerated liquid, containing at least 71.5% ethylene with not more than 22.5% acetylene and not more than 6% propylene	3 F	see 4.3.3.2.4				
3153	Perfluoro(methyl vinyl ether)	2 F	1.4	14	1.5	15	1.14
3154	Perfluoro(ethyl vinyl ether)	2 F	1	10	1	10	0.98
3156	Compressed gas, oxidizing, n.o.s.	1 O	see 4.3.3.2.1 or 4.3.3.2.2				
3157	Liquefied gas, oxidizing, n.o.s.	2 O	see 4.3.3.2.2 or 4.3.3.2.3				
3158	Gas, refrigerated liquid, n.o.s.	3 A	see 4.3.3.2.4				
3159	1,1,1,2-tetrafluoroethane (Refrigerant gas R134a)	2 A	1.6	16	1.8	18	1.04
3160	Liquefied gas, toxic, flammable, n.o.s. [a]	2 TF	see 4.3.3.2.2 or 4.3.3.2.3				
3161	Liquefied gas, flammable, n.o.s.	2 F	see 4.3.3.2.2 or 4.3.3.2.3				

[a] *Allowed if LC_{50} equal to or greater than 200 ppm.*

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
3162	Liquefied gas, toxic, n.o.s. [a]	2 T	see 4.3.3.2.2 or 4.3.3.2.3				
3163	Liquefied gas, n.o.s.	2 A	see 4.3.3.2.2 or 4.3.3.2.3				
3220	Pentafluoroethane (Refrigerant gas R125)	2 A	4.1	41	4.9	49	0.95
3252	Difluoromethane (Refrigerant gas R32)	2 F	3.9	39	4.3	43	0.78
3296	Heptafluoropropane (Refrigerant gas R227)	2 A	1.4	14	1.6	16	1.20
3297	Ethylene oxide and chlorotetrafluoroethane mixture, with not more than 8.8% ethylene oxide	2 A	1	10	1	10	1.16
3298	Ethylene oxide and pentafluoroethane mixture, with not more than 7.9% ethylene oxide	2 A	2.4	24	2.6	26	1.02
3299	Ethylene oxide and tetrafluoroethane mixture, with not more than 5.6% ethylene oxide	2 A	1.5	15	1.7	17	1.03
3300	Ethylene oxide and carbon dioxide mixture, with more than 87% ethylene oxide	2 TF	2.8	28	2.8	28	0.73
3303	Compressed gas, toxic, oxidizing, n.o.s. [a]	1 TO	see 4.3.3.2.1 or 4.3.3.2.2				
3304	Compressed gas, toxic, corrosive, n.o.s. [a]	1 TC	see 4.3.3.2.1 or 4.3.3.2.2				
3305	Compressed gas, toxic, flammable, corrosive, n.o.s. [a]	1 TFC	see 4.3.3.2.1 or 4.3.3.2.2				
3306	Compressed gas, toxic, oxidizing, corrosive, n.o.s. [a]	1 TOC	see 4.3.3.2.1 or 4.3.3.2.2				
3307	Liquefied gas, toxic, oxidizing, n.o.s. [a]	2 TO	see 4.3.3.2.2 or 4.3.3.2.3				

[a] *Allowed if LC_{50} equal to or greater than 200 ppm.*

	Name	Classification code	Minimum test pressure for tanks				Maximum permissible mass of contents per litre of capacity
			With thermal insulation		Without thermal insulation		
			MPa	bar	MPa	bar	kg
3308	Liquefied gas, toxic, corrosive, n.o.s. [a]	2 TC	see 4.3.3.2.2 or 4.3.3.2.3				
3309	Liquefied gas, toxic, flammable, corrosive, n.o.s. [a]	2 TFC	see 4.3.3.2.2 or 4.3.3.2.3				
3310	Liquefied gas, toxic, oxidizing, corrosive, n.o.s. [a]	2 TOC	see 4.3.3.2.2 or 4.3.3.2.3				
3311	Gas, refrigerated liquid, oxidizing, n.o.s.	3 O	see 4.3.3.2.4				
3312	Gas, refrigerated liquid, flammable, n.o.s.	3 F	see 4.3.3.2.4				
3318	Ammonia solutions, relative density less than 0.880 at 15 °C in water, with more than 50% ammonia	4 TC	see 4.3.3.2.2				
3337	Refrigerant gas R404A	2 A	2.9	29	3.2	32	0.84
3338	Refrigerant gas R407A	2 A	2.8	28	3.2	32	0.95
3339	Refrigerant gas R407B	2 A	3.0	30	3.3	33	0.95
3340	Refrigerant gas R407C	2 A	2.7	27	3.0	30	0.95
3354	Insecticide gas, flammable, n.o.s.	2 F	see 4.3.3.2.2 or 4.3.3.2.3				
3355	Insecticide gas, toxic, flammable, n.o.s. [a]	2 TF	see 4.3.3.2.2 or 4.3.3.2.3				

4.3.3.3 ***Operation***

4.3.3.3.1 When tanks, battery-vehicles or MEGCs are approved for different gases, the change of use shall include emptying, purging and evacuation operations to the extent necessary for safe operation.

4.3.3.3.2 When tanks, battery-vehicles or MEGCs are handed over for carriage, only the particulars specified in 6.8.3.5.6 applicable to the gas loaded or just discharged shall be visible; all particulars concerning other gases shall be covered up.

4.3.3.3.3 All the elements of a battery-vehicle or MEGC shall contain only one and the same gas.

[a] *Allowed if LC_{50} equal to or greater than 200 ppm.*

4.3.3.4 (*Reserved)*

4.3.4 Special provisions applicable to Classes 3 to 9

4.3.4.1 ***Coding, rationalized approach and hierarchy of tanks***

4.3.4.1.1 *Coding of tanks*

The four parts of the codes (tank codes) given in Column (12) of Table A in Chapter 3.2 have the following meanings:

Part	Description	Tank code
1	Types of tank	L = tank for substances in the liquid state (liquids or solids handed over for carriage in the molten state); S = tank for substances in the solid state (powdery or granular).
2	Calculation pressure	G = minimum calculation pressure according to the general requirements of 6.8.2.1.14; or 1.5; 2.65; 4; 10; 15 or 21= minimum calculation pressure in bar (see 6.8.2.1.14).
3	Openings (see 6.8.2.2.2)	A = tank with bottom-filling and discharge openings with 2 closures; B = tank with bottom-filling and discharge openings with 3 closures; C = tank with top-filling and discharge openings with only cleaning openings below the surface of the liquid; D = tank with top-filling and discharge openings with no openings below the surface of the liquid.
4	Safety valves/devices	V = tank with a venting system, according to 6.8.2.2.6, but no flame trap; or non-explosion-pressure proof tank; F = tank with a venting system, according to 6.8.2.2.6, fitted with a flame trap; or explosion-pressure proof tank; N = tank with a safety valve according to 6.8.2.2.7 or 6.8.2.2.8 and not hermetically closed; these tanks may be fitted with vacuum valves; H = hermetically closed tank (see 1.2.1).

4.3.4.1.2 *Rationalized approach for assignment of ADR tank codes to groups of substances and hierarchy of tanks*

NOTE: *Certain substances and groups of substances are not included in the rationalized approach, see 4.3.4.1.3*

Rationalized approach				Hierarchy of tanks
Tank code	**Group of permitted substances**			**Other tank codes permitted for substances under this code**
	Class	**Classification code**	**Packing group**	
LIQUIDS LGAV	3 9	F2 M9	III III	LGBV; LGBF; L1.5BN; L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH
LGBV	4.1 5.1 9 and groups of permitted substances for tank code LGAV	F2 O1 M6 M11	II, III III III III	LGBF; L1.5BN; L4BV; L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH
LGBF	3 3 3 3 and groups of permitted substances for tank codes LGAV and LGBV	F1 F1 D D	II vapour pressure at 50 °C ≤ 1.1 bar III II vapour pressure at 50 °C ≤ 1.1 bar III	L1.5BN; L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH
L1.5BN	3 3 3 and groups of permitted substances for tank codes LGAV, LGBV and LGBF	F1 F1 D 	I, II 1.1 bar < vapour pressure at 50 °C ≤ 1.75 bar III flashpoint <23°C, viscous, 1.1bar < vapour pressure at 50°C ≤ 1.75bar I, II 1.1bar < vapour pressure at 50°C ≤ 1.75bar	L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH.
L4BV	5.1	O1	-	-
L4BN	3 3 5.1 8 	F1 FC D O1 OT1 C1 C3 C4 C5 C7 C8 C9 C10 CF1 CF2	I, III vapour pressure at 50 °C>1.75 bar III I vapour pressure at 50°C>1.75 bar I, II I II, III II, III II, III II, III II, III II, III II, III II, III II II	L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH.

Rationalized approach				Hierarchy of tanks
Tank code	**Group of permitted substances**			**Other tank codes permitted for substances under this code**
	Class	**Classification code**	**Packing group**	
L4BN (cont'd)		CS1	II	
		CW1	II	
		CW2	II	
		CO1	II	
		CO2	II	
		CT1	II, III	
		CT2	II, III	
		CFT	II	
		M11	III	
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF and L1.5BN			
L4BH	3	FT1	II, III	L4DH; L10BH; L10CH; L10DH; L15CH; L21DH.
		FT2	II	
		FC	II	
		FTC	II	
	6.1	T1	II, III	
		T2	II, III	
		T3	II, III	
		T4	II, III	
		T6	II, III	
		T7	II, III	
		TF1	II	
		TF2	II, III	
		TF3	II	
		TS	II	
		TW1	II	
		TW2	II	
		TO1	II	
		TO2	II	
		TC1	II	
		TC2	II	
		TC3	II	
		TC4	II	
		TFC	II	
	6.2	Risk group 2		
		I3	II	
	9	M2	II	
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN and L4BN			
L4DH	4.2	S1	II, III	L10DH; L21DH
		S3	II, III	
		ST1	II, III	
		ST3	II, III	
		SC1	II, III	
		SC3	II, III	
	4.3	W1	II, III	
		WF1	II, III	
		WT1	II, III	
		WC1	II, III	
	8	CT1	II, III	
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN and L4BH			

Rationalized approach				Hierarchy of tanks
Tank code	**Group of permitted substances**			**Other tank codes permitted for substances under this code**
	Class	**Classification code**	**Packing group**	
L10BH	8	C1	I	L10CH; L10DH; L15CH; L21DH
		C3	I	
		C4	I	
		C5	I	
		C7	I	
		C8	I	
		C9	I	
		C10	I	
		CF1	I	
		CF2	I	
		CS1	I	
		CW1	I	
		CW2	I	
		CO1	I	
		CO2	I	
		CT1	I	
		CT2	I	
		COT	I	
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, and L4BH			
L10CH	3	FT1	I	L10DH; L15CH; L21DH
		FT2	I	
		FC	I	
		FTC	I	
	6.1	T1	I	
		T2	I	
		T3	I	
		T4	I	
		T6	I	
		T7	I	
		TF1	I	
		TF2	I	
		TF3	I	
		TS	I	
		TW1	I	
		TO1	I	
		TC1	I	
		TC2	I	
		TC3	I	
		TC4	I	
		TFC	I	
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, and L10BH			
L10DH	4.3	W1	I	L21DH
		WF1	I	
		WT1	I	
		WC1	I	
		WFC	I	
	5.1	OTC	I	
	8	CT1	I	
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, L4DH, L10BH and L10CH			

Rationalized approach				Hierarchy of tanks
Tank code	**Group of permitted substances**			**Other tank codes permitted for substances under this code**
	Class	**Classification code**	**Packing group**	
L15CH	3 6.1	FT1 TF1	I I	L21DH
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, L10BH and L10CH			
L21DH	4.2	S1 S3 SW ST3	I I I I	
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, L4DH, L10BH, L10CH, L10DH and L15CH			
SOLIDS SGAV	4.1 4.2 5.1 8 9	F1 F3 S2 S4 O2 C2 C4 C6 C8 C10 CT2 M7 M11	III III II, III III II, III II, III III III III II, III III III II, III	SGAN; SGAH; S4AH; S10AN; S10AH.
SGAN	4.1 4.2 4.3 5.1 8 	F1 F3 FT1 FT2 FC1 FC2 S2 S4 ST2 ST4 SC2 SC4 W2 WF2 WS WT2 WC2 O2 OT2 OC2 C2 C4 C6 C8 C10 CF2 CS2 CW2 CO2 CT2	II II II, III II, III II, III II, III II II, III II, III II, III II, III II, III II, III II II, III II, III II, III II, III II, III II II II II II II II II II II	SGAH; S4AH; S10AN; S10AH.

Rationalized approach				Hierarchy of tanks
Tank code	**Group of permitted substances**			**Other tank codes permitted for substances under this code**
	Class	**Classification code**	**Packing group**	
SGAN *(cont'd)*	9	M3	III	
	and groups of permitted substances for tank codes SGAV			
SGAH	6.1	T2	II, III	S4AH; S10AH
		T3	II, III	
		T5	II, III	
		T7	II, III	
		T9	II	
		TF3	II	
		TS	II	
		TW2	II	
		TO2	II	
		TC2	II	
		TC4	II	
	9	M1	II, III	
	and groups of permitted substances for tanks codes SGAV and SGAN			
S4AH	6.2	I3	II	S10AH
	9	M2	II	
	and groups of permitted substances for tanks codes SGAV, SGAN and SGAH			
S10AN	8	C2	I	S10AH
		C4	I	
		C6	I	
		C8	I	
		C10	I	
		CF2	I	
		CS2	I	
		CW2	I	
		CO2	I	
		CT2	I	
	and groups of permitted substances for tank codes SGAV and SGAN			
S10AH	6.1	T2	I	
		T3	I	
		T5	I	
		T7	I	
		TS	I	
		TW2	I	
		TO2	I	
		TC2	I	
		TC4	I	
	and groups of permitted substances for tank codes SGAV, SGAN, SGAH and S10AN			

***NOTE**: This hierarchy does not take account of any special provisions for each entry (see 4.3.5 and 6.8.4)*

The list of tank codes permitted under the hierarchy of tanks given in the table above is not necessarily complete. This table is limited to the tank codes that are indicated in Table A of Chapter 3.2. Tanks with tank codes different from those indicated in this table or in Table A of Chapter 3.2 may also be used provided that the first part of the code (L or S) remains unchanged and that any other element (number or letter) of parts 2 to 4 of these tank codes correspond to a level of safety at least equivalent to the corresponding element of the tank code indicated in Table A of Chapter 3.2, according to the following increasing order:

Part 2: Calculation pressure
G → 1.5 → 2.65 → 4 → 10 → 15 → 21 bar
Part 3: Openings
A → B → C → D
Part 4: Safety valves/devices
V → F → N → H

For example, a tank with the tank code L10CN is authorized for the carriage of a substance to which the tank code L4BN has been assigned.

4.3.4.1.3 The following substances and groups of substances in respect of which a "(+)" is given after the tank code in Column (12) of Table A in Chapter 3.2 are subject to special provisions. In that case the alternate use of the tanks for other substances and groups of substances is permitted only where this is specified in the certificate of type approval. The hierarchy in 4.3.4.1.2 is not applicable. However, higher value tanks according to the provisions at the end of the table in 4.3.4.1.2 may be used with due regard to the special provisions indicated in Column (13) of Table A in Chapter 3.2.

(a) Class 4.1:

UN No. 2448 sulphur, molten: code LGBV;

(b) Class 4.2:

UN No. 1381 phosphorus, white or yellow, dry, or under water or in solution and UN No. 2447 phosphorus, white or yellow molten: code L10DH;

(c) Class 4.3:

UN No. 1389 alkali metal amalgam, UN No. 1391 alkali metal dispersion or alkaline earth metal dispersion, UN No. 1392 alkaline earth metal amalgam, UN No. 1415 lithium, UN No. 1420 potassium metal alloys, UN No. 1421 alkali metal alloy, liquid, n.o.s, UN No. 1422 potassium sodium alloys, UN No. 1428 sodium and UN No. 2257 potassium: code L10BN;

UN No. 1407 caesium and UN No. 1423 rubidium: code L10CH;

(d) Class 5.1:

UN No. 1873 perchloric acid 50-72%: code L4DN;

UN No. 2015 hydrogen peroxide, aqueous solution, stabilized with more than 70% hydrogen peroxide: code L4DV;

UN No. 2015 hydrogen peroxide, aqueous solution, stabilized with 60-70% hydrogen peroxide: code L4BV;

UN No. 2014 hydrogen peroxide, aqueous solution with 20-60% hydrogen peroxide, and UN No. 3149 hydrogen peroxide and peroxyacetic acid mixture, stabilized: code L4BV;

(e) Class 5.2:

UN No. 3109 organic peroxide type F, liquid and UN No. 3119 organic peroxide, type F, liquid temperature controlled: code L4BN;

UN No. 3110 organic peroxide, type F, solid and UN No. 3120 organic peroxide, type F, solid, temperature controlled: code S4AN;

(f) Class 6.1:

UN No. 1613 hydrogen cyanide, aqueous solution and UN No. 3294 hydrogen cyanide solution in alcohol: code L15DH;

(g) Class 7:

All substances: special tanks;

Minimum requirements for liquids: code L2,65CN; for solids: code S2,65AN

Notwithstanding the general requirements of this paragraph, tanks used for radioactive material may also be used for the carriage of other goods provided the requirements of 5.1.3.2 are complied with.

(h) Class 8:

UN No. 1052 hydrogen fluoride, anhydrous and UN No. 1790 hydrofluoric acid, solution, with more than 85% hydrofluoric acid: code L21DH;

UN No. 1744 bromine or bromine solution: code L21DH;

UN No. 1791 hypochlorite solution and UN No. 1908 chlorite solution: code L4BV.

4.3.4.1.4 Tanks intended for the carriage of liquid wastes complying with the requirements of Chapter 6.10 and equipped with two closures in accordance with 6.10.3.2, shall be assigned to tank code L4AH. If the tanks concerned are equipped for the alternate carriage of liquid and solid substances, they shall be assigned to the combined codes L4AH+S4AH.

4.3.4.2 ***General provisions***

4.3.4.2.1 Where hot substances are loaded, the temperature of the outer surface of the tank or of the thermal insulation shall not exceed 70 °C during carriage.

4.3.4.2.2 The connecting pipes between independent but interconnected tanks of a transport unit shall be empty during carriage. Flexible filling and discharge pipes which are not permanently connected to the shells shall be empty during carriage.

4.3.4.2.3 *(Reserved)*

4.3.5 Special provisions

When they are shown under an entry in Column (13) of Table of A in Chapter 3.2, the following special provisions apply:

TU1 The tanks shall not be handed over for carriage until the substance has solidified completely and been covered by an inert gas. Uncleaned empty tanks which have contained these substances shall be filled with an inert gas.

TU2 The substance shall be covered by an inert gas. Uncleaned empty tanks which have contained these substances shall be filled with an inert gas.

TU3 The inside of the shell and all parts liable to come into contact with the substance shall be kept clean. No lubricant capable of combining dangerously with the substance shall be used for pumps, valves or other devices.

TU4 During carriage, these substances shall be under a layer of inert gas, the gauge pressure of which shall not be less than 50 kPa (0.5 bar).

Uncleaned empty tanks which have contained these substances shall when handed over for carriage be filled with an inert gas at a gauge pressure of at least 50 kPa (0.5 bar).

TU5 *(Reserved)*

TU6 Not authorized for carriage in tanks, battery-vehicles and MEGCs when having a LC_{50} lower than 200 ppm.

TU7 The materials used to ensure leakproofness of the joints or for the maintenance of the closures shall be compatible with the contents.

TU8 An aluminium-alloy tank shall not be used for carriage unless the tank is reserved solely for such carriage and the acetaldehyde is free from acid.

TU9 UN No.1203 petrol (gasoline) with a vapour pressure at 50 °C of more than 110 kPa (1.1 bar) but not above 150 kPa (1.5 bar) may also be carried in tanks designed according to 6.8.2.1.14 (a) and having equipment conforming to 6.8.2.2.6.

TU10 *(Reserved)*

TU11 During filling, the temperature of this substance shall not exceed 60 °C. A maximum filling temperature of 80 °C is allowed provided that smoulder spots are prevented and that the following conditions are met. After filling, the tanks shall be pressurized (e.g. with compressed air) to check tightness. It shall be ensured that no depressurization takes place during carriage. Before discharge, it shall be checked if pressure in the tanks is still above atmospheric. If this is not the case, an inert gas shall be introduced into the tanks prior to discharge.

TU12 In the event of a change of use, shells and equipment shall be thoroughly cleansed of all residues before and after the carriage of this substance.

TU13 Tanks shall be free from impurities at the time of filling. Service equipment such as valves and external piping shall be emptied after filling or discharging.

TU14 The protective caps of closures shall be locked during carriage.

TU15 Tanks shall not be used for the carriage of foodstuffs, articles of consumption or animal feeds.

TU16 Uncleaned empty tanks, shall, when handed over for carriage, either:

- be filled with nitrogen; or

- be filled with water to not less than 96% and not more than 98% of their capacity; between 1 October and 31 March, this water shall contain sufficient anti-freeze agent to make it impossible for the water to freeze during carriage; the anti-freeze agent shall be free from corrosive action and not liable to react with phosphorus.

TU17 Only to be carried in battery-vehicles or MEGCs the elements of which are composed of receptacles.

TU18 The degree of filling shall remain below the level at which, if the contents were raised to a temperature at which the vapour pressure equalled the opening pressure of the safety valve, the volume of the liquid would reach 95% of the tank's capacity at that temperature. The provision in 4.3.2.3.4 shall not apply.

TU19 Tanks may be filled to 98% at the filling temperature and pressure. The provision in 4.3.2.3.4 shall not apply.

TU20 *(Reserved)*

TU21 The substance shall, if water is used as a protective agent, be covered with a depth of not less than 12 cm of water at the time of filling; the degree of filling at a temperature of 60 °C shall not exceed 98%. If nitrogen is used as a protective agent, the degree of filling at a temperature of 60 °C shall not exceed 96%. The remaining space shall be filled with nitrogen in such a way that, even after cooling, the pressure at no time falls below atmospheric pressure. The tank shall be closed in such a way that no leakage of gas occurs.

TU22 Tanks shall be filled to not more than 90% of their capacity; a space of 5% shall remain empty when the liquid is at an average temperature of 50 °C.

TU23 The degree of filling shall not exceed 0.93 kg per litre of capacity, if filling is by mass. If filling is by volume, the degree of filling shall not exceed 85%.

TU24 The degree of filling shall not exceed 0.95 kg per litre of capacity, if filling is by mass. If filling is by volume, the degree of filling shall not exceed 85%.

TU25 The degree of filling shall not exceed 1.14 kg per litre of capacity, if filling is by mass. If filling is by volume, the degree of filling shall not exceed 85%.

TU26 The degree of filling shall not exceed 85%.

TU27 Tanks shall not be filled to more than 98% of their capacity.

TU28 Tanks shall be filled to not more than 95% of their capacity at a reference temperature of 15 °C.

TU29 Tanks shall be filled to not more than 97% of their capacity and the maximum temperature after filling shall not exceed 140 °C.

TU30 Tanks shall be filled as set out in the test report for the type approval of the tank but shall be filled to not more than 90% of their capacity.

TU31 Tanks shall not be filled to more than 1 kg per litre of capacity.

TU32 Tanks shall not be filled to more than 88% of their capacity.

TU33 Tanks shall be filled to not less than 88% and not more than 92% of their capacity or to 2.86 kg per litre of capacity.

TU34 Tanks shall not be filled to more than 0.84 kg per litre of capacity.

TU35 Empty fixed tanks (tank-vehicles), empty demountable tanks and empty tank-containers, uncleaned, which have contained these substances are not subject to the requirements of ADR if adequate measures have been taken to nullify any hazard.

TU36 The degree of filling according to 4.3.2.2, at the reference temperature of 15 °C, shall not exceed 93% of the capacity.

CHAPTER 4.4

USE OF FIBRE-REINFORCED PLASTICS (FRP) FIXED TANKS (TANK-VEHICLES), DEMOUNTABLE TANKS, TANK-CONTAINERS AND TANK SWAP BODIES

NOTE: *For portable tanks, see Chapter 4.2; for fixed tanks (tank-vehicles), demountable tanks, tank-containers and tank swap bodies, with shells made of metallic materials, and battery-vehicles and multiple elements gas containers (MEGCs), see Chapter 4.3; for vacuum operated waste containers, see Chapter 4.5.*

4.4.1 General

The carriage of dangerous substances in fibre-reinforced plastics (FRP) tanks is permitted only when the following conditions are met:

(a) The substance is classified in Class 3, 5.1, 6.1, 6.2, 8 or 9;

(b) The maximum vapour pressure (absolute pressure) at 50 °C of the substance does not exceed 110 kPa (1.1 bar);

(c) The carriage of the substance in metallic tanks is authorized according to 4.3.2.1.1;

(d) The calculation pressure specified for that substance in part 2 of the tank code given in Column (12) of Table A in Chapter 3.2 does not exceed 4 bar (see also 4.3.4.1.1) and,

(e) The tank complies with the provisions of Chapter 6.9 applicable for the carriage of the substance.

4.4.2 Operation

4.4.2.1 The provisions of 4.3.2.1.5 to 4.3.2.2.4, 4.3.2.3.3 to 4.3.2.3.6, 4.3.2.4.1, 4.3.2.4.2, 4.3.4.1 and 4.3.4.2 shall apply.

4.4.2.2 The temperature of the substance carried shall not exceed, at the time of filling, the maximum service temperature indicated on the tank plate referred to in 6.9.6.

4.4.2.3 When applicable to carriage in metallic tanks, the special provisions (TU) of 4.3.5 shall also apply, as indicated in Column (13) of Table A in Chapter 3.2.

CHAPTER 4.5

USE OF VACUUM OPERATED WASTE TANKS

NOTE: *For portable tanks, see Chapter 4.2; for fixed tanks (tank-vehicles), demountable tanks, tank-containers and tank swap bodies, with shells made of metallic materials, and battery-vehicles and multiple elements gas containers (MEGCs), see Chapter 4.3; for fibre reinforced plastics tanks, see Chapter 4.4.*

4.5.1 Use

4.5.1.1 Wastes consisting of substances in Classes 3, 4.1, 5.1, 6.1, 6.2, 8 and 9 may be carried in vacuum-operated waste tanks conforming to Chapter 6.10 if their carriage in fixed tanks, demountable tanks, tank-containers or tank swap bodies is permitted according to Chapter 4.3. Substances assigned to tank code L4BH in Column (12) of Table A of Chapter 3.2 or to another tank code permitted under the hierarchy in 4.3.3.1.2 may be carried in vacuum operated waste tanks with the letter "A" or "B" in part 3 of the tank code, as indicated in No. 9.5 of the vehicle approval certificate conforming to 9.1.2.1.5.

4.5.2 Operation

4.5.2.1 The provisions of Chapter 4.3 except those of 4.3.2.2.4 and 4.3.2.3.3 apply to the carriage in vacuum operated waste tanks and are supplemented by the provisions of 4.5.2.2 to 4.5.2.4 below.

4.5.2.2 For carriage of liquids classified as flammable, vacuum-operated waste tanks shall be filled through fillings which discharge into the tank at a low level. Provisions shall be made to minimize the production of spray.

4.5.2.3 When discharging flammable liquids with a flash-point below 23° C by using air pressure, the maximum allowed pressure is 100 kPa (1 bar).

4.5.2.4 The use of tanks fitted with an internal piston operating as a compartment wall is allowed only when the substances on either side of the wall (piston) do not react dangerously with each other (see 4.3.2.3.6).