

INF. 23

**Joint Meeting of the RID Safety Committee
and the Working Party on the Transport of
of Dangerous Goods**
(Geneva, 13-24 March 2000)

RESTRUCTURING OF RID/ADR

Chapter 4.3

ADR version of Chapter 4.3 resulting from the revision of TRANS/WP.15/AC.1/1999/4/Rev.1 by the Joint meeting editorial group.

GE.00-

CHAPTER 4.3

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

Note: For use of portable tanks see Chapter 4.2, for fiber-reinforced plastics tanks see Chapter 4.4, for vacuum operated waste tanks see Chapter 4.5.

4.3.1 General provisions for application Scope

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

- ~~tank-vehicles (fixed tanks)~~ 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 ~~requirements~~ provisions apply to

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

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

4.3.1.5 For transitional measures for use see section

| | |
|-------|-------|
| 1.6.3 | 1.6.4 |
|-------|-------|

4.3.2 Requirements Provisions applicable to all classes

4.3.2.1 Use

4.3.2.1.1 A substance [or article] of ADR may be carried in ~~tank-vehicles (fixed tanks)~~ fixed tanks (tank-vehicles), ~~vehicles with~~ demountable tanks and battery-vehicles or 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 of Chapter 3.2.

4.3.2.1.2 The required type of tank ~~made of metallic materials~~, battery-vehicle and MEGC is given in code form in column [12] of Table A of 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 of tank made of metallic materials, of battery wagon/ battery vehicle and of MEGC which is given in coded form in column [12] of table A of Chapter 3.2, according to 4.3.2.1.2 corresponds to the least stringent construction requirements which are acceptable for the dangerous substance in question. It is possible to use tanks corresponding to codes prescribing a higher minimum calculation pressure, arrangements or more stringent requirements for bottom filling or bottom 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, metal tanks, battery-vehicles or MEGCs are subject to additional requirements provisions which are included as special provisions in column [13] of Table A of 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 whose the carriage of which they have been approved according to 6.8.3.2.1 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 the material. Foodstuffs shall not be carried in these tanks unless the necessary steps have been taken to prevent any harm to public health. 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.

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 *Rates 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):

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

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

$$\text{degree of filling} = \frac{98}{1 + a (50 - t_F)} \% \text{ of capacity}$$

¹

An exception is made for tanks intended for the carriage of substances of Class 5.2 or 7 (see 4.3.4.1.4).

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

$$\text{degree of filling} = \frac{97}{1 + a (50 - t_F)} \% \text{ of capacity}$$

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

$$\text{degree of filling} = \frac{95}{1 + a (50 - t_F)} \% \text{ of capacity}$$

4.3.2.2.2 In these formulae, " 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.

" is calculated by the formula:

$$a = \frac{d_{15} - d_{50}}{35 \times d_{50}}$$

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 ² 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 ~~Service~~ 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

4.3.2.3.2 6.8.2.1.17 and 6.8.2.1.18

| 6.8.2.1.17 to 6.8.1.20

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 overturning³. If the

² Under this provision, substances whose kinematic viscosity at 20 °C is below 2680 mm²/s shall be deemed to be liquids.

³ Examples of protection of shells:

tanks, including the service equipment, are so constructed as to withstand impact or overturning they need not be protected in this way.

4.3.2.3.3 During ~~loading~~ filling and ~~unloading~~ 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 a 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 ~~shell~~ 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 and TU16 may apply.

4.3.2.4.1 No dangerous residue of the filling substance shall adhere to the outside of the ~~shell~~ 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 ~~in to~~ the same degree as ~~though~~ if they were full.

4.3.2.4.3 Empty ~~tank vehicles (fixed tanks)~~ fixed tanks (tank-vehicles), ~~vehicles with 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] ~~checks~~ for undergoing the inspection.

-
- 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 real impact, may, for example, consist of a bumper or frame.

4.3.3 Special requirements provisions applicable to Class 2

4.3.3.1 Coding of tanks and ranking hierarchy of tanks

4.3.3.1.1 Coding of tanks, battery-vehicles and MEGCs

The four sections parts of the tank codes (tank codes) given in column [12] of Table A of chapter 3.2 have the following meanings:

| Section Part | Description | Code |
|--------------|---|---|
| 1 | Types of tank, battery-vehicle or MEGC | <p>C = tank, battery-vehicle or MEGC for compressed gases</p> <p>P = tank, battery-vehicle or MEGC for liquefied gases or gases dissolved under pressure</p> <p>R = tank for refrigerated liquefied gases</p> |
| 2 | Calculation pressure | <p>X = value of the minimum relevant test pressure according to the table in 4.3.3.2.5 or</p> <p>22 = minimum calculation pressure in bar</p> |
| 3 | Openings (see 6.8.2.2 and 6.8.3.2) | <p>B = tank with bottom filling or discharge openings with 3 closures or battery-vehicle or MEGC with apertures openings below the surface of the liquid or for compressed gases</p> <p>C = tank with top filling or discharge openings with 3 closures with only cleaning apertures openings below the surface of the liquid</p> <p>D = tank with top filling or discharge openings with 3 closures, or battery-vehicle or MEGC with no apertures openings below the surface of the liquid</p> |
| 4 | Safety/pressure-relief devices valves/devices | <p>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</p> <p>H = hermetically closed tank, battery-vehicle or MEGC (see 1.2.1)</p> |

Note 1: The special requirement provision TUI7 indicated in column [13] of Table A of 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 ~~Ranking~~ **Hierarchy** of tanks

| Tank code | Other tank codes 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*CH | 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 ~~ranking~~ **hierarchy** does not take any special provisions into account (see ~~section~~ 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 values of the test pressure shall be as follows:

4.3.3.2.1 The test pressure for tanks intended for the carriage of **compressed** gases ~~of 1^o~~ having a critical temperature below -50 °C shall be at least one and one half times the filling pressure at 15 °C.

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

- compressed gases having a critical temperature of - 50° C or above;
- liquefied gases having a critical temperature below 70 ° C; and
- gases dissolved under pressure

shall be such that, when the shell is filled to the maximum mass of the contents per litre of capacity, the pressure reached in the shell by the substance at 55° C for tanks with thermal insulation or 65° C for shells without thermal insulation does not exceed the test pressure.

4.3.3.2.3 The test pressure for tanks intended for the carriage of liquefied gases having a critical temperature of 70° C or above 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 H 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 permissible mass of contents per litre of capacity conforming to ~~margin 219 (d)~~ 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 liquefied refrigerated gases shall be not less than 1.3 times the maximum permitted working pressure 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 permitted working pressure increased by 100 KPa (1 bar).

4.3.3.2.5 *Table of gases and gas mixtures which may be carried in ~~tank-vehicles (fixed tanks)~~ fixed tanks (tank-vehicles), battery-vehicles, ~~vehicles with demountable tanks,~~ tank-containers and MEGCs indicating the minimum test pressure for tanks and as far as applicable, maximum permissible mass of contents per litre of capacity*

In the case of gases and gas mixtures classified under n.o.s. entries, the values of the test pressure and maximum permissible mass of contents per litre of capacity shall be prescribed by the expert approved by the competent authority.

When shells for compressed ~~and~~ or liquefied gases having a critical temperature of -50° C or above and below 70° C 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.

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|---|---------------------|--|-----|----------------------------|-----|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 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 | | | | |

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|--|---------------------|---------------------------------|----------------------|----------------------------|----------------------|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 1008 | boron trifluoride, compressed | 1 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, inhibited or 1,2-butadiene, inhibited or mixtures of 1,3-butadiene and hydrocarbons, inhibited | 2 F | 1 1 1 | 10 10 10 | 1 1 1 | 10 10 10 | 0.55 0.59 0.50 |
| 1011 | butane | 2 F | 1 | 10 | 1 | 10 | 0.51 |
| 1012 | 1-butylene or trans-2nbutylene or cis-2nbutylene 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 |

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|---|---------------------|---------------------------------|------------|----------------------------|--------------------------|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 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 | Dichlorofluoromethane (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 |
| 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% ethylene oxide but not more than 87% | 2 F | 2.4 | 24 | 2.6 | 26 | 0.73 |

| UN No. | Name (R...) = (Refrigerant gas R...) | 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 |
| 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 | | | 0.69 |
| | | | | | 10 | 100 | 0.30 |
| | | | | | 12 | 120 | 0.56 |
| | | | | | 15 | 150 | 0.67 |
| | | | | 20 | 200 | 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 | | | | |
| 1058 | Liquefied gases, non flammable, charged with nitrogen, carbon dioxide or air | 2 A | 1.5 x filling pressure see 4.3.3.2.2 or 4.3.3.2.3 | | | | |
| 1060 | methylacetylene and propadiene mixture, stabilized: mixture P1 mixture P2 propadiene with 1% to 4% methylacetylene | 2 F | see 4.3.3.2.2 or 4.3.3.2.3 | | | | |
| | | | 2.5 | 25 | 2.8 | 28 | 0.49 |
| | | | 2.2 | 22 | 2.3 | 23 | 0.47 |
| | | | 2.2 | 22 | 2.2 | 22 | 0.50 |
| 1061 | methylamine, anhydrous | 2 F | 1 | 10 | 1.1 | 11 | 0.58 |
| 1062 | methyl bromide | 2 T | 1 | 10 | 1 | 10 | 1.51 |
| 1063 | Methylchloride (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 | | | | |

| UN No. | Name (R...) = (Refrigerant gas R...) | 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 |
| 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 |
| 1078 | refrigerant gases, n.o.s. such as: mixture F1 mixture F2 mixture F3 other mixtures | 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 |
| | | | 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, inhibited | 2 TF | 1.5 | 15 | 1.7 | 17 | 1.13 |
| 1083 | trimethylamine, anhydrous | 2 F | 1 | 10 | 1 | 10 | 0.56 |
| 1085 | vinyl bromide, inhibited | 2 F | 1 | 10 | 1 | 10 | 1.37 |
| 1086 | vinyl chloride, inhibited | 2 F | 1 | 10 | 1.1 | 11 | 0.81 |
| 1087 | vinyl methyl ether, inhibited | 2 F | 1 | 10 | 1 | 10 | 0.67 |
| 1612 | Hexaethyltetrphosphate and compressed gas mixture | 1 T | see 4.3.3.2.2 | | | | |
| 1749 | chlorine trifluoride | 2 TOC | 3 | 30 | 3 | 30 | 1.40 |
| 1859 | silicon tetrafluoride, compressed | 1 TC | 20 30 | 200 300 | 20 30 | 200 300 | 0.74 1.10 |

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|---|---------------------|---------------------------------|------------|----------------------------|------------|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 1860 | vinyl fluoride, inhibited | 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 |
| 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.* | 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.* | 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, compressed | 1 F | 00012 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 | | | | |

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|---|---------------------|---------------------------------|-----|----------------------------|-----|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 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.* | 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 |

| UN No. | Name (R...) = (Refrigerant gas R...) | 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 R.14), compressed | 1 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, compressed | 1 A | 12 | 120 | 13 | 130 | 1.30 1.24 |
| 2044 | 2,2-diamethylpropane | 2 F | 1 | 10 | 1 | 10 | 0.53 |
| 2073 | ammonia solutions, relative density less than 0.88 at 15 °C 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), compressed | 1 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 |

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|--|---------------------|---------------------------------|-----------------|----------------------------|---------------------|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 2200 | Propadiene, inhibited | 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, compressed | 1 F | 22.5 25 | 225 250 | 22.5 25 | 225 250 | 0.32 0.41 |
| 2204 | Carbonyl sulphide, compressed | 2 TF | 2.7 | 27 | 3.0 | 30 | 0.84 |
| 2417 | Carbonyl fluoride, compressed | 1 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, compressed | 1 O | 20 30 | 200 300 | 20 30 | 200 300 | 0.50 0.75 |
| 2452 | Ethylacetylene, inhibited | 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 | | | | |
| 2601 | Cyclobutane | 2 F | 1 | 10 | 1 | 10 | 0.63 |

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|---|---------------------|---------------------------------|-----|----------------------------|-----|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 2602 | Dichlorodifluoromethane and 1,1-difluoroethane, 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, refrigerated 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.* | 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 | | | | |
| 3162 | Liquefied gas, toxic, n.o.s.* | 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 | | | | |

| UN No. | Name (R...) = (Refrigerant gas R...) | Classification code | Minimum test pressure for tanks | | | | Maximum permissible mass of contents per litre of capacity kg |
|--------|--|---------------------|---------------------------------|-----|----------------------------|-----|--|
| | | | With thermal insulation | | Without thermal insulation | | |
| | | | MPa | bar | MPa | bar | |
| 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.* | 1 TO | see 4.3.3.2.1 or 4.3.3.2.2 | | | | |
| 3304 | Compressed gas, toxic, corrosive, n.o.s.* | 1 TC | see 4.3.3.2.1 or 4.3.3.2.2 | | | | |
| 3305 | Compressed gas, toxic, flammable, corrosive, n.o.s.* | 1 TFC | see 4.3.3.2.1 or 4.3.3.2.2 | | | | |
| 3306 | Compressed gas, toxic, oxidizing, corrosive, n.o.s.* | 1 TOC | see 4.3.3.2.1 or 4.3.3.2.2 | | | | |
| 3307 | Liquefied gas, toxic, oxidizing, n.o.s.* | 2 TO | see 4.3.3.2.2 or 4.3.3.2.3 | | | | |
| 3308 | Liquefied gas, toxic, corrosive, n.o.s.* | 2 TC | see 4.3.3.2.2 or 4.3.3.2.3 | | | | |
| 3309 | Liquefied gas, toxic, flammable, corrosive, n.o.s.* | 2 TFC | see 4.3.3.2.2 or 4.3.3.2.3 | | | | |

| UN No. | Name (R...) = (Refrigerant gas R...) | 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 |
| 3310 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s.* | 2 TOC | see 4.3.3.2.2 or 4.3.3.2.3 | | | | |
| 3311 | Gas, refrigerated, liquefied, oxidizing, n.o.s. | 3 O | see 4.3.3.2.4 | | | | |
| 3312 | Gas, refrigerated, liquefied, flammable, n.o.s. | 3 F | see 4.3.3.2.4 | | | | |
| 3318 | Ammonia solutions, relative density less than 0.880 kg/l 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 | 0.82 |
| 3338 | Refrigerant gas R407A | 2 A | 2.9 | 29 | 3.3 | 33 | 0.94 |
| 3339 | Refrigerant gas R407B | 2 A | 2.9 | 29 | 3.3 | 33 | 0.94 |
| 3340 | Refrigerant gas R407C | 2 A | 2.7 | 27 | 3.1 | 31 | 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.* | 2 TF | see 4.3.3.2.2 or 4.3.3.2.3 | | | | |

* (Allowed if LC_{50} equal to or greater than 200 ppm.)

4.3.3.3 Service 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 (see leaflet UIC 573 OR).

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

4.3.3.3 Reserved

4.3.4 Requirements Provisions applicable to Classes 3 to 9

4.3.4.1 Tank Coding, rationalized approach and hierarchy of tanks

4.3.4.1.1 Coding of tanks

The four sections parts of the tank codes (tank codes) given in column [12] of table A of Chapter 3.2 have the following meanings:

| Section Part | Description | Code |
|--------------|---------------------------------|--|
| 1 | Types of tank | L = tank for substances in the liquid state (liquids or solids in the molten state) S = tank for substances in the solid state (powdery or granular) |
| 2 | Minimum Calculation pressure | G = minimum calculation pressure according to the general requirements of [6.8.2.1.14]; or 1.5; 4; 10; 15 or 21= minimum calculation pressure in bar (see 6.8.2.1.14) |
| 3 | Openings (see also 6.8.2.2.3) | 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 apertures openings below the surface of the liquid D = tank with top-filling and discharge openings with no apertures below the surface of the liquid |
| 4 | Safety/ pressure relief devices | V = tank with a venting system but no flame trap; or non-explosion-pressure proof tank F = tank with a venting system fitted with a flame trap according to [6.8.2.2.7 and TE 1 of 6.8.4]; or explosion-pressure proof tank N = tank with a safety valve according to [6.8.2.2.8 or 6.8.2.2.9] and not hermetically closed; these tanks may be fitted with pressure relief valves or controlled ventilation (auto-vent) 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 ~~ranking~~ hierarchy of tanks.

Note: Certain substances and groups of substances are not included in the rationalized approach, see paragraph 4.3.4.1.4.

| Tank code | Rationalized approach | | | Other tank codes permitted for substances under this code |
|---|--|---------------------|---|---|
| | Class | Classification code | Packing group | |
| LIQUIDS LGAV | 3 | A2 | III | LGAH; LGBV; LGBF; LGBH; L1.5AH; 1.5BN; L1.5BH; L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH. |
| | 9 | G1 | III | |
| LGBV | 4.1 | A2 | none | LGBF; LGBH; L1.5BN; L1.5BH ; L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH |
| | 5.1 | A1 | III | |
| | 9 | F1 | III | |
| | 9 | H | III | |
| and groups of permitted substances for tank code LGAV | | | | |
| LGBF | 3 | A1 | II vapour pressure at 50 °C < 1.1 bar | LGBH; L1.5BN; L1.5BH; L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH. |
| | 3 | A1 | III | |
| and groups of permitted substances for tank codes LGAV and LGBV | | | | |
| L1.5BN | 3 | A1 | I, II 1.1 bar < vapour pressure at 50 °C < 1.75 bar | L1.5BH; L4BN; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH. |
| | and groups of permitted substances for tank codes LGAV, LGBV and LGBF. | | | |
| L4BN | 3 | A1 | I Vapour pressure at 50 °C < 1.75 bar | L1.5BH ; L4BH; L4DH; L10BH; L10CH; L10DH; L15CH; L21DH. |
| | 3 | C | III | |
| | 5.1 | A1 | I, II | |
| | 8 | A1 | II, III | |
| | 8 | A3 | II, III | |
| | 8 | A4 | II, III | |
| | 8 | B1 | II, III | |
| | 8 | B3 | II, III | |
| | 8 | B4 | II, III | |
| | 8 | C1 | II, III | |
| | 8 | C2 | II, III | |
| | 8 | E1 | II | |
| | 8 | E2 | II | |
| | 8 | F1 | II | |
| | 8 | F2 | II | |
| | 8 | G1 | II | |
| 8 | G2 | II | | |

| Rationalized approach | | | | Ranking Hierarchy of tanks |
|-----------------------|--|---|---|---|
| Tank code | Group of permitted substances | | | Other tank codes permitted for substances under this code |
| | Class | Classification code | Packing group | |
| | 8 8 8 8 8 8 | H1 H2 I1 I2 J H | II II II, III II, III II III | |
| | and groups of permitted substances for tank codes LGAV, LGBV, LGBF and L1.5BN | | | |
| L4BH | 3 6.1 | B1 B2 C D A1 A2 A3 A4 A6 A7 B1 B2 C D D E1 | II, III II II II II, III II, III II, III II, III II, III II, III II II, III II II II I | L4DH; L10BH; L10CH; L10DH; L15CH; L21DH. |
| L4BH | 6.1 6.2 9 | F1 G1 G2 G3 H Hazard Risk group 2 B | II II II II II II | |
| | and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN and L4BN. | | | |
| L4DH | 4.2 4.3 8 | A1 A3 D1 D3 E1 E3 A1 B F1 G1 I1 | II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III | L10DH; L21DH |
| | and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN and L4BH. | | | |
| L10BH | 8 | A1 | I | |

| Rationalized approach | | | | Ranking Hierarchy of tanks |
|-----------------------|-------------------------------|--|--|---|
| Tank code | Group of permitted substances | | | Other tank codes permitted for substances under this code |
| | Class | Classification code | Packing group | |
| | | A3 A4 B1 B3 B3 B4 C1 C2 E1 E2 F1 G1 H2 I1 I2 K | I I I I I I I I I I I I I I I I | |
| | | and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, and L4BH. | | |
| L10CH | 3 | B1 B2 C D | I I I I | L10DH; L15CH; L21DH |
| | 6.1 | A1 | I | |
| L10CH | 6.1 | A2 A3 A4 A6 A7 B1 B2 C D E1 F1 F1 G1 G2 G3 G4 H | I I I I I I I I I I I I I I I I I I | |
| | | and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, and L10BH. | | |
| L10DH | 4.3 | A1 B F1 G1 | I I I I | L21DH |
| | 5.1 | H | I | |
| | 8 | G I1 | I I | |

| Rationalized approach | | | | Ranking Hierarchy of tanks |
|-----------------------|--|---|---|---|
| Tank code | Group of permitted substances | | | Other tank codes permitted for substances under this code |
| | Class | Classification code | Packing group | |
| | and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, L4DH, L10BH and L10CH. | | | |
| L15CH | 3 | B1 A3 B D3 | I I I I | L21 DH |
| | and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, L10BH and L10CH. | | | |
| L21CH | 4.2 | A1 A3 B D3 | 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. | | | |
| <i>SOLIDS</i> SGAV | 4.1 | A1 A3 | III III | SGAN, SGAH, S10AN, S10AH. |
| SGAV | 4.2 5.1 8 | A2 A2 A2 A4 B2 B4 C2 I2 F1 H | III II, III II, III III III III III II, III III III II, III | |
| SGAN | 4.1 4.2 4.3 5.1 | A1 A3 C1 C2 D1 D2 A2 A4 D2 D4 E2 E4 A2 D F2 G2 A2 E2 F2 | II II II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III II, III | SGAH, S10AN, S10AH. |

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

4.3.4.1.4 For the following substances and groups of substances subject to special requirements provisions, the alternative use of the tanks for other substances and groups of substances is not possible and the ranking hierarchy of 4.3.4.1.3 is not applicable (see also section 6.8.4).

(a) Class 4.1 ~~[15°]~~ :

UN No. 2448 sulphur, molten: ~~type code~~ LGBV

(b) Class 4.2 ~~[11° (a) and 22°]~~:

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

(c) Class 4.3:

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

UN No.1407 caesium and UN No.1423 rubidium: ~~type code~~ L10CH

(a) Class 5.1:

UN No. 1873 perchloric acid 50-72%: ~~type code~~ L4DN,

UN No. 2015 hydrogen peroxide > 70% hydrogen peroxide: ~~type code~~ L4DV

UN No. 2015 hydrogen peroxide 60-70% hydrogen peroxide: ~~type code~~ L4BV

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

UN No. 2426, ammonium nitrate, liquid: ~~type code~~ L4BV

(e) Class 5.2:

all substances: special tank with minimum calculation pressure of 4 bar

(f) Class 6.1:

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

- g) Class 7:
all substances: special tanks
- h) Class 8:
UN No. 1052 hydrogen fluoride, anhydrous and UN No. 1790 hydrofluoric acid containing more than 85% hydrogen fluoride: ~~type~~ code L21DH
UN No. 1744 bromine or UN No.1744 bromine solution: ~~type~~ code L21DH
UN No. 1791 hypochlorite solution and 1908 chlorite solution: ~~type~~ code L4BV

4.3.4.2 *General provisions*

- 4.3.4.2.1 Where hot substances are loaded, the temperature of the outer surface of the ~~shell~~ 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 of 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). [4.7.2 21x 471 31° to 33° of marginal 431 and substances of 2° (a), 3° (a), 3° (b) and 11° (a) of marginal 471]
- 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 transport in tanks, battery-vehicles and MEGCs ~~with~~ when having a $LC_{50} < 200$ 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) 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 ~~When substances are being loaded,~~ During filling ~~[of [marginal 431-1° (b)] [of UN No. 1361, packing group II)]~~ ~~are being loaded,~~ the temperature of ~~the goods being loaded~~ this substance shall not exceed 60 °C. A maximum ~~loading~~ filling temperature of 80° C is allowed provided that smoulder spots are prevented during ~~loading~~ filling and the tanks are hermetically closed. After ~~loading~~ 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 ~~unloading~~ 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 ~~unloading~~ discharge.

TU12 In the event of a change of use, ~~tanks shells~~ and equipment shall be thoroughly cleansed of all residues before and after the carriage of ~~this substance of [20°] [of UN No. 2426].~~

TU13 Tanks shall be free from impurities at the time of filling. Service equipment such as valves and external piping ~~of tanks intended for the carriage of substances referred to in [5.1.2]~~ shall be emptied after filling or discharging. ~~of the tank [of UN Nos. 3109,3110, 3119 and 3120]~~

TU14 The closures of the tanks shall be protected with ~~lockable~~ locked caps 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 ~~tanks~~ [intended for the carriage of flammable refrigerated liquefied gases] 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 ~~requirement~~ provision in 4.3.2.3.4 shall not apply.
- TU19 Tanks [intended for the carriage of asphyxiant and oxidizing refrigerated liquefied gases] may be filled to 98% at the ~~loading~~ filling temperature and pressure. The ~~requirement~~ provision in 4.3.2.3.4 shall not apply.
- TU20 (Reserved) ~~Tanks [intended for the carriage of oxidizing refrigerated liquefied gases] may be filled to 98% at the loading temperature and the loading pressure. The requirement in 4.3.2.3.4 shall not apply.~~
- 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 98%. 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 [containing substances of 31° to 33° of marginal 2431 and substances of 2° (a), 3° (a) and 3° (b) of marginal 2471] shall be filled to not more than 90% of their capacity; a space of 5% shall remain empty for safety when the liquid is at an average temperature of 50 °C.
- TU23 The degree of filling [for UN No. 1183 ethyldichlorosilane,] shall not exceed 0.93 kg per litre of capacity, if filling is by mass. If filling is by volume, the ~~rate~~ degree of filling shall not exceed 85%.
- TU24 The degree of filling [for methylchlorosilane ~~of marginal 471, 1°~~, UN No.1242] shall not exceed 0.95 kg per litre of capacity, if filling is by mass. If filling is by volume, the ~~rate~~ degree of filling shall not exceed 85%.
- TU25 The degree of filling [for UN No. 1295 trichlorosilane] shall not exceed 1.14 kg per litre of capacity, if filling is by mass. If filling is by volume, the ~~rate~~ degree of filling shall not exceed 85%.
- TU26 ~~If~~ The degree of filling is by volume [for UN No. 2988 chlorosilanes not mentioned by name (n.o.s.)], the ~~rate of filling~~ shall not exceed 85%.
- TU27 Tanks [containing substances of UN Nos. 2304, 2448 and 3176] shall not be filled to more than 98% of their capacity.
- TU28 Tanks [intended for the carriage of substances of UN Nos. 1510, 1873 and 2015] shall be filled to not more than 95% of their capacity at a reference temperature of 15 °C.

TU29 Tanks [intended for the carriage of substances of UN NO. 2426] shall be filled to not more than 97% of their capacity and the maximum temperature after filling shall not exceed 140 °C.

TU30 Tanks [intended for the carriage of the substances of UN Nos. 3109, 3110, 3119 and 3120] 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 [intended for the carriage of substances of UN Nos. 1259 and 1294] shall not be filled to more than 1 kg per litre of capacity.

TU32 Tanks [intended for the carriage of UN No. 1829 stabilized sulphur trioxide] shall not be filled to more than 88% of their capacity.

TU33 Tanks [intended for the carriage of substances of UN No. 1744] 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 [intended for the carriage of UN Nos. 1052 and 1790] shall not be filled to more than 0.84 kg per litre of capacity.
