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 and UN multiple-element gas containers (MEGCs) 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.

4.3.2.1.7 The tank record shall be retained by the owner or the operator who shall be able to provide this documentation at the request of the competent authority. The tank record shall be maintained throughout the life of the tank and retained for 15 months after the tank is taken out of service.

Should a change of owner or operator occur during the life of the tank the tank record shall be transferred to the new owner or operator.

Copies of the tank record or all necessary documents shall be made available to the expert for tests, inspections and checks on tanks in accordance with 6.8.2.4.5 or 6.8.3.4.16, on the occasion of periodic inspections or exceptional checks.

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):

---

[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.*

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

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

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

(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

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

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.

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] *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.*

4.3.2.4.4 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 the elements of which are composed of receptacles.*

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.

UN No.	**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	225	22.5	225	0.715
			30	300	30	300	0.86
1009	Bromotrifluoromethane (Refrigerant gas R13B1)	2 A	12	120			1.50
					4.2	42	1.13
					12	120	1.44
					25	250	1.60
1010	BUTADIENES, STABILIZED (1,2-butadiene) or	2 F	1	10	1	10	0.59
1010	BUTADIENES, STABILIZED (1,3-butadiene) or	2 F	1	10	1	10	0.55
1010	BUTADIENES AND HYDROCARBON, MIXTURE, STABILIZED	2 F	1	10	1	10	0.50
1011	Butane	2 F	1	10	1	10	0.51
1012	1-butylene or	2 F	1	10	1	10	0.53
1012	trans-2-butylene or	2 F	1	10	1	10	0.54
1012	cis-2-butylene or	2 F	1	10	1	10	0.55
1012	butylenes mixture	2 F	1	10	1	10	0.50
1013	Carbon dioxide	2 A	19	190			0.73
			22.5	225			0.78
					19	190	0.66
					25	250	0.75
1016	Carbon monoxide, compressed	1 TF	see 4.3.3.2.1				

UN No.	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
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	120			0.96
			22.5	225			1.12
					10	100	0.83
					12	120	0.90
					19	190	1.04
					25	250	1.10
1023	Coal gas, compressed	TF	see 4.3.3.2.1				
1026	Cyanogen	2 TF	10	100	10	100	0.70
1027	Cyclopropane	2 F	1.6	16	1.8	18	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
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			0.32
					9.5	95	0.25
					12	120	0.29
					30	300	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			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 × filling pressure see 4.3.3.2.2 or 4.3.3.2.3				

UN No.	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
1060	Methylacetylene and propadiene mixture, stabilized:	2 F	see 4.3.3.2.2 or 4.3.3.2.3				
	mixture P1	2 F	2.5	25	2.8	28	0.49
	mixture P2	2 F	2.2	22	2.3	23	0.47
	propadiene with 1% to 4% methylacetylene	2 F	2.2	22	2.2	22	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			0.78
					18	180	0.68
					22.5	225	0.74
					25	250	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:	2 A					
	mixture F1	2 A	1	10	1.1	11	1.23
	mixture F2	2 A	1.5	15	1.6	16	1.15
	mixture F3	2 A	2.4	24	2.7	27	1.03
	other mixtures	2 A	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			1.34
					7	70	1.04
					14	140	1.33
					16	160	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	inyl 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	200	20	200	0.74
			30	300	30	300	1.10
1860	Vinyl fluoride, stabilized	2 F	12	120			0.58
			22.5	225			0.65
					25	250	0.64

UN No.	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
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	190	19	190	0.66
			25	250	25	250	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	120			0.66
			22.5	225			0.78
					25	250	0.77
1961	Ethane, refrigerated liquid	3 F	see 4.3.3.2.4				
1962	Ethylene	2 F	12	120			0.25
			22.5	225			0.36
					22.5	225	0.34
					30	300	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				
1965	Hydrocarbon gas mixture, liquefied, n.o.s.:	2 F					
	Mixture A	2 F	1	10	1	10	0.50
	Mixture A01	2 F	1.2	12	1.4	14	0.49
	Mixture A02	2 F	1.2	12	1.4	14	0.48
	Mixture A0	2 F	1.2	12	1.4	14	0.47
	Mixture A1	2 F	1.6	16	1.8	18	0.46
	Mixture B1	2 F	2	20	2.3	23	0.45
	Mixture B2	2 F	2	20	2.3	23	0.44
	Mixture B	2 F	2	20	2.3	23	0.43
	Mixture C	2 F	2.5	25	2.7	27	0.42
	Other mixtures	2 F	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

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

UN No.	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
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
1982	Tetrafluoromethane (Refrigerant gas R14)	2 A	20	200	20	200	0.62
			30	300	30	300	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	190			0.92
			25	250			0.99
					19	190	0.87
					25	250	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			1.30
					13	130	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:	4 A					
	with more than 35% and not more than 40% ammonia	4 A	1	10	1	10	0.80
	with more than 40% and not more than 50% ammonia	4 A	1.2	12	1.2	12	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	160			1.28
			20	200			1.34
					20	200	1.10
2197	Hydrogen iodide, anhydrous	2 TC	1.9	19	2.1	21	2.25
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	225	22.5	225	0.32
			25	250	25	250	0.36
2204	Carbonyl sulphide	2 TF	2.7	27	3.0	30	0.84
2417	Carbonyl fluoride	2 TC	20	200	20	200	0.47
			30	300	30	300	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	200	20	200	0.50
			30	300	30	300	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

[b] *Considered as pyrophoric.*

UN No.	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
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	31	3.1	31	0.11
			4.2	42			0.21
			10	100			0.76
					4.2	42	0.20
					10	100	0.66
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				
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

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

UN No.	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
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				
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.

4.3.3.4 (*Reserved)*

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

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 without a venting system according to 6.8.2.2.6 and not hermetically closed; 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			
Tank code	**Group of permitted substances**		
	Class	**Classification code**	**Packing group**
LIQUIDS	3	F2	III
LGAV	9	M9	III
LGBV	4.1	F2	II, III
	5.1	O1	III
	9	M6	III
		M11	III
	and groups of permitted substances for tank code LGAV		
LGBF	3	F1	II vapour pressure at 50 °C ≤ 1.1 bar
		F1	III
		D	II vapour pressure at 50 °C ≤ 1.1 bar
		D	III
	and groups of permitted substances for tank codes LGAV and LGBV		
L1.5BN	3	F1	II vapour pressure at 50 °C > 1.1 bar
		F1	III flash-point < 23 °C, viscous, vapour pressure at 50 °C > 1.1 bar boiling point > 35 °C
		D	II vapour pressure at 50 °C > 1.1 bar
	and groups of permitted substances for tank codes LGAV, LGBV and LGBF		
L4BN	3	F1	I, III boiling point ≤ 35 °C
		FC	III
		D	I
	5.1	O1	I, II
		OT1	I
	8	C1	II, III
		C3	II, III
		C4	II, III
		C5	II, III
		C7	II, III
		C8	II, III
		C9	II, III
		C10	II, III
		CF1	II
		CF2	II
		CS1	II
		CW1	II
		CW2	II
		CO1	II
		CO2	II
		CT1	II, III
		CT2	II, III
		CFT	II
	9	M11	III
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF and L1.5BN		

Rationalized approach			
Tank code	**Group of permitted substances**		
	Class	**Classification code**	**Packing group**
L4BH	3	FT1	II, III
		FT2	II
		FC	II
		FTC	II
	6.1	T1	II, III
		T2	II, III
		T3	II, III
		T4	II, III
		T5	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	I3	II
		I4	
	9	M2	II
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN and L4BN		
L4DH	4.2	S1	II, III
		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		
L10BH	8	C1	I
		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		

Rationalized approach			
Tank code	**Group of permitted substances**		
	Class	**Classification code**	**Packing group**
L10CH	3	FT1	I
		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
		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		
L15CH	3	FT1	I
	6.1	TF1	I
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, L10BH and L10CH		
L21DH	4.2	S1	I
		S3	I
		SW	I
		ST3	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	F1	III
		F3	III
	4.2	S2	II, III
		S4	III
	5.1	O2	II, III
	8	C2	II, III
		C4	III
		C6	III
		C8	III
		C10	II, III
		CT2	III
	9	M7	III
		M11	II, III

Rationalized approach			
Tank code	**Group of permitted substances**		
	Class	**Classification code**	**Packing group**
SGAN	4.1	F1	II
		F3	II
		FT1	II, III
		FT2	II, III
		FC1	II, III
		FC2	II, III
	4.2	S2	II
		S4	II, III
		ST2	II, III
		ST4	II, III
		SC2	II, III
		SC4	II, III
	4.3	W2	II, III
		WF2	II
		WS	II, III
		WT2	II, III
		WC2	II, III
	5.1	O2	II, III
		OT2	II, III
		OC2	II, III
	8	C2	II
		C4	II
		C6	II
		C8	II
		C10	II
		CF2	II
		CS2	II
		CW2	II
		CO2	II
		CT2	II
	9	M3	III
	and groups of permitted substances for tank codes SGAV		
SGAH	6.1	T2	II, III
		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
	9	M2	II
	and groups of permitted substances for tanks codes SGAV, SGAN and SGAH		
S10AN	8	C2	I
		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		

Rationalized approach			
Tank code	**Group of permitted substances**		
	Class	**Classification code**	**Packing group**
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		

Hierarchy of tanks

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 any element (number or letter) of parts 1 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 1: Types of tanks
S → L
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;

- A tank with the tank code L4BN is authorized for the carriage of a substance to which the tank code SGAN has been assigned.

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

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. 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, liquid, UN No. 1391 alkali metal dispersion or alkaline earth metal dispersion, UN No. 1392 alkaline earth metal amalgam, liquid, UN No. 1415 lithium, UN No. 1420 potassium metal alloys, liquid, UN No. 1421 alkali metal alloy, liquid, n.o.s, UN No. 1422 potassium sodium alloys, liquid, UN No. 1428 sodium, UN No. 2257 potassium, UN No. 3401 alkali metal amalgam, solid, UN No. 3402 alkaline earth metal amalgam, solid, 3403 potassium metal alloys, solid and UN No. 3404 potassium sodium alloys, solid: 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. 2014 hydrogen peroxide, aqueous solution with 20-60% hydrogen peroxide, UN No. 2015 hydrogen peroxide, aqueous solution, stabilized with 60-70% hydrogen peroxide, UN No. 2426 ammonium nitrate, liquid, hot concentrated solution with more than 80% but not more than 93% and UN No. 3149 hydrogen peroxide and peroxyacetic acid mixture, stabilized: code L4BV;

UN No. 3375 ammonium nitrate emulsion, suspension or gel, liquid: code LGAV;

UN No. 3375 ammonium nitrate emulsion, suspension or gel, solid: code SGAV;

(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, UN No. 1744 bromine or bromine solution and UN No. 1790 hydrofluoric acid, solution, with more than 85% hydrofluoric acid: 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.

TU37 Carriage in tanks is limited to substances containing pathogens which are unlikely to be a serious hazard, and for which, while capable of causing serious infection on exposure, effective treatment and preventive measures are available and the risk of spread of infection is limited (i.e. moderate individual risk and low community risk).

TU38 *(Reserved)*

TU39 The suitability of the substance for carriage in tanks shall be demonstrated. The method to evaluate this suitability shall be approved by the competent authority. One method is test 8(d) in Test Series 8 (see Manual of Tests and Criteria, Part 1, sub-section 18.7).

Substances shall not be allowed to remain in the tank for any period that could result in caking. Appropriate measures shall be taken to avoid accumulation and packing of substances in the tank (e.g. cleaning etc.).

CHAPTER 4.4

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

NOTE: *For portable tanks and UN multiple-element gas containers (MEGCs), 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) other than UN 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 and UN multiple-element gas containers (MEGCs), 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) other than UN 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 4.3.4.1.2 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 9.1.3.5.

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).