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
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				
1075	Petroleum gases, liquefied	2 F	See 4.3.3.2.2 or 4.3.3.2.3				
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
1081	Tetrafluoroethylene, stabilized	2 F	only in battery-vehicles and MEGCs composed of seamless receptacles				
1082	Trifluorochloroethylene, stabilized (Refrigerant gas R1113)	2 TF	1.5	15	1.7	17	1.13
1083	Trimethylamine, anhydrous	2 F	1	10	1	10	0.56
1085	Vinyl bromide, stabilized	2 F	1	10	1	10	1.37
1086	Vinyl chloride, stabilized	2 F	1	10	1.1	11	0.81
1087	Vinyl methyl ether, stabilized	2 F	1	10	1	10	0.67
1581	Chloropicrin and methyl bromide mixture with more than 2 % chloropicrin	2 T	1	10	1	10	1.51
1582	Chloropicrin and methyl chloride mixture	2 T	1.3	13	1.5	15	0.81
1612	Hexaethyl tetraphosphate and compressed gas mixture	1 T	see 4.3.3.2.1				
1749	Chlorine trifluoride	2 TOC	3	30	3	30	1.40
1858	Hexafluoropropylene (Refrigerant gas R 1216)	2A	1.7	17	1.9	19	1.11
1859	Silicon tetrafluoride	2 TC	20 30	200 300	20 30	200 300	0.74 1.10
1860	Vinyl fluoride, stabilized	2 F	12	120			0.58
			22.5	225			0.65
					25	250	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	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				

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

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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
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
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				

Cont'd on next page

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
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
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

[b] *Considered as pyrophoric.*

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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
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
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				

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

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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
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				

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

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 *(Deleted)*

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

4.3.3.3.4 When the external overpressure could be greater than the tank resistance to external pressure (e.g. due to low ambient temperatures), adequate measures shall be taken to protect tanks carrying low pressure liquefied gases against the risk of deformation, e.g. by filling them with nitrogen or another inert gas in order to maintain sufficient pressure inside the tank.

4.3.3.4 *(Reserved)*

4.3.3.5 The actual holding time shall be determined for each journey of a tank-container carrying a refrigerated liquefied gas on the basis of the following:

(a) The reference holding time for the refrigerated liquefied gas to be carried (see 6.8.3.4.10) as indicated on the plate referred to in 6.8.3.5.4;

(b) The actual filling density;

(c) The actual filling pressure;

(d) The lowest set pressure of the pressure limiting device(s);

(e) The deterioration of the insulation[4].

NOTE: *ISO 21014:2006 'Cryogenic vessels – Cryogenic insulation performance' details methods of determining the insulation performance of cryogenic vessels and provides a method of calculating the holding time.*

The date at which the actual holding time ends shall be entered in the transport document (see 5.4.1.2.2. (d)).

The calculation of the actual holding time may be waived when the whole journey takes place by road only, without trans-shipment onto another vehicle and without intermediate temporary storage. When the

[4] *Guidance is provided in the European Industrial Gases Association (EIGA) document "Methods to prevent the premature activation of relief devices on tanks" available at www.eiga.eu.*

calculation of the actual holding time is waived the provisions of 4.3.3.6 (e), (f) and (g) shall not apply.

The requirements of 4.3.3.5 need not be complied with for empty, uncleaned tank-containers.

4.3.3.6

Tank-containers shall not be offered for carriage:

(a) In a filling condition liable to produce an unacceptable hydraulic force due to surge within the shell;

(b) When leaking;

(c) When damaged to such an extent that the integrity of the tank-container or its lifting or securing arrangements may be affected;

(d) Unless the service equipment has been examined and found to be in good working order;

and for refrigerated liquefied gases:

(e) Unless the actual holding time for the gas being carried has been determined;

(f) Unless the duration of carriage, after taking into consideration any delays which might be encountered, does not exceed the actual holding time;

(g) Unless the pressure is steady and has been lowered to a level such that the actual holding time may be achieved[4];

(h) When empty, uncleaned, unless the pressure has been reduced to a level that ensures that the pressure relief devices will not activate during carriage[4].

4.3.4 Special provisions applicable to Classes 1 and 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).

[4] *Guidance is provided in the European Industrial Gases Association (EIGA) document "Methods to prevent the premature activation of relief devices on tanks" available at www.eiga.eu.*

Part	Description	Tank code
3	Openings (see 6.8.2.2.2)	A = tank with bottom-filling or bottom-discharge openings with 2 closures; B = tank with bottom-filling or bottom-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 breather device, according to 6.8.2.2.6, but no device protecting against the propagation of a flame; or non-explosion pressure shock resistant tank ; F = tank with a breather device, according to 6.8.2.2.6, fitted with a device protecting against the propagation of a flame; or explosion pressure shock resistant tank ; N = tank without a breather device 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			
LGAV	3	F2	III
	9	M9	III
LGBV	4.1	F2	II, III
	5.1	O1	III
		OT1	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
		D	II vapour pressure at 50 °C > 1.1 bar
	and groups of permitted substances for tank codes LGAV, LGBV and LGBF		

Tank code	Group of permitted substances		
	Class	Classification code	Packing group
L4BN	3	F1	
		FC	III
		D	I
	5.1	O1	II
		OT1	II
	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[a]	II, III
		CT2	II, III
		CFT	II
	9	M11	III
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF and L1.5BN		
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		

[a] Substances except hydrofluoric acid and hydrogen difluoride solutions shall be assigned to this tank code.

Tank code	Group of permitted substances		
	Class	Classification code	Packing group
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[b]	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[c]	I
		CT2	I
		COT	I
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, and L4BH		
L10CH	3	FT1	I
		FT2	I
		FC	I
		FTC	I
	6.1[d]	T1	I
		T2	I
		T3	I
		T4	I
		T5	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
		TFW	I
	and groups of permitted substances for tank codes LGAV, LGBV, LGBF, L1.5BN, L4BN, L4BH, and L10BH		

[b] Hydrofluoric acid and hydrogen difluoride solutions shall be assigned to this tank code.

[c] Substances except those containing hydrofluoric acid shall be assigned to this tank code.

[d] Substances with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50} shall be assigned to tank code L15CH.

Tank code	Group of permitted substances		
	Class	Classification code	Packing group
L10DH	4.3	W1	I
		WF1	I
		WT1	I
		WC1	I
		WFC	I
	5.1	OTC	I
	8	CT1[e]	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[f]	T1	I
		T4	I
		TF1	I
		TW1	I
		TO1	I
		TC1	I
		TC3	I
		TFC	I
		TFW	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
		SW1	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
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

[e] Substances containing hydrofluoric acid shall be assigned to this tank code, with the exception of hydrofluoric acid with more than 85 % hydrogen fluoride.

[f] Substances with an LC_{50} lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC_{50} shall be assigned to this tank code

Tank code	Group of permitted substances		
	Class	Classification code	Packing group
SGAN *(cont'd)*	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		
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. The requirements for these tanks are given by the following tank codes supplemented by the relevant special provisions indicated in column (13) of table A in Chapter 3.2.

Class	UN No.	Name and description	Tank code
1	0331	Explosive, blasting, Type B	S2.65AN
4.1	2448	Sulphur, molten	LGBV
	3531	Polymerizing substance, solid, stabilized, N.O.S.	SGAN
	3533	Polymerizing substance, solid, temperature controlled, N.O.S	
	3532	Polymerizing substance, liquid, stabilized, N.O.S	L4BN
	3534	Polymerizing substance, liquid, temperature controlled, N.O.S.	
4.2	1381	Phosphorus, white or yellow, dry, under water or in solution	L10DH
	2447	Phosphorus, white, molten	
4.3	1389	Alkali metal amalgam, liquid	L10BN
	1391	Alkali metal dispersion or Alkaline earth metal dispersion	
	1392	Alkaline earth metal amalgam, liquid	
	1415	Lithium	
	1420	Potassium metal alloys, liquid	
	1421	Alkali metal alloy, liquid, N.O.S.	
	1422	Potassium sodium alloys, liquid	
	1428	Sodium	
	2257	Potassium	
	3401	Alkali metal amalgam, solid	
	3402	Alkaline earth metal amalgam, solid	
	3403	Potassium metal alloys, solid	
	3404	Potassium sodium alloys, solid	
	3482	Alkali metal dispersion, flammable or Alkaline earth metal dispersion, flammable	
	1407	Caesium	L10CH
	1423	Rubidium	
	1402	Calcium carbide, packing group I	S2.65AN
5.1	1873	Perchloric acid with more than 50 % but not more than 72 % acid, by mass	L4DN
	2015	Hydrogen peroxide, aqueous solution, stabilized with more than 70 % hydrogen peroxide	L4DV
	2014	Hydrogen peroxide, aqueous solution with not less than 20 % but not more than 60 % hydrogen peroxide	L4BV
	2015	Hydrogen peroxide, aqueous solution, stabilized with more than 60 % hydrogen peroxide and not more than 70 % hydrogen peroxide	
	2426	Ammonium nitrate, liquid (hot concentrated solution)	
	3149	Hydrogen peroxide and peroxyacetic acid mixture, stabilized	
	3375	Ammonium nitrate emulsion, suspension or gel, intermediate for blasting explosives, liquid	LGAV
	3375	Ammonium nitrate emulsion, suspension or gel, intermediate for blasting explosives, solid	SGAV

Class	UN No.	Name and description	Tank code
5.2	3109	Organic peroxide, type F, liquid	L4BN
	3119	Organic peroxide, type F, liquid, temperature controlled	
	3110	Organic peroxide, type F, Solid	S4AN
	3120	Organic peroxide, type F, solid, temperature controlled	
6.1	1613	Hydrogen cyanide, aqueous solution	L15DH
	3294	Hydrogen cyanide solution in alcohol	
7 [a]		All substances	special tanks
		Minimum requirement for liquids	L2.65CN
		Minimum requirement for solids	S2.65AN
8	1052	Hydrogen fluoride, anhydrous	L21DH
	1744	Bromine or bromine solution	
	1790	Hydrofluoric acid with more than 85 % hydrogen fluoride	
	1791	Hypochlorite solution	L4BV
	1908	Chlorite solution	

[a] *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.*

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 shell, excluding openings and their closures, 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 tank 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 When handed over for carriage, uncleaned empty tanks shall be filled with a protective agent fulfilling one of the following measures:

Protective agent	**Degree of filling of water**	**Additional requirements for carriage at low ambient temperatures**
Nitrogen[a]	–	
Water and nitrogen[a]	–	
Water	not less than 96 % and not more than 98 %	The water shall contain sufficient anti-freeze agent to prevent it from freezing. The anti-freeze agent shall be free from corrosive action and not liable to react with the substance.

[a] *The tank 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.*

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 be protected by a protective agent in the following ways:

Protective agent	A layer of water in the tank	Degree of filling of the substance (including water if any) at a temperature of 60° C shall not exceed	Additional requirements for carriage at low ambient temperatures
Nitrogen[a]	–	96 %	–
Water and nitrogen[a]	–	98 %	The water shall contain sufficient anti-freeze agent to prevent it from freezing. The anti-freeze agent shall be free from corrosive action and not liable to react with the substance.
Water	not less than 12 cm	98 %	

[a] *The remaining space of the tank 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; for liquids, a space of 5 % shall remain empty when the liquid is at an average temperature of 50 °C.

TU23 The 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 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 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.).

TU40 Only to be carried in battery-vehicles or MEGCs, the elements of which are composed of seamless receptacles.

TU41 The suitability of the substance for carriage in tanks shall be demonstrated to the satisfaction of the competent authority of every country through or into which the carriage is performed.

The method to evaluate this suitability shall be approved by the competent authority of any ADR Contracting Party who may also recognize an approval granted by the competent authority of a country which is not an ADR Contracting Party provided that this approval has been granted in accordance with the procedures applicable according to ADR, RID, ADN or the IMDG Code.

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.).

TU42 Tanks with a shell constructed of aluminium alloy, including those with a protective lining, shall only be used if the pH value of the substance is not less than 5.0 and not more than 8.0.

TU43 An empty uncleaned tank may be offered for carriage after the date of expiry of the last inspection of the lining for a period not to exceed three months beyond this date for the purposes of performing the next inspection of the lining prior to refilling (see special provision TT2 in 6.8.4 (d)).

CHAPTER 4.4

USE OF FIBRE-REINFORCED PLASTICS (FRP) FIXED TANKS (TANK-VEHICLES) AND DEMOUNTABLE 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 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 6.13 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 6.13.6.

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. Wastes consisting of 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.

4.5.1.2 Non waste substances may be carried in vacuum-operated waste tanks under the same conditions as mentioned under 4.5.1.1.

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 4.5.2.6 below.

4.5.2.2 For carriage of liquids meeting the flash point criteria of Class 3, vacuum-operated waste tanks shall be filled through filling devices which discharge into the tank at a low level. Measures shall be taken 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).

4.5.2.5 *(Reserved)*

4.5.2.6 When a vacuum pump/exhauster unit which may provide a source of ignition is used to fill or discharge flammable liquids, precautions shall be taken to avoid ignition of the substance or to avoid the propagation of the effects of the ignition outside the tank itself.

CHAPTER 4.6

(Reserved)

CHAPTER 4.7

USE OF MOBILE EXPLOSIVES MANUFACTURING UNITS (MEMUs)

NOTE 1: *For packagings, see Chapter 4.1; for portable tanks, see Chapter 4.2; for fixed tanks (tank vehicles), demountable tanks, tank-containers and tank swap bodies with shells made of metallic materials, see Chapter 4.3; for fibre-reinforced plastics (FRP) tanks, see Chapter 4.4; for vacuum operated waste tanks, see Chapter 4.5.*

NOTE 2: *For requirements concerning construction, equipment, type approval, inspections and tests and marking, see Chapters 6.7, 6.8, 6.9, 6.11, 6.12 and 6.13.*

4.7.1 Use

4.7.1.1 Substances of Classes 3, 5.1, 6.1 and 8 may be carried on MEMUs conforming to Chapter 6.12, in portable tanks if their carriage is permitted according to Chapter 4.2; or in fixed tanks, demountable tanks, tank containers or tank swap bodies if their carriage is permitted according to Chapter 4.3; or in fibre-reinforced plastics (FRP) tanks if their carriage is permitted according to Chapter 4.4; or in bulk containers, if their carriage is permitted according to Chapter 7.3.

4.7.1.2 Subject to the approval of the competent authority (see 7.5.5.2.3) explosive substances or articles of Class 1 may be carried in packages, in special compartments conforming to section 6.12.5, if their packaging is permitted according to Chapter 4.1 and their carriage is permitted according to Chapter 7.2 and 7.5.

4.7.2 Operation

4.7.2.1 The following provisions apply for operation of tanks according to Chapter 6.12:

(a) For tanks with a capacity of 1 000 litres or more, the provisions of Chapter 4.2, Chapter 4.3, except 4.3.1.4, 4.3.2.3.1, 4.3.3 and 4.3.4, or Chapter 4.4 apply to the carriage on MEMUs, and are supplemented by the provisions of 4.7.2.2 , 4.7.2.3 and 4.7.2.4 below.

(b) For tanks with a capacity of less than 1 000 litres, the provisions of Chapter 4.2, Chapter 4.3, except 4.3.1.4, 4.3.2.1, 4.3.2.3.1, 4.3.3 and 4.3.4, or Chapter 4.4 apply to the carriage on MEMUs, and are supplemented by the provisions of 4.7.2.2, 4.7.2.3 and 4.7.2.4 below.

4.7.2.2 The thickness of the walls of the shell shall not, throughout its use, fall below the minimum figure prescribed in the appropriate construction requirements.

4.7.2.3 Flexible discharge pipes, whether permanently connected or not, and hoppers shall be empty of mixed or sensitised explosive substances during carriage.

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

4.7.2.5 Operators shall ensure that the locks specified in 9.8.8 are used during carriage.

PART 5

Consignment procedures

CHAPTER 5.1

GENERAL PROVISIONS

5.1.1 Application and general provisions

This Part sets forth the provisions for dangerous goods consignments relative to marking, labelling, and documentation, and, where appropriate, authorization of consignments and advance notifications.

5.1.2 Use of overpacks

5.1.2.1 (a) Unless marks and labels required in Chapter 5.2, except 5.2.1.3 to 5.2.1.6, 5.2.1.7.2 to 5.2.1.7.8 and 5.2.1.10, representative of all dangerous goods in the overpack are visible, the overpack shall be:

(i) Marked with the word "OVERPACK". The lettering of the "OVERPACK" mark shall be at least 12 mm high. The mark shall be in an official language of the country of origin and also, if that language is not English, French or German, in English, French or German, unless agreements, if any, concluded between the countries concerned in the transport operation provide otherwise; and

(ii) Labelled and marked with the UN number and other marks, as required for packages in Chapter 5.2 except 5.2.1.3 to 5.2.1.6, 5.2.1.7.2 to 5.2.1.7.8 and 5.2.1.10, for each item of dangerous goods contained in the overpack. Each applicable mark or label only needs to be applied once.

Labelling of overpacks containing radioactive material shall be in accordance with 5.2.2.1.11.

(b) Orientation arrows illustrated in 5.2.1.10 shall be displayed on two opposite sides of overpacks containing packages which shall be marked in accordance with 5.2.1.10.1, unless the marks remains visible.

5.1.2.2 Each package of dangerous goods contained in an overpack shall comply with all applicable provisions of ADR. The intended function of each package shall not be impaired by the overpack.

5.1.2.3 Each package bearing package orientation marks as prescribed in 5.2.1.10 and which is overpacked or placed in a large packaging shall be oriented in accordance with such marks.

5.1.2.4 The prohibitions on mixed loading also apply to these overpacks.

5.1.3 Empty uncleaned packagings (including IBCs and large packagings), tanks, MEMUs, vehicles and containers for carriage in bulk

5.1.3.1 Empty uncleaned packagings (including IBCs and large packagings), tanks (including tank-vehicles, battery-vehicles, demountable tanks, portable tanks, tank-containers, MEGCs), MEMUs, vehicles and containers for carriage in bulk having contained dangerous goods of the different classes other than Class 7, shall be marked and labelled as if they were full.

NOTE: *For documentation, see Chapter 5.4.*

5.1.3.2 Containers, tanks, IBCs, as well as other packagings and overpacks, used for the carriage of radioactive material shall not be used for the storage or carriage of other goods unless decontaminated below the level of 0.4 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters and 0.04 Bq/cm² for all other alpha emitters.

5.1.4 Mixed packing

When two or more dangerous goods are packed within the same outer packaging, the package shall be labelled and marked as required for each substance or article. If the same label is required for different goods, it only needs to be applied once.

5.1.5 General provisions for Class 7

5.1.5.1 ***Approval of shipments and notification***

5.1.5.1.1 *General*

In addition to the approval of package designs described in Chapter 6.4, multilateral shipment approval is also required in certain circumstances (5.1.5.1.2 and 5.1.5.1.3). In some circumstances it is also necessary to notify competent authorities of a shipment (5.1.5.1.4).

5.1.5.1.2 *Shipment approvals*

Multilateral approval shall be required for:

(a) The shipment of Type B(M) packages not conforming with the requirements of 6.4.7.5 or designed to allow controlled intermittent venting;

(b) The shipment of Type B(M) packages containing radioactive material with an activity greater than 3 000 A_1 or 3 000 A_2, as appropriate, or 1 000 TBq, whichever is the lower;

(c) The shipment of packages containing fissile materials if the sum of the criticality safety indexes of the packages in a single vehicle or container exceeds 50; and

(d) *(Reserved)*

(e) The shipment of SCO-III.

except that a competent authority may authorize carriage into or through its country without shipment approval, by a specific provision in its design approval (see 5.1.5.2.1).

5.1.5.1.3 *Shipment approval by special arrangement*

A competent authority may approve provisions under which consignments that do not satisfy all the applicable requirements of ADR may be carried under special arrangement (see 1.7.4).

5.1.5.1.4 *Notifications*

Notification to competent authorities is required as follows:

(a) Before the first shipment of any package requiring competent authority approval, the consignor shall ensure that copies of each applicable competent authority certificate applying to that package design have been submitted to the competent authority of the country of origin of the shipment and to the competent authority of each country through or into which the consignment is to be carried. The consignor is not required to await an acknowledgement from the competent authority, nor is the competent authority required to make such acknowledgement of receipt of the certificate;

(b) For each of the following types of shipments:

(i) Type C packages containing radioactive material with an activity greater than 3 000 A_1 or 3 000 A_2, as appropriate, or 1 000 TBq, whichever is the lower;

(ii) Type B(U) packages containing radioactive material with an activity greater than 3 000 A_1 or 3 000 A_2, as appropriate, or 1 000 TBq, whichever is the lower;

(iii) Type B(M) packages;

(iv) Shipment under special arrangement;

The consignor shall notify the competent authority of the country of origin of the shipment and the competent authority of each country through or into which the consignment is to be carried. This notification shall be in the possession of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance;

(c) The consignor is not required to send a separate notification if the required information has been included in the application for approval of shipment (see 6.4.23.2);

(d) The consignment notification shall include:

(i) Sufficient information to enable the identification of the package or packages including all applicable certificate numbers and identification marks;

(ii) Information on the date of shipment, the expected date of arrival and proposed routeing;

(iii) The name(s) of the radioactive material(s) or nuclide(s);

(iv) Descriptions of the physical and chemical forms of the radioactive material, or whether it is special form radioactive material or low dispersible radioactive material; and

(v) The maximum activity of the radioactive contents during carriage expressed in becquerels (Bq) with an appropriate SI prefix symbol (see 1.2.2.1). For fissile material, the mass of fissile material (or of each fissile nuclide for mixtures when appropriate) in grams (g), or multiples thereof, may be used in place of activity.

5.1.5.2 ***Certificates issued by the competent authority***

5.1.5.2.1 Certificates issued by the competent authority are required for the following:

(a) Designs for:

(i) Special form radioactive material;

(ii) Low dispersible radioactive material;

(iii) Fissile material excepted under 2.2.7.2.3.5 (f);

(iv) Packages containing 0.1 kg or more of uranium hexafluoride;

(v) Packages containing fissile material unless excepted by 2.2.7.2.3.5, 6.4.11.2 or 6.4.11.3;

(vi) Type B(U) packages and Type B(M) packages;

(vii) Type C packages;

(b) Special arrangements;

(c) Certain shipments (see 5.1.5.1.2);

(d) Determination of the basic radionuclide values referred to in 2.2.7.2.2.1 for individual radionuclides which are not listed in Table 2.2.7.2.2.1 (see 2.2.7.2.2.2 (a));

(e) Alternative activity limits for an exempt consignment of instruments or articles (see 2.2.7.2.2.2 (b)).

The certificates shall confirm that the applicable requirements are met, and for design approvals shall attribute to the design an identification mark.

The certificates of approval for the package design and the shipment may be combined into a single certificate.

Certificates and applications for these certificates shall be in accordance with the requirements in 6.4.23.

5.1.5.2.2 The consignor shall be in possession of a copy of each applicable certificate.

5.1.5.2.3 For package designs where it is not required that a competent authority issue a certificate of approval, the consignor shall, on request, make available for inspection by the competent authority, documentary evidence of the compliance of the package design with all the applicable requirements.

5.1.5.3 ***Determination of transport index (TI) and criticality safety index (CSI)***

5.1.5.3.1 The transport index (TI) for a package, overpack or container, or for unpackaged LSA-I, SCO-I or SCO-III, shall be the number derived in accordance with the following procedure:

(a) Determine the maximum dose rate in units of millisieverts per hour (mSv/h) at a distance of 1 m from the external surfaces of the package, overpack, container, or unpackaged LSA-I, SCO-I or SCO-III. The value determined shall be multiplied by 100. For uranium and thorium ores and their concentrates, the maximum dose rate at any point 1 m from the external surface of the load may be taken as:

0.4 mSv/h for ores and physical concentrates of uranium and thorium;

0.3 mSv/h for chemical concentrates of thorium;

0.02 mSv/h for chemical concentrates of uranium, other than uranium hexafluoride;

(b) For tanks, containers and unpackaged LSA-I, SCO-I and SCO-III, the value determined in step (a) above shall be multiplied by the appropriate factor from Table 5.1.5.3.1;

(c) The value obtained in steps (a) and (b) above shall be rounded up to the first decimal place (e.g. 1.13 becomes 1.2), except that a value of 0.05 or less may be considered as zero and the resulting number is the TI value.

Table 5.1.5.3.1: Multiplication factors for tanks, containers and unpackaged LSA-I, SCO-I and SCO-III

Size of load [a]	Multiplication factor
size of load ≤ 1 m²	1
1 m² < size of load ≤ 5 m²	2
5 m² < size of load ≤ 20 m²	3
20 m² < size of load	10

[a] *Largest cross-sectional area of the load being measured.*

5.1.5.3.2 The TI for each rigid overpack, container or vehicle shall be determined as the sum of the TIs of all the packages contained therein. For a shipment from a single consignor, the consignor may determine the TI by direct measurement of dose rate.

The TI for a non-rigid overpack shall be determined only as the sum of the TIs of all the packages within the overpack.

5.1.5.3.3 The criticality safety index for each overpack or container shall be determined as the sum of the CSIs of all the packages contained. The same procedure shall be followed for determining the total sum of the CSIs in a consignment or aboard a vehicle.

5.1.5.3.4 Packages, overpacks and containers shall be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table 5.1.5.3.4 and with the following requirements:

(a) For a package, overpack or container, both the transport index and the surface dose rate conditions shall be taken into account in determining which is the appropriate category. Where the transport index satisfies the condition for one category but the surface dose rate satisfies the condition for a different category, the package, overpack or container shall be assigned to the higher category. For this purpose, category I-WHITE shall be regarded as the lowest category;

(b) The TI shall be determined following the procedures specified in 5.1.5.3.1 and 5.1.5.3.2;

(c) If the surface dose rate is greater than 2 mSv/h, the package or overpack shall be carried under exclusive use and under the provisions of 7.5.11, CV33 (1.3) and (3.5) (a);

(d) A package carried under a special arrangement shall be assigned to category III-YELLOW except under the provisions of 5.1.5.3.5;

(e) An overpack or container which contains packages carried under special arrangement shall be assigned to category III-YELLOW except under the provisions of 5.1.5.3.5.

Table 5.1.5.3.4: Categories of packages, overpacks and containers

Conditions		
Transport index	**Maximum dose rate at any point on external surface**	**Category**
0[a]	Not more than 0.005 mSv/h	I-WHITE
More than 0 but not more than 1[a]	More than 0.005 mSv/h but not more than 0.5 mSv/h	II-YELLOW
More than 1 but not more than 10	More than 0.5 mSv/h but not more than 2 mSv/h	III-YELLOW
More than 10	More than 2 mSv/h but not more than 10 mSv/h	III-YELLOW [b]

[a] *If the measured TI is not greater than 0.05, the value quoted may be zero in accordance with 5.1.5.3.1 (c).*

[b] *Shall also be carried under exclusive use except for containers (see Table D in 7.5.11 CV33 (3.3)).*

5.1.5.3.5 In all cases of international carriage of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, the categorization shall be in accordance with the certificate of the country of origin of design.

5.1.5.4 ***Specific provisions for excepted packages of radioactive material of Class 7***

5.1.5.4.1 Excepted packages of radioactive material of Class 7 shall be legibly and durably marked on the outside of the packaging with:

(a) The UN number preceded by the letters "UN";

(b) An identification of either the consignor or consignee, or both; and

(c) The permissible gross mass if this exceeds 50 kg.

5.1.5.4.2 ***The documentation requirements of Chapter 5.4 do not apply to excepted packages of radioactive material of Class 7, except that:***

(a) The UN number preceded by the letters "UN" and the name and address of the consignor and the consignee and, if relevant, the identification mark for each competent authority certificate of approval (see 5.4.1.2.5.1 (g)) shall be shown on a transport document such as a bill of lading, air waybill or CMR or CIM consignment note;

(b) If relevant, the requirements of 5.4.1.2.5.1 (g), 5.4.1.2.5.3 and 5.4.1.2.5.4 shall apply;

(c) The requirements of 5.4.2 and 5.4.4 shall apply.

5.1.5.4.3 The requirements of 5.2.1.7.8 and 5.2.2.1.11.5 shall apply if relevant.

5.1.5.5 ***Summary of approval and prior notification requirements***

NOTE 1: *Before first shipment of any package requiring competent authority approval of the design, the consignor shall ensure that a copy of the approval certificate for that design has been submitted to the competent authority of each country en route (see 5.1.5.1.4 (a)).*

NOTE 2: *Notification required if contents exceed $3 \times 10^3 A_1$, or $3 \times 10^3 A_2$, or 1 000 TBq; (see 5.1.5.1.4 (b)).*

NOTE 3: *Multilateral approval of shipment required if contents exceed $3 \times 10^3 A_1$, or $3 \times 10^3 A_2$, or 1 000 TBq, or if controlled intermittent venting is allowed (see 5.1.5.1).*

NOTE 4: *See approval and prior notification provisions for the applicable package for carrying this material.*

Subject	UN Number	Competent Authority approval required		Consignor required to notify the competent authorities of the country of origin and of the countries en route [a] before each shipment	Reference
		Country of origin	Countries en route [a]		
Calculation of unlisted A_1 and A_2 values	-	Yes	Yes	No	2.2.7.2.2.2 (a), 5.1.5.2.1 (d)
Excepted packages - Package design - Shipment	2908, 2909, 2910, 2911	 No No	 No No	 No No	---
LSA material [b] and SCO [b] Industrial packages types 1, 2 or 3, non fissile and fissile excepted - Package design - Shipment	2912, 2913, 3321, 3322	 No No	 No No	 No No	---
Type A packages [b], non fissile and fissile excepted - Package design - Shipment	2915, 3332	 No No	 No No	 No No	--
Type B(U) packages [b], non fissile and fissile excepted - Package design - Shipment	2916	 Yes No	 No No	 See note 1 See note 2	5.1.5.1.4 (b), 5.1.5.2.1 (a), 6.4.22.2
Type B(M) packages [b], non fissile and fissile excepted - Package design - Shipment	2917	 Yes See note 3	 Yes See note 3	 No Yes	5.1.5.1.4 (b), 5.1.5.2.1 (a), 5.1.5.1.2, 6.4.22.3
Type C packages [b], non fissile and fissile excepted - Package design - Shipment	3323	 Yes No	 No No	 See note 1 See note 2	5.1.5.1.4 (b), 5.1.5.2.1 (a), 6.4.22.2
Packages for fissile material - Package design - Shipment: - Sum of criticality safety indexes not more than 50 - Sum of criticality safety indexes greater than 50	2977, 3324, 3325, 3326, 3327, 3328, 3329, 3330, 3331, 3333	 Yes [c] No [d] Yes	 Yes [c] No [d] Yes	 No See note 2 See note 2	5.1.5.2.1 (a), 5.1.5.1.2, 6.4.22.4
Special form radioactive material - Design - Shipment	- See note 4	 Yes See note 4	 No See note 4	 No See note 4	1.6.6.4, 5.1.5.2.1 (a) 6.4.22.5

[a] *Countries from, through or into which the consignment is carried.*

[b] *If the radioactive contents are fissile material which is not excepted from the provisions for packages containing fissile material, then the provisions for fissile material packages apply (see 6.4.11).*

[c] *Designs of packages for fissile material may also require approval in respect of one of the other items in the table.*

[d] *Shipments may, however, require approval in respect of one of the other items in the table.*

Subject	UN Number	Competent Authority approval required		Consignor required to notify the competent authorities of the country of origin and of the countries en route [a] before each shipment	Reference
		Country of origin	Countries en route [a]		
Low dispersible radioactive material - Design - Shipment	- See note 4	Yes See note 4	No See note 4	No See note 4	5.1.5.2.1 (a), 6.4.22.5
Packages containing 0.1 kg or more of uranium hexafluoride - Design - Shipment	- See note 4	Yes See note 4	No See note 4	No See note 4	5.1.5.2.1 (a), 6.4.22.1
Special Arrangement - Shipment	2919, 3331	Yes	Yes	Yes	1.7.4.2, 5.1.5.2.1 (b), 5.1.5.1.4 (b)
Approved packages designs subjected to transitional measures	-	See 1.6.6	See 1.6.6	See note 1	1.6.6.2, 5.1.5.1.4 (b), 5.1.5.2.1 (a), 5.1.5.1.2, 6.4.22.9
Alternative activity limits for an exempt consignment of instruments or articles	-	Yes	Yes	No	5.1.5.2.1(e), 6.4.22.7
Fissile material excepted in accordance with 2.2.7.2.3.5 (f)	-	Yes	Yes	No	5.1.5.2.1 (a) (iii), 6.4.22.6

[a] *Countries from, through or into which the consignment is carried.*

CHAPTER 5.2

MARKING AND LABELLING

5.2.1 Marking of packages

NOTE 1: For marks related to the construction, testing and approval of packagings, large packagings, gas receptacles and IBCs, see Part 6.

NOTE 2: In accordance with the GHS, a GHS pictogram not required by ADR should only appear in carriage as part of a complete GHS label and not independently (see GHS 1.4.10.4.4).

5.2.1.1 Unless provided otherwise in ADR, the UN number corresponding to the dangerous goods contained, preceded by the letters "UN" shall be clearly and durably marked on each package. The UN number and the letters "UN" shall be at least 12 mm high, except for packages of 30 *l* capacity or less or of 30 kg maximum net mass and for cylinders of 60 *l* water capacity or less when they shall be at least 6 mm in height and except for packages of 5 *l* capacity or less or of 5 kg maximum net mass when they shall be of an appropriate size. In the case of unpackaged articles the mark shall be displayed on the article, on its cradle or on its handling, storage or launching device.

5.2.1.2 All package marks required by this Chapter:

(a) Shall be readily visible and legible;

(b) Shall be able to withstand open weather exposure without a substantial reduction in effectiveness.

5.2.1.3 Salvage packagings including large salvage packagings and salvage pressure receptacles shall additionally be marked with the word "**SALVAGE**". The lettering of the "SALVAGE" mark shall be at least 12 mm high.

5.2.1.4 Intermediate bulk containers of more than 450 litres capacity and large packagings shall be marked on two opposite sides.

5.2.1.5 ***Additional provisions for goods of Class 1***

For goods of Class 1, packages shall, in addition, bear the proper shipping name as determined in accordance with 3.1.2. The mark, which shall be clearly legible and indelible, shall be in one or more languages, one of which shall be French, German or English, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

5.2.1.6 ***Additional provisions for goods of Class 2***

Refillable receptacles shall bear the following particulars in clearly legible and durable characters:

(a) The UN number and the proper shipping name of the gas or mixture of gases, as determined in accordance with 3.1.2.

In the case of gases classified under an N.O.S. entry, only the technical name[1] of the gas has to be indicated in addition to the UN number.

In the case of mixtures, not more than the two constituents which most predominantly contribute to the hazards have to be indicated;

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[1] *Instead of the technical name the use of one of the following names is permitted:*

- *for UN No. 1078 refrigerant gas, n.o.s: mixture F1, mixture F2, mixture F3;*
- *for UN No. 1060 methylacetylene and propadiene mixtures, stabilized: mixture P1, mixture P2;*
- *for UN No. 1965 hydrocarbon gas mixture, liquefied, n.o.s.: mixture A or butane, mixture A01 or butane, mixture A02 or butane, mixture A0 or butane, mixture A1, mixture B1, mixture B2, mixture B, mixture C or propane;*
- *for UN No. 1010 Butadienes, stabilized: 1,2-Butadiene, stabilized, 1,3-Butadiene, stabilized;*
- *For UN No. 1012 Butylene: 1-butylene, cis-2-butylene, trans-2-butylene, butylenes mixture.*

(b) For compressed gases filled by mass and for liquefied gases, either the maximum filling mass and the tare of the receptacle with fittings and accessories as fitted at the time of filling, or the gross mass;

(c) The date (year) of the next periodic inspection.

These particulars can either be engraved or indicated on a durable information disk or label attached on the receptacle or indicated by an adherent and clearly visible mark such as by printing or by any equivalent process.

NOTE 1: *See also 6.2.2.7.*

NOTE 2: *For non refillable receptacles, see 6.2.2.8.*

5.2.1.7 ***Special marking provisions for radioactive material***

5.2.1.7.1 Each package shall be legibly and durably marked on the outside of the packaging with an identification of either the consignor or consignee, or both. Each overpack shall be legibly and durably marked on the outside of the overpack with an identification of either the consignor or consignee, or both unless these marks of all packages within the overpack are clearly visible.

5.2.1.7.2 For each package, other than excepted packages, the UN number preceded by the letters "UN" and the proper shipping name shall be legibly and durably marked on the outside of the packaging. The marking of excepted packages shall be as required by 5.1.5.4.1.

5.2.1.7.3 Each package of gross mass exceeding 50 kg shall have its permissible gross mass legibly and durably marked on the outside of the packaging.

5.2.1.7.4 Each package which conforms to:

(a) a Type IP-1 package, a Type IP-2 package or a Type IP-3 package design shall be legibly and durably marked on the outside of the packaging with "TYPE IP-1", "TYPE IP-2" or "TYPE IP-3" as appropriate;

(b) a Type A package design shall be legibly and durably marked on the outside of the packaging with "TYPE A";

(c) a Type IP-2 package, a Type IP-3 package or a Type A package design shall be legibly and durably marked on the outside of the packaging with the distinguishing sign used on vehicles in international road traffic[2] of the country of origin of design and either the name of the manufacturer or other identification of the packaging specified by the competent authority of the country of origin of design.

5.2.1.7.5 Each package which conforms to a design approved under one or more of paragraphs 1.6.6.2.1, 5.1.5.2.1, 6.4.22.1 to 6.4.22.4 and 6.4.23.4 to 6.4.23.7 shall be legibly and durably marked on the outside of the package with the following information:

(a) The identification mark allocated to that design by the competent authority;

(b) A serial number to uniquely identify each packaging which conforms to that design;

(c) "Type B(U)", "Type B(M)" or "Type C", in the case of a Type B(U), Type B(M) or Type C package design.

5.2.1.7.6 Each package which conforms to a Type B(U), Type B(M) or Type C package design shall have the outside of the outermost receptacle which is resistant to the effects of fire and water plainly marked by embossing, stamping or other means resistant to the effects of fire and water with the trefoil symbol shown in the figure below.

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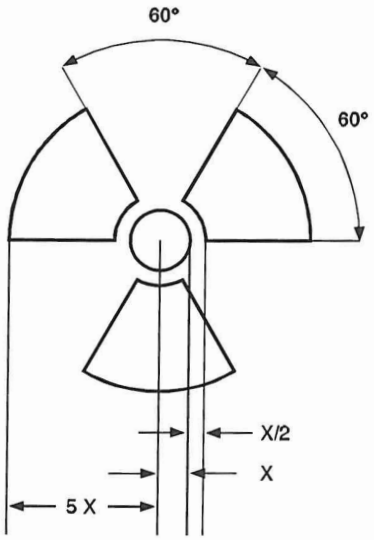
[2] *Distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.*

Basic trefoil symbol with proportions based on a central circle of radius X.
The minimum allowable size of X shall be 4 mm.



Any mark on the package made in accordance with the requirements of 5.2.1.7.4 (a) and (b) and 5.2.1.7.5 (c) relating to the package type that does not relate to the UN number and proper shipping name assigned to the consignment shall be removed or covered.

5.2.1.7.7 Where LSA-I or SCO-I material is contained in receptacles or wrapping materials and is carried under exclusive use as permitted by 4.1.9.2.4, the outer surface of these receptacles or wrapping materials may bear the mark "RADIOACTIVE LSA-I" or "RADIOACTIVE SCO-I", as appropriate.

5.2.1.7.8 In all cases of international carriage of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, marking shall be in accordance with the certificate of the country of origin of the design.

5.2.1.8 ***Special marking provisions for environmentally hazardous substances***

5.2.1.8.1 Packages containing environmentally hazardous substances meeting the criteria of 2.2.9.1.10 shall be durably marked with the environmentally hazardous substance mark shown in 5.2.1.8.3 with the exception of single packagings and combination packagings where such single packagings or inner packagings of such combination packagings have:

- A quantity of 5 *l* or less for liquids; or
- A net mass of 5 kg or less for solids.

5.2.1.8.2 The environmentally hazardous substance mark shall be located adjacent to the marks required by 5.2.1.1. The requirements of 5.2.1.2 and 5.2.1.4 shall be met.

5.2.1.8.3 The environmentally hazardous substance mark shall be as shown in Figure 5.2.1.8.3.

Figure 5.2.1.8.3: Environmentally hazardous substance mark

The mark shall be in the form of a square set at an angle of 45° (diamond-shaped). The symbol (fish and tree) shall be black on white or suitable contrasting background. The minimum dimensions shall be 100 mm × 100 mm and the minimum width of the line forming the diamond shall be 2 mm. If the size of the package so requires, the dimensions/line thickness may be reduced, provided the mark remains clearly visible. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

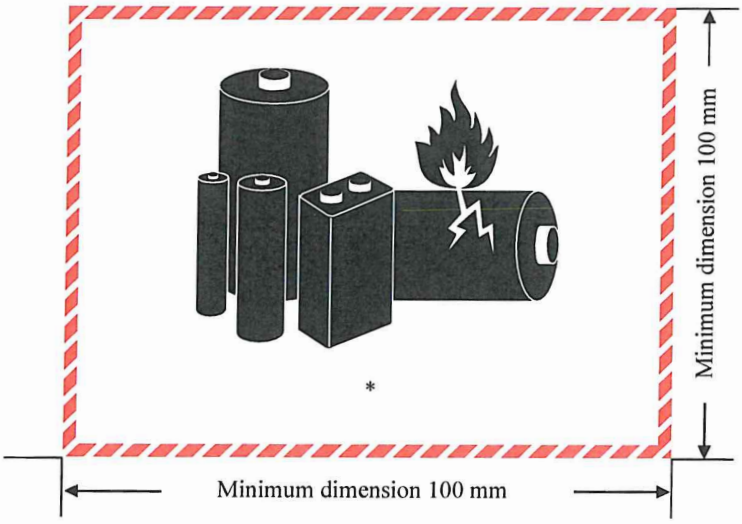
NOTE: *The labelling provisions of 5.2.2 apply in addition to any requirement for packages to bear the environmentally hazardous substance mark.*

5.2.1.9 ***Battery mark***

5.2.1.9.1 Packages containing lithium cells or batteries or sodium ion cells or batteries prepared in accordance with special provisions 188 or 400 of Chapter 3.3 shall be marked as shown in Figure 5.2.1.9.2.

5.2.1.9.2 The mark shall indicate the UN number preceded by the letters "UN", i.e. "UN 3090" for lithium metal cells or batteries, "UN 3480" for lithium ion cells or batteries, or "UN 3551" for sodium ion cells or batteries. Where the cells or batteries are contained in, or packed with, equipment, the UN number preceded by the letters "UN", i.e. " UN 3091", "UN 3481" or "UN 3552", as appropriate, shall be indicated. Where a package contains cells or batteries assigned to different UN numbers, all applicable UN numbers shall be indicated on one or more marks.

Figure 5.2.1.9.2: Battery mark



* Place for UN number(s)

The mark shall be in the form of a rectangle or a square with hatched edging. The dimensions shall be a minimum of 100 mm wide × 100 mm high and the minimum width of the hatching shall be 5 mm.

The symbol (group of batteries, one damaged and emitting flame, above the UN number(s)) shall be black on white or suitable contrasting background. The hatching shall be red. If the size of the package so requires, the dimensions may be reduced to not less than 100 mm wide × 70 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

5.2.1.10 ***Orientation arrows***

5.2.1.10.1 Except as provided in 5.2.1.10.2:

(a) Combination packagings having inner packagings containing liquids;

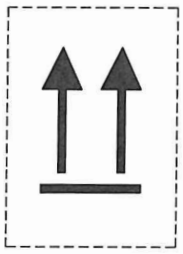
(b) Single packagings fitted with vents;

(c) Closed or open cryogenic receptacles intended for the carriage of refrigerated liquefied gases; and

(d) Machinery or apparatus containing liquid dangerous goods when it is required to ensure the liquid dangerous goods remain in their intended orientation (see special provision 301 of Chapter 3.3);

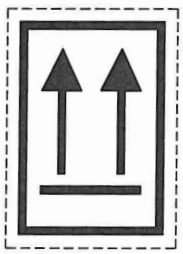
shall be legibly marked with package orientation arrows which are similar to the illustration shown below or with those meeting the specifications of ISO 780:1997. The orientation arrows shall appear on two opposite vertical sides of the package with the arrows pointing in the correct upright direction. They shall be rectangular and of a size that is clearly visible commensurate with the size of the package. Depicting a rectangular border around the arrows is optional.

Figure 5.2.1.10.1.1



or

Figure 5.2.1.10.1.2



Two black or red arrows on white or suitable contrasting background.
The rectangular border is optional.
All features shall be in approximate proportion to those shown.

5.2.1.10.2 Orientation arrows are not required on:

(a) Outer packagings containing pressure receptacles except closed or open cryogenic receptacles;

(b) Outer packagings containing dangerous goods in inner packagings each containing not more than 120 ml, with sufficient absorbent material between the inner and outer packagings to completely absorb the liquid contents;

(c) Outer packagings containing Class 6.2 infectious substances in primary receptacles each containing not more than 50 ml;

(d) Type IP-2, type IP-3, type A, type B(U), type B(M) or type C packages containing Class 7 radioactive material;

(e) Outer packagings containing articles which are leak-tight in all orientations (e.g. alcohol or mercury in thermometers, aerosols, etc.); or

(f) Outer packagings containing dangerous goods in hermetically sealed inner packagings each containing not more than 500 ml.

5.2.1.10.3 Arrows for purposes other than indicating proper package orientation shall not be displayed on a package marked in accordance with this sub-section.

5.2.2 Labelling of packages

5.2.2.1 ***Labelling provisions***

5.2.2.1.1 For each article or substance listed in Table A of Chapter 3.2, the labels shown in Column (5) shall be affixed unless otherwise provided for by a special provision in Column (6).

5.2.2.1.2 Indelible danger marks corresponding exactly to the prescribed models may be used instead of labels.

5.2.2.1.3 to 5.2.2.1.5 *(Reserved)*

5.2.2.1.6 Except as provided in 5.2.2.2.1.2, each label shall:

(a) Be affixed to the same surface of the package, if the dimensions of the package allow; for packages of Class 1 and 7, near the mark indicating the proper shipping name;

(b) Be so placed on the package that it is not covered or obscured by any part or attachment to the packaging or any other label or marks; and

(c) Be displayed next to each other when more than one label is required.

Where a package is of such an irregular shape or small size that a label cannot be satisfactorily affixed, the label may be attached to the package by a securely affixed tag or other suitable means.

5.2.2.1.7 Intermediate bulk containers of more than 450 litres capacity and large packagings shall be labelled on two opposite sides.

5.2.2.1.8 *(Reserved)*

5.2.2.1.9 *Special provisions for the labelling of self-reactive substances and organic peroxides*

(a) The label conforming to model No. 4.1 also implies that the product may be flammable and hence no label conforming to model No. 3 is required. In addition, a label conforming to model No. 1 shall be applied for self-reactive substances Type B, unless the competent authority has permitted this label to be dispensed with for a specific packaging because test data have proven that the self-reactive substance in such a packaging does not exhibit explosive behaviour.

(b) The label conforming to model No. 5.2 also implies that the product may be flammable and hence no label conforming to model No. 3 is required. In addition, the following labels shall be applied:

(i) A label conforming to model No. 1 for organic peroxides type B, unless the competent authority has permitted this label to be dispensed with for a specific packaging because test data have proven that the organic peroxide in such a packaging does not exhibit explosive behaviour;

(ii) A label conforming to model No. 8 is required when Packing Group I or II criteria of Class 8 are met.

For self-reactive substances and organic peroxides mentioned by name, the labels to be affixed are indicated in the list found in 2.2.41.4 and 2.2.52.4 respectively.

5.2.2.1.10 *Special provisions for the labelling of infectious substances packages*

In addition to the label conforming to model No. 6.2, infectious substances packages shall bear any other label required by the nature of the contents.

5.2.2.1.11 *Special provisions for the labelling of radioactive material*

5.2.2.1.11.1 Except when enlarged labels are used in accordance with 5.3.1.1.3, each package, overpack and container containing radioactive material shall bear the labels conforming to the applicable models Nos. 7A, 7B or 7C, according to the appropriate category. Labels shall be affixed to two opposite sides on the outside of the package or overpack or on the outside of all four sides of a container or tank. In addition, each package, overpack and container containing fissile material, other than fissile material excepted under the provisions of 2.2.7.2.3.5 shall bear labels conforming to model No.7E; such labels, where applicable, shall be affixed adjacent to the labels conforming to the applicable model Nos. 7A, 7B or 7C.. Labels shall not cover the marks specified in 5.2.1. Any labels which do not relate to the contents shall be removed or covered.

5.2.2.1.11.2 Each label conforming to the applicable model No. 7A, 7B or 7C shall be completed with the following information.

(a) *Contents*:

(i) except for LSA-I material, the name(s) of the radionuclide(s) as taken from Table 2.2.7.2.2.1, using the symbols prescribed therein. For mixtures of radionuclides, the most restrictive nuclides shall be listed to the extent the space on the line permits. The group of LSA or SCO shall be shown following the name(s) of the radionuclide(s). The terms "LSA-II","LSA-III", "SCO-I" and "SCO-II" shall be used for this purpose;

(ii) for LSA-I material, only the term "LSA-I" is necessary; the name of the radionuclide is not necessary;

(b) *Activity*: The maximum activity of the radioactive contents during carriage expressed in becquerels (Bq) with the appropriate SI prefix symbol (see 1.2.2.1). For fissile material, the total mass of fissile nuclides in units of grams (g), or multiples thereof, may be used in place of activity;

(c) For overpacks and containers the "contents" and "activity" entries on the label shall bear the information required in (a) and (b) above, respectively, totalled together for the entire contents of the overpack or container except that on labels for overpacks or containers containing mixed loads of packages containing different radionuclides, such entries may read "See Transport Documents";

(d) *Transport index*: The number determined in accordance with 5.1.5.3.1 and 5.1.5.3.2 (except for category I-WHITE).

5.2.2.1.11.3 Each label conforming to the model No. 7E shall be completed with the criticality safety index (CSI) as stated in the certificate of approval applicable in the countries through or into which the consignment is carried and issued by the competent authority or as specified in 6.4.11.2 or 6.4.11.3.

5.2.2.1.11.4 For overpacks and containers, the label conforming to model No. 7E shall bear the sum of the criticality safety indexes of all the packages contained therein.

5.2.2.1.11.5 In all cases of international carriage of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, labelling shall be in accordance with the certificate of the country of origin of design.

5.2.2.1.12 *Special provisions for the labelling of articles containing dangerous goods carried as UN Nos. 3537, 3538, 3539, 3540, 3541, 3542, 3543, 3544, 3545, 3546, 3547 and 3548*

5.2.2.1.12.1 Packages containing articles or articles carried unpackaged shall bear labels according to 5.2.2.1 reflecting the hazards established according to 2.1.5, except that for articles that in addition contain lithium batteries or sodium ion batteries, a battery mark or a label conforming to model No. 9A is not required.

5.2.2.1.12.2 When it is required to ensure articles containing liquid dangerous goods remain in their intended orientation, orientation arrows meeting 5.2.1.10.1 shall be affixed and visible on at least two opposite vertical sides of the package or of the unpackaged article where possible, with the arrows pointing in the correct upright direction.

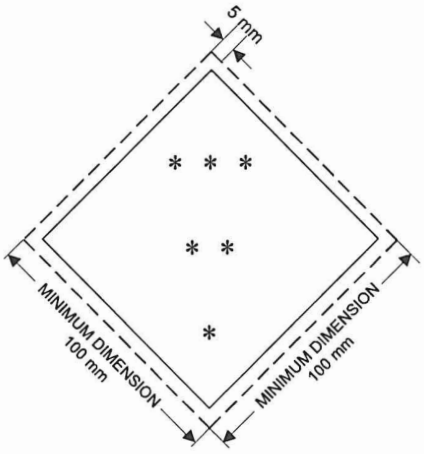
5.2.2.2 ***Provisions for labels***

5.2.2.2.1 Labels shall satisfy the provisions below and conform, in terms of colour, symbols and general format, to the models shown in 5.2.2.2.2. Corresponding models required for other modes of transport, with minor variations which do not affect the obvious meaning of the label, are also acceptable.

NOTE: *Where appropriate, labels in 5.2.2.2.2 are shown with a dotted outer boundary as provided for in 5.2.2.2.1.1. This is not required when the label is applied on a background of contrasting colour.*

5.2.2.2.1.1 Labels shall be configured as shown in Figure 5.2.2.2.1.1.

Figure 5.2.2.2.1.1: Class/division label



* The class or for Classes 4.1, 4.2 and 4.3, the figure "4" or for Classes 6.1 and 6.2, the figure "6", shall be shown in the bottom corner.

** Additional text/numbers/symbol/letters shall (if mandatory) or may (if optional) be shown in this bottom half.

*** The class symbol or, for divisions 1.4, 1.5 and 1.6, the division number and for Model No 7E the word "FISSILE" shall be shown in this top half.

5.2.2.2.1.1.1 Labels shall be displayed on a background of contrasting colour, or shall have either a dotted or solid outer boundary line.

5.2.2.2.1.1.2 The label shall be in the form of a square set at an angle of 45° (diamond-shaped). The minimum dimensions shall be 100 mm × 100 mm. There shall be a line inside the edge forming the diamond which shall be parallel and approximately 5 mm from the outside of that line to the edge of the label. The line inside the edge on the upper half of the label shall be the same colour as the symbol and the line inside the edge on the lower half of the label shall be the same colour as the class or division number in the bottom corner. Where dimensions are not specified, all features shall be in approximate proportion to those shown.

5.2.2.2.1.1.3 If the size of the package so requires the dimensions may be reduced proportionally, provided the symbols and other elements of the label remain clearly visible. Dimensions for cylinders shall comply with 5.2.2.2.1.2.

5.2.2.2.1.2 Cylinders for Class 2 may, on account of their shape, orientation and securing mechanisms for carriage, bear labels representative of those specified in this section and the environmentally hazardous substance mark when appropriate, which have been reduced in size, according to the dimensions outlined in ISO 7225:2005, *"Gas cylinders - Precautionary labels"*, for display on the non-cylindrical part (shoulder) of such cylinders.

NOTE: *When the diameter of the cylinder is too small to permit the display of the reduced size labels on the non-cylindrical upper part of the cylinder, the reduced sized labels may be displayed on the cylindrical part.*

Notwithstanding the provisions of 5.2.2.1.6, labels and the environmentally hazardous substance mark (see 5.2.1.8.3) may overlap to the extent provided for by ISO 7225:2005. However, in all cases, the primary hazard label and the figures appearing on any label shall remain fully visible and the symbols recognizable.

Empty uncleaned pressure receptacles for gases of Class 2 may be carried with obsolete or damaged labels for the purposes of refilling or inspection as appropriate and the application of a new label in conformity with current regulations or for the disposal of the pressure receptacle.

5.2.2.2.1.3 With the exception of labels for Divisions 1.4, 1.5 and 1.6 of Class 1, the upper half of the label shall contain the pictorial symbol and the lower half shall contain:

(a) For Classes 1, 2, 3, 5.1, 5.2, 7, 8 and 9, the class number;

(b) For Classes 4.1, 4.2 and 4.3, the figure "4";

(c) For Classes 6.1 and 6.2, the figure "6".

However for label model No. 9A, the upper half of the label shall only contain the seven vertical stripes of the symbol and the lower half shall contain the group of batteries of the symbol and the class number.

Except for label model No. 9A, the labels may include text such as the UN number or words describing the hazard (e.g. "flammable") in accordance with 5.2.2.2.1.5 provided the text does not obscure or detract from the other required label elements.

5.2.2.2.1.4 In addition, except for Divisions 1.4, 1.5 and 1.6, labels for Class 1 shall show in the lower half, above the class number, the division number and the compatibility group letter for the substance or article. Labels for Divisions 1.4, 1.5 and 1.6 shall show in the upper half the division number, and in the lower half the class number and the compatibility group letter.

5.2.2.2.1.5 On labels other than those for material of Class 7, the optional insertion of any text (other than the class number) in the space below the symbol shall be confined to particulars indicating the nature of the hazard and precautions to be taken in handling.

5.2.2.2.1.6 The symbols, text and numbers shall be clearly legible and indelible and shall be shown in black on all labels except for:

(a) The Class 8 label, where the text (if any) and class number shall appear in white;

(b) Labels with entirely green, red or blue backgrounds where they may be shown in white;

(c) The Class 5.2 label, where the symbol may be shown in white; and

(d) Labels conforming to model No. 2.1 displayed on cylinders and gas cartridges for liquefied petroleum gases, where they may be shown in the background colour of the receptacle if adequate contrast is provided.

5.2.2.2.1.7 All labels shall be able to withstand open weather exposure without a substantial reduction in effectiveness.

5.2.2.2.2 *Specimen labels*

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 1 hazard: Explosive substances or articles						
1	Divisions 1.1, 1.2, 1.3	Exploding bomb: black	Orange	1 (black)		ôô Place for division – to be left blank if explosive is the subsidiary hazard ô Place for compatibility group – to be left blank if explosive is the subsidiary hazard
1.4	Division 1.4	1.4: black Numerals shall be about 30 mm in height and be about 5 mm thick (for a label measuring 100 mm × 100 mm)	Orange	1 (black)		ô Place for compatibility group
1.5	Division 1.5	1.5: black Numerals shall be about 30 mm in height and be about 5 mm thick (for a label measuring 100 mm × 100 mm)	Orange	1 (black)		ô Place for compatibility group
1.6	Division 1.6	1.6: black Numerals shall be about 30 mm in height and be about 5 mm thick (for a label measuring 100 mm × 100 mm)	Orange	1 (black)		ô Place for compatibility group

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 2 hazard: Gases						
2.1	Flammable gases	Flame: black or white (except as provided for in 5.2.2.2.1.6 d))	Red	2 (black or white) (except as provided for in 5.2.2.2.1.6 d))		-
2.2	Non-flammable, non-toxic gases	Gas cylinder: black or white	Green	2 (black or white)		-
2.3	Toxic gases	Skull and crossbones: black	White	2 (black)		-
Class 3 hazard: Flammable liquids						
3	-	Flame: black or white	Red	3 (black or white)		-

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 4.1 hazard: Flammable solids, self-reactive substances, polymerizing substances and solid desensitized explosives						
4.1	-	Flame: black	White with 7 vertical red stripes	4 (black)		-
Class 4.2 hazard: Substances liable to spontaneous combustion						
4.2	-	Flame: black	Upper half white, lower half red	4 (black)		-
Class 4.3 hazard: Substances which, in contact with water emit flammable gases						
4.3	-	Flame: black or white	Blue	4 (black or white)		-

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 5.1 hazard: Oxidizing substances						
5.1	-	Flame over circle: black	Yellow	5.1 (black)		-
Class 5.2 hazard: Organic peroxides						
5.2	-	Flame: black or white	Upper half red, lower half yellow	5.2 (black)		-
Class 6.1 hazard: Toxic substances						
6.1	-	Skull and crossbones: black	White	6 (black)		-
Class 6.2 hazard: Infectious substances						
6.2	-	Three crescents superimposed on a circle: black	White	6 (black)		The lower half of the label may bear the inscriptions: "INFECTIOUS SUBSTANCE" and "In the case of damage or leakage immediately notify Public Health Authority" in black colour

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 7 hazard: Radioactive material						
7A	Category I – WHITE	Trefoil: black	White	7 (black)		Text (mandatory), black in lower half of label: "RADIOACTIVE" "CONTENTS ..." "ACTIVITY ..." One red vertical bar shall follow the word: "RADIOACTIVE"
7B	Category II – YELLOW	Trefoil: black	Upper half yellow with white border, lower half white	7 (black)		Text (mandatory), black in lower half of label: "RADIOACTIVE" "CONTENTS ..." "ACTIVITY ..." In a black outlined box: "TRANSPORT INDEX"; Two red vertical bars shall follow the word: "RADIOACTIVE"
7C	Category III – YELLOW	Trefoil: black	Upper half yellow with white border, lower half white	7 (black)		Text (mandatory), black in lower half of label: "RADIOACTIVE" "CONTENTS ..." "ACTIVITY ..." In a black outlined box: "TRANSPORT INDEX". Three red vertical bars shall follow the word: "RADIOACTIVE"
7E	Fissile material	-	White	7 (black)		Text (mandatory): black in upper half of label: "FISSILE"; In a black outlined box in the lower half of label: "CRITICALITY SAFETY INDEX"

Label model No.	Division or Category	Symbol and symbol colour	Background	Figure in bottom corner (and figure colour)	Specimen labels	Note
Class 8 hazard: Corrosive substances						
8	-	Liquids, spilling from two glass vessels and attacking a hand and a metal: black	Upper half white, lower half black with white border	8 (white)		-
Class 9 hazard: Miscellaneous dangerous substances and articles						
9	-	7 vertical stripes in upper half: black	White	9 underlined (black)		-
9A	-	7 vertical stripes in upper half: black; battery group, one broken and emitting flame in lower half: black	White	9 underlined (black)		-