ORGANISATION FOR CO-OPERATION BETWEEN RAILWAYS
(OSJD)

RULES FOR THE CARRIAGE OF DANGEROUS GOODS

ANNEX 2

TO THE AGREEMENT ON INTERNATIONAL TRANSPORT OF GOODS BY RAIL

(SMGS)

As of 1 July 2023

VOLUME I

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PART 1
GENERAL REQUIREMENTS

CHAPTER 1.1
SCOPE OF APPLICATION

1.1.1 STRUCTURE

Annex 2 to SMGS is composed of seven parts. Each part is divided into chapters, articles and paragraphs.

1.1.2 SCOPE OF APPLICATION

1.1.2.1 In compliance with Article 9 “Rules for the transport of dangerous goods these rules shall apply to the international carriage of dangerous goods by rail and regulate:

a) conditions for the carriage of dangerous substances and articles including:
- classification, classification criteria and test procedures;
- packaging and labelling as well as requirements at the mixed packing;
- use of tanks, its filling and labelling;
- consignment procedures, execution of transport documents;
- requirements at the construction, testing and approval of packagings and tanks;
- use of wagons and containers;
- requirements concerning loading, unloading and handling of goods as well as of consolidated cargo

b) list of dangerous goods which are not allowed to be carried.

1.1.2.2 (Reserved)

1.1.2.3 For the carriage of dangerous goods as hand luggage, registered luggage in passenger cars only the provisions of 1.1.3.8 shall apply.

1.1.3 EXEMPTIONS

1.1.3.1 General exemptions

The provisions laid down in Annex 2 to SMGS shall not apply to:

a) the carriage of dangerous goods by private individuals where the goods in question are packaged for retail sale and are intended for their personal or domestic use or for their leisure or sporting activities, provided that measures have been taken to prevent any leakage of contents in normal conditions of carriage. When these goods are flammable liquids carried in refillable receptacles filled by, or for, a private individual, the total quantity shall not exceed 60 litres per receptacle. Dangerous goods in intermediate bulk containers, large packagings or tanks are not considered to be packaged for retail sale or to be intended for the personal or domestic use or for the leisure or sporting activities;

b) (reserved);

c) the carriage undertaken by enterprises which is ancillary to their main activity, such as deliveries to or returns from building or civil engineering sites, or in relation to surveying, repairs and maintenance, in quantities of not more than 450 litres per packaging, including IBCs and large packagings, and within the maximum quantities specified in 1.1.3.6. Measures shall be taken to prevent any leakage of contents in normal conditions of carriage. Carriage undertaken by such enterprises for their supply or external or internal distribution does not fall within the scope of this exemption. These exemptions shall also not apply to Class 7;

d) the carriage undertaken by the competent authorities for the emergency response or under their supervision, insofar as such carriage is necessary in relation to the

emergency response, in particular carriage undertaken to contain and collect the dangerous goods involved in an incident or accident and move them to the nearest appropriate safe place;

e) emergency transport intended to save human lives or protect the environment, undertaken by the competent authority for the emergency respone or under theis supervision, provided that all measures are taken to ensure that such transport is carried out in complete safety;

f) the carriage of uncleaned empty static storage vessels which have contained gases of Class 2, groups A, O or F, substances of Class 3 or Class 9 belonging to packing group II or III or pesticides of Class 6.1 belonging to packing group II or III, provided the conditions set out below are satisfied:

- all openings with the exception of pressure relief devices (when fitted) are hermetically closed;
- measures have been taken to prevent any leakage of contents in normal conditions of carriage;
- the load is fixed in cradles or crates or other handling devices or to the wagon or container in such a way that it will not shift during normal conditions of carriage.

This exemption shall not apply to the static storage vessels which have contained desensitized explosives or substances the carriage of which is prohibited by Annex 2 to SMGS.

Note: *For radioactive material see also 1.7.1.4.*

1.1.3.2 Exemptions related to the carriage of gases

The provisions laid down in Annex 2 to SMGS shall not apply to the carriage of:

a) gases contained in the fuel tanks or fuel tanks of railway vehicles performing a transport operation and destined for their propulsion or for the operatioin of any of their equipment used or intended for use during carriage (e.g.refrigerating eqipment);

Note: *A container fitted with equipment for use during carriage, secured on a railway vehicle, is considered as an integral part of the railway vehicle. The fuel necessary to operate the equipment benefits from the same exemptions.*

b) (reserved);

c) gases of Groups A and O (according to 2.2.2.1), if the pressure of the gas in the receptacle or tank at a temperature of 20°C does not exceed 200 kPa (2 bar) and if the gas is not a liquefied or a refrigerated liquefied gas. This includes every kind of receptacle or tank, e.g. also parts of machinery and apparatus;

Note: *This exemption shall not apply to lamps. For lamps see 1.1.3.10.*

d) gases contained in the equipment used for the operation of the vehicle (e.g. fire extinguishers), including in spare parts (e.g. inflated pneumatic tyres); this exemption also applies to inflated pneumatic tyres carried as a load;

e) gases contained in the special equipment of wagons or vehicles carried as a load and necessary for the operation of this special equipment during transport (cooling systems, fish-tanks, heaters, etc.) as well as spare receptacles for such equipment or uncleaned empty exchange receptacles, transported in the same wagon or vehicle;

f) gases contained in foodstuffs (except UN 1950), including carbonated beverages;

g) gases contained in balls intended for use in sports; and

h) (reserved)

1.1.3.3 Exemptions related to the carriage of liquid fuels

The provisions laid down in Annex 2 to SMGS shall not apply to the carriage of:

a) fuel contained in the fuel tanks of railway vehicles performing a transport operation and destined for their propulsion or for the operatioin of any of their equipment used or intended for use during carriage (e.g.refrigerating eqipment);

Note: *A container fitted with equipment for use during carriage, secured on a railway vehicle, is considered as an integral part of the railway vehicle. The fuel necessary to operate the equipment benefits from the same exemptions.*

b) (reserved)

c) (reserved)

1.1.3.4 Exemptions related to special provisions or to dangerous goods packed in limited or excepted quantities

Note: *For radioactive material see also 1.7.1.4.*

1.1.3.4.1 Special provisions of Chapter 3.3 exempt partially or totally the carriage of specific dangerous substances and articles from the requirements of Annex 2 to SMGS. The exemption applies when the special provision is referred to in Column (6) of Table A of Chapter 3.2.

1.1.3.4.2 Certain dangerous goods may be exempted from the requirements of Annex 2 to SMGS provided that the conditions of Chapter 3.4 are met.

1.1.3.4.3 Certain dangerous goods may be exempted from the requirements of Annex 2 to SMGS provided that the conditions of Chapter 3.5 are met.

1.1.3.5 Exemptions related to empty uncleaned packagings

The requirements of Annex 2 to SMGS shall not apply to empty uncleaned packagings (including IBCs and large packagings) which have contained substances of Classes 2, 3, 4.1, 5.1, 6.1, 8 and 9 provided adequate measures have been taken to nullify any hazard. Hazards shall be deemed to be nullified provided adequate measures have been taken to nullify all hazards of Classes 1 to 9.

1.1.3.6 Quantity of packed goods transported by wagon or large container being subject to requirements or exemptions of Annex 2 to SMGS.

Note 1: *This paragraph shall apply when it is referred to in other provisions of Annex 2 to SMGS (in Chapters 1.8 and 1.10 as well as in paragraph 1.1.3.1 c) etc.).*

Note 2: *Transport category is a category which is assigned to specific goods depending on its hazard risk*

1.1.3.6.1 (reserved)

1.1.3.6.2 (reserved)

1.1.3.6.3 The provisions of paragraph 1.1.3.1 c) may apply if the total quantity of dangerous goods of the same transport category transported by wagon or large container does not exceed the quantity indicated in column (3) of the table below.

Some requirements (for example provisions of paragraph 1.8.3 and Chapter 1.10) shall apply if the values indicated in column (3) of the table below are exceeded.

Transport category	**Substances or articles (UN No., classification code/ group, packing group)**	**Total quantity per wagon or large container[b)]**
(1)	**(2)**	**(3)**
0	Class 1: 1.1L, 1.2L, 1.3L and UN No. 0190 Class 3: UN No. 3343 Class 4.2: Substances belonging to packing group I Class 4.3: UN Nos. 1183, 1242, 1295, 1340, 1390, 1403, 1928, 2813, 2965, 2968, 2988, 3129, 3130, 3131, 3132б 3134, 3148, 3396, 3398 and 3399 Class 5.1: UN No.2426 Class 6.1: UN Nos. 1051, 1600, 1613, 1614, 2312, 3250 and 3294 Class 6.2: UN Nos. 2814, 2900 and 3549 Class 7: UN Nos. 2912 to 2919, 2977, 2978 and 3321 to 3333 Class 8: UN No. 2215 MALEIC ANHYDRIDE, MOLTEN Class 9: UN Nos. 2315, 3151, 3152, 3432 and articles containing such substances or mixtures, and empty uncleaned packagings, except those classified under UN No. 2908, having contained substances classified in this transport category	0
1	Substances and articles belonging to packing group I and not classified in transport category 0, and substances and articles of the following classes: Class 1: classification codes: 1.1B - 1.1J[a)], 1.2B - 1.2J, 1.3C, 1.3G, 1.3H, 1.3J and 1.5D [a)] Class 2: groups: «T», «TC» [a)], «TO», «TF», «TOC» [a)] и «TFC» aerosols: groups: «C», «CO», «FC», «T», «TF», «TC», «TO», «TFC» and «TOC» chemicals under pressure: UN Nos.3502, 3503, 3504 and 3505 Class 4.1: UN Nos. 3221 to 3224 Class 5.2: UN Nos. 3101 to 3104	20
2	Substances belonging to packing group II and not classified in transport categories 0, 1 or 4 and substances of the following classes: Class 1: with classification codes: 1.4B to 1.4G and 1.6N Class 2: group «F» aerosols: group «F» chemicals under pressure: UN No. 3501 Class 4.1: UN Nos. 3225 to 3230 Class 4.3: UN No. 3292 Class 5.1: UN No. 3356 Class 5.2: UN Nos. 3105 to 3110, 3531, 3532 Class 6.1: UN Nos.1700, 2016 and 2017 articles belonging to packing group III Class 6.2: UN No. 3291 Class 9: UN Nos. 3090, 3091, 3245, 3480, 3481, and 3536	333
3	Substances belonging to packing group III and not classified in transport categories 0, 2 or 4, as well as articles of the following classes: Class 2: groups «A» and «O»	1000

Transport category	Substances or articles (UN No., classification code/ group, packing group)	Total quantity per wagon or large container[b)]
(1)	(2)	(3)
	aerosols: groups: «A» and «O» chemicals under pressure: UN No. 3500 Class 3: UN No. 3473 Class 4.3: UN No. 3476 Class 8: UN Nos. 2794, 2795, 2800, 3028, 3477 and 3506 Class 9: UN Nos. 2990 and 3072	
4	Class 1: 1.4S Class 2: UN Nos. 3537 to 3539 Class 3: UN No. 3540 Class 4.1: UN Nos. 1331, 1345, 1944, 1945, 2254, 2623 and 3541 Class 4.2: UN Nos. 1361 and 1362, packing group III and 3542 Class 4.3: UN No. 3543 Class 5.1: UN No. 3544 Class 5.2: UN No. 3545 Class 6.1: UN No. 3546 Class 7: UN Nos.2908 to 2911 Class 8: UN No. 3547 Class 9: UN No.3268, 3499, 3508, 3509 and 3548 and empty, uncleaned packagings having contained dangerous goods, except for those classified in transport category 0	unlimited

[a)] *For UN Nos. 0081, 0082, 0084, 0241, 0331, 0332, 0482, 1005 and 1017, the total quantity per wagon or large container shall be 50 kg.*

[b)] In the above table, "total quantity per wagon or large container" means:

- for articles, total mass in kilograms of the articles without their packagings (for articles of Class 1, net mass in kilograms of the explosive substance; for dangerous goods in machinery and equipment specified in Annex 2 to SMGS, the total quantity of dangerous goods contained therein in kilograms or litres as appropriate;
- for solids, liquefied gases, refrigerated liquefied gases and dissolved gases, net mass in kilograms;
- for liquids, the total quantity of dangerous goods contained in litres;
- for compressed gases, adsorbed gases and chemicals under pressure, the water capacity of the receptacle in litres.

1.1.3.6.4 If dangerous goods of different transport categories are carried in the same wagon or large container, and the sum of

- the quantity of substances and articles of transport category 1 multiplied by "50",
- the quantity of substances and articles of transport category 1 referred to in Note a to the table in 1.1.3.6.3 multiplied by "20";
- the quantity of substances and articles of transport category 2 multiplied by "3",

and

- the quantity of substances and articles of transport category 3

exceeds a calculated value of "1000", then in these cases some requirements have to be met (for example, provisions of 1.8.3 and Chapter 1.10).

1.1.3.6.5 For the purposes of 1.1.3.6 dangerous goods exempted from provisions of Annex 2 to SMGS in accordance with 1.1.3.1 (a), (b) and (d) to (f), 1.1.3.2 to 1.1.3.5, 1.1.3.7 to 1.1.3.10 shall not be taken into account.

1.1.3.7 Exemptions related to the carriage of electric energy storage and production systems

The provisions laid down in Annex 2 to SMGS do not apply to electric energy storage and production systems (e.g. lithium batteries, electric capacitors, asymmetric capacitors, metal hydride storage systems, fuel cells, etc.):

a) installed in a railway vehicle, performing a transport operation and destined for its propulsion or for the operation of any of its equipment;

b) contained in equipment for the operation of this equipment used or intended for use during carriage (e.g. a laptopexcept for equipment such as data loggers and cargo tracking devices attached to or placed in packages, overpacks, containers or load compartments which are only subject to the requirements in 5.5.4);

c) (reserved)

1.1.3.8 Application of the exemptions in the carriage of dangerous goods as hand luggage, registered luggage or in or on board vehicles

Note: *The provisions of this article do not preclude the application of additional restrictions imposed by national law and/or by passenger operators in compliance with contract of carriage falling within scope of contractual law.*

For the carriage of dangerous goods as hand luggage, registered luggage or in or on board vehicles, the exemptions in accordance with 1.1.3.1, 1.1.3.2 c) to g), 1.1.3.4 - 1.1.3.5, 1.1.3.7 and 1.1.3.10 shall apply.

1.1.3.9 Exemptions related to dangerous goods used as a coolant or conditioner during carriage

When used in wagons or containers for cooling or conditioning purposes, dangerous goods that are only asphyxiant (which dilute or replace the oxygen normally in the atmosphere) are only subject to the provisions of section 5.5.3.

1.1.3.10 Exemptions related to the carriage of lamps containing dangerous goods

The following lamps are not subject to Annex 2 to SMGS provided that they don't contain radioactive material and don not contain mercury in quantities above those specified in special provision 366 of Chapter 3.3:

a) lamps that are collected directly from individuals and households when carried to a collection or recycling facility;

Note: *This also includes lamps brought by individuals to a first collection point, and then carried to another collection point, intermediate processing or recycling facility.*

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

1) the lamps are manufactured according to a certified quality management system;

Note: *ISO 9001 may be used for this purpose*

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

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

d) Lamps containing only gases of Groups A and O (according to 2.2.2.1) provided they are packaged so that the projectile effects of any rupture of the lamp will be contained within the package.

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

1.1.4 APPLICABILITY OF OTHER REGULATIONS

1.1.4.1 General provisions

1.1.4.1.1 International carriage on the territory of any Contracting State may be subject to national regulations or prohibitions. Such regulations or prohibitions shall be published in an appropriate manner.

1.1.4.1.2 (Reserved)

1.1.4.1.3 (Reserved)

1.1.4.2 Carriage in a transport chain including maritime or air carriage

1.1.4.2.1 Packages, containers, bulk containers, portable tanks, tank-containers and MEGCs and wagons containing a wagon load made up of packages containing one and the same substance or articles, which do not entirely meet the requirements for packing, mixed packing, marking, labelling of packages or placarding and orange plate marking of Annex 2 to SMGS, but are in conformity with the requirements of the IMDG Code or the ICAO Technical instructions shall be accepted for carriage in a transport chain including maritime or air carriage subject to the following conditions:

a) If the packages are not marked and labelled in accordance with Annex 2 to SMGS, they shall bear marks and danger labels in accordance with the requirements of the IMDG Code or the ICAO Technical Instructions;

b) The requirements of the IMDG Code or the ICAO Technical Instructions shall be applicable to mixed packing within a package;

c) For carriage in a transport chain including maritime carriage, if the containers, bulk containers, portable tanks, tank-containers or MEGCs or wagons containing a wagon load made up of packages containing one and the same substance or article are not marked and placarded in accordance with Chapter 5.3 of Annex 2 to SMGS, they shall be marked and placarded in accordance with Chapter 5.3 of the IMDG Code. For empty, uncleaned portable tanks, tank-containers and MEGCs, this requirement shall apply up to and including the subsequent transfer to a cleaning station.

This derogation does not apply in the case of goods classified as dangerous goods in classes 1 to 9 of Annex 2 to SMGS and considered as non-dangerous goods according to the applicable requirements of the IMDG Code or the ICAO Technical Instructions.

1.1.4.2.2 (reserved)

1.1.4.2.3 (reserved)

Note: *For carriage in accordance with 1.1.4.2.1 see also 5.4.1.1.7; for carriage in containers, see also 5.4.2.*

1.1.4.3 Use of IMO type portable tanks approved for maritime transport

IMO type portable tanks (types 1, 2, 5 and 7) which don't meet the requirements of Chapters 6.7 or 6.8, but which were built and approved before 1 January 2003 in accordance with the provisions of the IMDG Code (amendments 29-98) may continue to be

used provided that they meet the applicable periodic inspection and test provisions of the IMDG Code[11]. In addition, they shall meet the provisions corresponding to the instructions set out in columns (10) and (11) of Table A in Chapter 3.2 and the provisions of Chapter 4.2 of Annex 2 to SMGS. See also 4.2.0.1 of the IMDG Code.

1.1.4.4 Piggyback transport

1.1.4.4.1 Dangerous goods may also be carried in piggyback transport under the following conditions:

Road vehicles and their contents handed over for transport in piggyback transport shall meet the provisions of ADR.

The following shall not be permitted:

- explosives of Class 1, compatibility group A (UN Nos. 0074, 0113, 0114, 0129, 0130, 0135, 0224 and 0473);
- self-reactive substances of Class 4.1 requiring temperature control (UN Nos. 3231 to 3240);
- polymerizing substances of classes 1 to 8 in packagings or IBCs with a self-accelerating decomposition temperature (SAPT) ≤ 50°C and polymerizing substances in tanks with an SAPT ≤ 45 °C, therefore requiring temperature control;s
- organic peroxides of Class 5.2 requiring temperature control (UN Nos. 3111 to 3120);
- sulphur trioxide of Class 8 at least 99.95% pure, without inhibitor, carried in tanks (UN No. 1829).

1.1.4.4.2 Placards, marks or orange-coloured plates on wagons carrying road vehicles

It is not necessary to affix placards, marks or orange-coloured plates to carrying wagons in the following cases:

a) when road vehicles bear the placards, marks or orange-coloured plates in accordance with chapters 5.3 or 3.4 of ADR;

b) when placards, marks or orange-coloured plates are not required for road vehicles (e.g. in accordance with 1.1.3.6 or the Note to 5.3.2.1.5 of ADR).

1.1.4.4.3 Carriage of trailers carrying packages

If a trailer becomes separated from its tractor unit, the orange-coloured plate in accordance with 5.3.2 of ADR and the mark in accordance with Chapter 3.4 of ADR affixed at the rear of the trailer shall also be affixed to its front. However, the orange-coloured plate need not be affixed to the front of the trailer if the corresponding placards are affixed to both sides.

1.1.4.4.4 Repetition of placards, marks or orange-coloured plates on wagons carrying road vehicles

If the affixed placards, marks or orange-coloured plates in accordance with 1.1.4.4.2 are not visible from outside the carrying wagon, they shall be affixed to both sides of the wagon carrying transport units or trailers.

1.1.4.4.5 Information in the consignment note

For carriage in piggyback transport in accordance with 1.1.4.4, the following shall be entered in the consignment note:

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1. *The International Maritime Organization (IMO) has issued "Guidance on the Continued Use of Existing IMO Type Portable Tanks and Road Tank Vehicles for the Transport of Dangerous Goods" as CCC.1/Circ.3. The text of this guidance can be found on the IMO website at: www.imo.org*

"CARRIAGE IN ACCORDANCE WITH 1.1.4.4."

For the carriage of tanks or dangerous goods in bulk for which ADR prescribes an orange-coloured plate with the hazard identification number, the hazard identification number shall be entered in the transport document before the letters “UN” preceding the UN number (see 5.4.1.1.1 (a)).

1.1.4.4.6 All the other provisions of Annex 2 to SMGS remain unaffected.

1.1.4.5 Carriage other than by rail

1.1.4.5.1 If the wagon carrying dangerous goods is carried by maritime on one of the sections of the journey, then national or international rules governing the carriage of goods by sea shall be applicable to the said section of the journey**.**

1.1.4.5.2 (reserved)

1.1.4.5.3 (reserved)

1.1.4.6 Consignments into or through the territory of the state applying the provisions of RID

If carriage in accordance with RID follows carriage in accordance with Annex 2 to SMGS, the provisions of RID shall apply to this section of the journey located in the territory of the state applying the provisions of RID.

In this case, the marks for packages, overpacks, tank-wagons and tank-containers as well as the information to be provided in accordance with Annex 2 to SMGS in the documents attached to the consignment note can also, in addition to the languages prescribed in Annex 2 to SMGS, be in English, German or French, unless otherwise stipulated in the agreements concluded between the countries concerned in the transport operation.

Note: *The provisions of this paragraph shall apply to labelling and marking of packages in compliance with 5.2.1.5 and 5.5.3.4 and of overpacks in compliance with 5.1.2.1 a), of tank-wagons and tank-containers in compliance with 5.5.2.3, 5.5.3.6, 6.8.3.5.6 d) and 6.8.4 e). These provisions shall also apply to the information to be provided in the documents attached to the consignment note in compliance with 5.4.1.2.1 c), d), g) and 5.4.1.2.3.3.*

1.1.5 Application of standards

Where the application of a standard is required and there is any conflict between the standard and the provisions of Annex 2 to SMGS, the provisions of Annex 2 to SMGS take precedence.

Titles of standards mentioned in Annex 2 to SMGS may differ from titles of standards mentioned in other international documents. The number of standard plays an important role here. The requirements of the concrete standard, which are not inconsistent with and contrary to the provisions of Annex 2 to SMGS as well as the requirements of other standards or its parts, to which a reference is made in that concrete standard, shall be applied in accordance with the procedures laid down.

Note: *A standard provides details on how to meet the provisions of Annex 2 to SMGS and may include requirements in addition to those set out in Annex 2 to SMGS.*

1.1.6 List of technical documents and regulations

Additional technical requirements to be applied by the SMGS Contacting States on their own territory in order to ensure the safety of transport of dangerous goods and fulfill the requirements of Annex 2 to SMGS are listed in the list of technical documents and regulations (hereinafter referred to as the “*List*”) to be applied additionally for the purpose of implementing the provisions and requirements of Annex 2 to SMGS.

The technical documents and regulations, which are listed in *the List*, shall be applied by the SMGS Contracting States mentioned in the column 5 of *this List*. The SMGS Contracting States, which are not mentioned in the column 5 of *this List*, are not bound by these technical documents and regulations, which can be used only as recommendation for them.

Amendments and changes to *the List* shall be made and published in compliance with the procedure laid down in Article 56. Amendments and changes to *the list* shall take effect at the same time as the appropriate amendments and changes to Annex 2 to SMGS.

CHAPTER 1.2
DEFINITIONS, UNITS OF MEASUREMENT, AND ABBREVIATIONS

1.2.1 TERMS AND DEFINITIONS

For the purposes of Annex 2 to SMGS, terms and definitions are used as follows:

A

Aerosol or aerosol dispenser: see ***Aerosol packaging.***

B

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

Battery-wagon means a wagon containing elements which are linked to each other by a manifold and permanently fixed to this wagon. The following elements are considered to be elements of a battery-wagon: cylinders, tubes, bundles of cylinders (also known as frames), pressure drums as well as tanks destined for the carriage of gases as defined in 2.2.2.1.1 with a capacity of more than 450 litres;

Body (for all categories of IBC other than composite IBCs) means the receptacle proper, including openings and closures, but does not include service equipment.

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

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

A bulk container is:

– of a permanent character and accordingly strong enough to be suitable for repeated use,

– specially designed to facilitate the carriage of goods by one or more means of transport without intermediate reloading,

– fitted with devices permitting its ready handling,

– of a capacity of not less than 1.0 m3.

Examples of bulk containers are containers, offshore bulk containers, skips, bulk bins, swap bodies, trough-shaped containers, roller containers, load compartments of wagons.

Note: *This definition only applies to bulk containers meeting the requirements of Chapter 6.11.*

Bundle of cylinders means a pressure receptacle comprising an assembly of cylinders or cylinder shells that are fastened together and which are interconnected by a manifold and carried as a unit. The total water capacity shall not exceed 3 000 litres except that bundles intended for the carriage of toxic gases of Class 2 (groups starting with letter T according to 2.2.2.1.3) shall be limited to 1 000 litres water capacity.

C

Calculation pressure means a theoretical pressure at least equal to the test pressure which, according to the degree of danger exhibited by the substance being carried, may to a greater or lesser degree exceed the working pressure. It is used solely to determine

the thickness of the walls of the shell, independently of any external or internal reinforcing device.

Note: *For portable tanks, see Chapter 6.7.*

Capacity of shell or shell compartment for tanks, means the total inner volume of the shell or shell compartment expressed in litres or cubic metres. When it is impossible to completely fill the shell or the shell compartment because of its shape or construction, this reduced capacity shall be used for the determination of the degree of filling and for the marking of the tank;

Cargo transport unit means a wagon, a container, a tank-container, portable tank or a MEGC;

Note: *This definition applies only for the application of special provision 302 of Chapter 3.3 and of 5.5.2.*

Carriage in bulk means the carriage of uncounted unpackaged solids or articles in wagons, containers or bulk containers. The term does not apply to packaged goods nor to substances carried in tanks.

Carriage means the change of place of dangerous goods, including stops made necessary by transport conditions and including any period spent by the dangerous goods in wagons, tanks and containers made necessary by traffic conditions before, during and after the change of place.

This definition also covers the intermediate temporary storage of dangerous goods in order to change the mode or means of transport (transshipment). This shall apply, provided that transport documents showing the place of dispatch and the place of reception are presented on request and provided that packages and tanks are not opened during intermediate storage, except to be checked by the competent authorities.

Carrier – See Part I, Article 2 of SMGS «Definitions».

CGA («АСГ») means the Compressed Gas Association (CGA, 14501 George Carter Way, Suite 103, Chantilly, VA 20151, USA).

Closed bulk container means a totally closed bulk container having a rigid roof, sidewalls, end walls and floor (including hopper-type bottoms). The term includes bulk containers with an opening roof, side or end wall that can be closed during carriage. Closed bulk containers may be equipped with openings to allow for the exchange of vapours and gases with air and which under normal conditions of carriage prevent the release of solid contents as well as the penetration of rain and splash water.

Closed container means a totally enclosed container having a rigid roof, rigid side walls, rigid end walls and a floor. The term includes containers with an opening roof where the roof is closed during transport.

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

Closed wagon means a wagon with fixed sides and roof as well as floor. The wagons with movable sides or roof, which shall be closed during transportation process, are included.

Note: *Closed hopper wagons shall be covered by this definition.*

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

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

Collective entry means an entry for a defined group of substances or articles (see 2.1.1.2, B, C and D).

Competent authority means the authority or authorities or any other body or bodies designated as such in each State and in each specific case in accordance with domestic law.

Compliance assurance (radioactive material) means a systematic programme of measures applied by a competent authority which is aimed at ensuring that the requirements of Annex 2 to SMGS are met in practice.

Compressed Natural Gas means a compressed gas composed of natural gas with a high methane content assigned to UN No. 1971 (See also the *List*, document No.2)

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

Conformity assessment means the process of verifying the conformity of a product according to the provisions of sections 1.8.6 and 1.8.7 related to to type examination, supervision of manufacture, initial inspection and associated testing.

Consignee – See Part I, Article 2 of SMGS «Definitions».

Consignor – See Part I, Article 2 of SMGS «Definitions».

Container means an article of transport equipment

- of a permanent character and accordingly strong enough to be suitable for repeated use,
- specially designed to facilitate the carriage of goods, by one or more means of transport, without breakage of load,
- fitted with devices permitting its mechanical loading and unloading and fixation on the transportation means,
- equipped with loading and unloading devices and all other operational devices (See also *"*large container*"*, *"*closed container*"*, *"*open container*"*, *"*sheeted container*"* and *"*small container*"*,
- having an internal volume of not less than 1 m3, except for containers for the carriage of radioactive material.

Note: *The term "container" does not cover conventional packagings, IBCs, tank-containers or wagons. Nevertheless, a container may be used as a packaging for the carriage of radioactive material.*

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

Control temperature means the maximum temperature at which the organic peroxide or the self-reactive substance can be safely carried.

Conveyance" means, for carriage by road or by rail, a road vehicle or a wagon.

Crate means an outer packaging with incomplete surfaces.

Critical temperature (for organic peroxides and self-reactive substances) means the temperature at which emergency procedures shall be implemented in the event of loss of temperature control in order to prevent a dangerous reaction during transportation of organic peroxides and self-reactive substances.

Critical temperature (for gases) means the temperature above which the substance cannot exist in the liquid state.

Criticality safety index (CSI) assigned to a package, overpack or container containing fissile material, for the carriage of radioactive material, means a number which is used to

provide control over the accumulation of packages, overpacks or containers containing fissile material.

Cryogenic receptacle means a transportable thermally insulated pressure receptacle for refrigerated liquefied gases of a water capacity of not more than 1 000 litres (see also "Open cryogenic receptacle").

CSC means the International Convention for Safe Containers (Geneva, 1972) as amended and published by the International Maritime Organization (IMO), London.

CSI[2] means the criticality safety index.

Cylinder means a pressure receptacle of a water capacity not exceeding 150 litres (see also "Bundle of cylinders").

D

Dangerous goods means those substances or articles the carriage, loading or unloading and storage of which may cause explosion, fire, damage to technical facilities or other goods, serious injuries or even death, skin injuries, intoxication, radiation injuries or diseases in people or animals. Dangerous goods means also substances or articles, which are not accepted for carriage in compliance with provisions of Annex 2 to SMGS or can be accepted for carriage only under conditions prescribed therein.

Dangerous reaction means:

a) combustion or evolution of considerable heat;

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

c) the formation of corrosive substances;

d) the formation of unstable substances; or

e) dangerous rise in pressure (for tanks only).

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

Design, for the carriage of radioactive material, means the description of fissile material excepted under 2.2.7.2.3.5 (f), special form radioactive material, low dispersible radioactive material, package or packaging which enables such an item to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.

Diameter of a shell (for shells of tanks) means the internal diameter of the shell.

Discharge pressure means the maximum pressure actually built up in the tank when it is being discharged under pressure.

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

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

E

[2] *CSI – Critical safety index*

EN means a standard published by the European Committee of Standardization (CEN) (CEN, Avenue Marnix 17, B-1000 Brussels);

Enterprise means any natural person, any legal person, whether profit-making or not, any association or group of persons without legal personality, whether profit-making or not, or any official body, whether it has legal personality itself or is dependent upon an authority that has such personality

Entity in charge of maintenance (ECM) means the entity in charge of the maintenance of a wagon, which had been certified accordingly thereto.

Examination of tank-wagons, portable tanks, battery-wagons, tank-containers, demountable tanks and multiple-element gas containers (MEGC) means technical activities to be carried out by experts or enterprise authorized by the competent authority in compliance with the requirements of 6.8.2.4, in the course of inspection (certification) of tank-wagons, portable tanks, battery-wagons, tank-containers, demountable tanks and multiple-element gas containers (MEGC); (for example leakproofness or test hydraulic test).

Exclusive use, for the carriage of radioactive material, means the sole use, by a single consignor, of a wagon or of a large container, in respect of which all initial, intermediate and final loading, shipment and unloading are carried out in accordance with the directions of the consignor or consignee, where so required by Annex 2 to SMGS.

F

Filler means any enterprise which fills dangerous goods into a tank (tank-wagon, wagon with demountable tank, portable tank or tank-container) and/or into a wagon, large container or small container for carriage in bulk, or into a battery-wagon or MEGC.

Filling pressure means the maximum pressure actually built up in the tank when it is being filled under pressure.

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

Flammable component (for aerosols) means flammable liquids, flammable solids or flammable gases and gas mixtures as defined in Notes 1 to 3 of sub-section 31.1.3 of Part III of the Manual of Tests and Criteria. This designation does not cover pyrophoric, self-heating or water-reactive substances. The chemical heat of combustion shall be determined by one of the following methods ASTM D 240, ISO/FDIS 13943: 1999 (E/F) 86.1 to 86.3 or NFPA 30B.

Flash-point means the lowest temperature of a liquid at which its vapours form a flammable mixture with air.

Flexible bulk container means a flexible container with a capacity not exceeding 15 m3 and includes liners and attached handling devices and service equipment;

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

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

Full wagon load or ***Full container load*** means the use of a wagon or a large container, whether or not its loading space is used wholly or in part, and provided that all loading and unloading operation shall be carried out in compliance with instructions of consignor or consignee.

Note: *The corresponding term for radioactive material is "exclusive use".*

G

Gas means a substance which:

a) at 50 °C has a vapour pressure greater than 300 kPa (3 bar); or

b) is completely gaseous at 20 °C under standard pressure of 101.3 kPa;

GHS (СГС) means the seventh edition of the Globally Harmonized System of Classification and Labelling of Chemicals, published by the United Nations as document ST/SG/AC.10/30/Rev.8.

Globally Harmonized System of Classification and Labelling of Chemicals means the ninth revised edition of the United Nations publication bearing this title (ST/SG/AC.10/30/Rev.9).

H

Handling device (for flexible IBCs) means any sling, loop, eye or frame attached to the body of the IBC or formed from the continuation of the IBC body material.

Holding time means the time that will elapse from the establishment of the initial filling condition until the pressure has risen due to heat influx to the lowest set pressure of the pressure limiting device(s) of tanks intended for the carriage of refrigerated liquefied gases.

Note: *For portable tanks, see 6.7.4.1.*

I

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

IAEA Regulations for the Safe Transport of Radioactive Material means one of the editions of those Regulations, as follows: (a) For the 1985 and 1985 (as amended 1990) editions: IAEA Safety Series No. 6; (b) For the 1996 edition: IAEA Safety Series No. ST-1; (c) For the 1996 (revised) edition: IAEA Safety Series No. TS-R-1 (ST-1, Revised); (d) For the 1996 (as amended 2003), 2005 and 2009 editions: IAEA Safety Standards Series No. TS-R-1; (e) For the 2012 edition: IAEA Safety Standards Series No. SSR-6; (f) For the 2018 edition: IAEA Safety Standards Series No. SSR–6 (Rev.1)

IBC means "Intermediate bulk container".

Composite IBC with plastics inner receptacle means an IBC comprising structural equipment in the form of a rigid outer casing encasing a plastics inner receptacle together with any service or other structural equipment. It is so constructed that the inner receptacle and outer casing once assembled form, and are used as, an integrated single unit to be filled, stored, transported or emptied as such.

Note: *"Plastics material", when used in connection with inner receptacles for composite IBCs, is taken to include other polymeric materials such as rubber.*

Fibreboard IBC means a fibreboard body with or without separate top and bottom caps, if necessary an inner liner (but no inner packagings), and with appropriate service and structural equipment.

Flexible IBC means a body constituted of film, woven fabric or any other flexible material or combinations thereof, and if necessary, an inner coating or liner, together with any appropriate service equipment and handling devices.

Metal IBC means a metal body together with appropriate service and structural equipment.

Protected IBC (for metal IBCs) means an IBC provided with additional protection against impact, the protection taking the form of, for example, a multi-layer (sandwich) or double-wall construction, or a frame with a metal lattice-work casing.

Rigid plastics IBC means a rigid plastics body, which may have structural equipment together with appropriate service equipment.

Repaired IBC means a metal, rigid plastics or composite IBC that, as a result of impact or for any other cause (e.g. corrosion, embrittlement or other evidence of reduced strength as compared to the design type) is restored so as to conform to the design type and to be able to withstand the design type tests. For the purposes of Annex 2 to SMGS, the replacement of the rigid inner receptacle of a composite IBC with a receptacle con- forming to the original design type from the same manufacturer is considered repair. However, routine maintenance of rigid IBCs is not considered repair. The bodies of rigid plastics IBCs and the inner receptacles of composite IBCs are not repairable. Flexible IBCs are not repairable unless approved by the competent authority.

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

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

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

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

Wooden IBC means a rigid or collapsible wooden body, together with an inner liner (but no inner packaging) and appropriate service and structural equipment.

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

ICAO Technical Instructions means the Technical Instructions for the Safe Transport of Dangerous Goods by Air, which complement Annex 18 to the Chicago Convention on International Civil Aviation (Chicago 1944), published by the International Civil Aviation Organization (ICAO) in Montreal.

IMDG – Code (МК МПОГ) means the International Maritime Dangerous Goods Code, for the implementation of Chapter VII, Part A, of the International Convention for the Safety of Life at Sea, 1974 (SOLAS Convention), published by the International Maritime Organization (IMO), London.

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

Infrastructure (Railway infrastructure) – See Article 2 § 1 SMGS “Definitions”.

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

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

Inspection (certification) of tank-wagons, demountable tanks, battery-wagons, tank-containers, tank swap-bodies and MEGCs means inspection of tank-wagons, demountable tanks, battery-wagons, tank-containers, swap-bodies and MEGCs in compliance with the requirements of 6.8.2.4 to be performed by experts on enterprise authorized by competent authority and certification verifying that they correspond to requirements of Annex 2 to SMGS. There are different types of inspection: initial inspection, periodic inspection, intermediate inspection and exceptional checks.

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

Intermediate bulk container (IBC) means a rigid, or flexible portable packaging, other than those specified in Chapter 6.1, that:

a) has a capacity of:

1) not more than 3.0 m3 for solids and liquids of packing groups II and III;

2) not more than 1.5 m3 for solids of packing group I when packed in flexible, rigid plastics, composite, fibreboard and wooden IBCs;

3) not more than 3.0 m3 for solids of packing group I when packed in metal IBCs;

4) more than 3.0 m3 for radioactive material of Class 7;

b) is designed for mechanical handling;

c) is resistant to the stresses produced in handling and transport as determined by the tests specified in Chapter 6.5

(see also "Composite IBC with plastics inner receptacle", "Fibreboard IBC", "Flexible IBC", "Metal IBC", "Rigid plastics IBC" and "Wooden IBC");

Note 1: Portable tanks or tank-containers that meet the requirements of Chapter 6.7 or 6.8 respectively are not considered to be intermediate bulk containers (IBCs).

Note 2: Intermediate bulk containers (IBCs) which meet the requirements of Chapter 6.5 are not considered to be containers for the purposes of Annex 2 to SMGS.

ISO (*И*СО) means an international standard published by the International Organization for Standardization (ISO) (ISO, 1, rue de Varembé, CH-1204 Geneva 20).

J

Jerrican means a metal or plastics packaging of rectangular or polygonal cross-section with one or more orifices.

L

Large container means

a) a container which does not meet the definition of a small container;

b) in the meaning of the CSC, a container of a size such that the area enclosed by the four outer bottom corners is either

(i) at least 14 m2 (150 square feet) or

(ii) at least 7 m2 (75 square feet) if fitted with top corner fittings.

Leakproofness test means a test to determine the leakproofness of a tank, a packaging or an IBC and of the equipment and closure devices;

Note*: For portable tanks, see Chapter 6.7*.

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

Liquefied Natural Gas means a refrigerated liquefied gas composed of natural gas with a high methane content assigned to UN No. 1972 (See also the *List*, document No.3)

Liquefied Petroleum Gas means a low pressure liquefied gas composed of one or more light hydrocarbons which are assigned to UN Nos. 1011, 1075, 1965, 1969 or 1978 only and which consists mainly of propane, propene, butane, butane isomers, butene with traces of other hydrocarbon gases;

Note 1: Flammable gases assigned to other UN numbers shall not be regarded as LPG.

Note 2: For UN No. 1075 see Note 2 under 2F, UN No. 1965, in the table for liquefied gases in 2.2.2.3.

Liquid means a substance which at 50 °C has a vapour pressure of not more than 300 kPa (3 bar), which is not completely gaseous at 20 °C and 101.3 kPa, and which

a) has a melting point or initial melting point of 20 °C or less at a pressure of 101.3 kPa, or

b) is liquid according to the ASTM D 4359-90 test method or

c) is not pasty according to the criteria applicable to the test for determining fluidity (penetrometer test) described in 2.3.4;

Note: "*Carriage in the liquid state", for the purpose of tank requirements, means:*

– Carriage of liquids according to the above definition, or

– Solids handed over for carriage in the molten state.

List (term written in italics) means the list of technical documents and regulations to be applied additionally for the purpose of implementing the requirements of Annex 2 to SMGS as provided by paragraph 1.1.6.

Loader means any enterprise which:

a) Loads packaged dangerous goods, small containers or portable tanks into or onto a wagon or a container; or

b) Loads a container, bulk-container, MEGC, tank-container, portable tank or road vehicle onto a wagon.

Loading means all actions carried out by the loader, in accordance with the definition of loader.

M

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

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

Mass of package means gross mass of the package unless otherwise stated.

Maximum capacity means the maximum inner volume of receptacles or packagings including intermediate bulk containers (IBCs) and large packagings expressed in cubic metres or litres;

Maximum net mass means the maximum net mass of contents in a single packaging or maximum combined mass of inner packagings and the contents thereof expressed in kilograms.

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

Maximum permissible gross mass

a) (for IBCs) means the mass of the IBC and any service or structural equipment together with the maximum net mass;

b) (for tanks) means the tare of the tank and the heaviest load authorized for carriage;

Note: *For portable tanks, see Chapter 6.7.*

Maximum working pressure (gauge pressure) means the highest of the following three pressures, that may occur at the top of the tank in the operating position:

a) the highest effective pressure allowed in the tank during filling (maximum filling pressure allowed);

b) the highest effective pressure allowed in the tank during discharge (maximum discharge pressure allowed); and

c) the effective gauge pressure to which the tank is subjected by its contents (including such extraneous gases as it may contain) at the maximum working temperature.

Unless the special requirements prescribed in Chapter 4.3 provide otherwise, the numerical value of this working pressure (gauge pressure) shall not be lower than the vapour pressure (absolute pressure) of the filling substance at 50 °C.

For tanks equipped with safety valves (with or without bursting disc) other than tanks for the carriage of compressed, liquefied or dissolved gases of Class 2., the maximum working pressure (gauge pressure) shall however be equal to the prescribed opening pressure of such safety valves.

Note 1: Maximum working pressure is not applicable to gravity-discharge tanks according to 6.8.2.1.14.

Note 2: For portable tanks, see Chapter 6.7.

Note 3: For closed cryogenic receptacles, see Note to 6.2.1.3.6.5.

MEGC, see "Multiple-element gas container.

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

Mild steel means a steel having a minimum tensile strength between 360 N/mm2 and 440 N/mm2;

Note: *For portable tanks, see Chapter 6.7.*

Multilateral approval, for the carriage of radioactive material, means approval by the relevant competent authority of the country of origin of the design or shipment, as applicable, and by the competent authority of each country through or into which the consignment is to be carried.

Multiple-element gas container (MEGC) means a container consisting of elements which are linked to each other by a manifold and mounted on a frame. The following elements are considered to be elements of a multiple-element gas container: cylinders, tubes, pressure drums and bundles of cylinders as well as tanks for the carriage of gases as defined in 2.2.2.1.1 having a capacity of more than 450 litres,

Note: *For UN MEGCs, see Chapter 6.7.*

N

N.O.S. entry (not otherwise specified entry means a collective entry to which substances, mixtures, solutions or articles may be assigned if they:

a) are not mentioned by name in Table A of Chapter 3.2, and

b) exhibit chemical, physical and/or dangerous properties corresponding to the Class, classification code, packing group and the name and description of the n.o.s. entry.

N.O.S. see «N.O.S. entry.

Net explosive mass (NEM) means the total mass of the explosive substances, without the packagings, casings, etc. (Net explosive quantity (NEQ), net explosive contents

(NEC), net explosive weight (NEW) or net mass of explosive contents are often used to convey the same meaning.).

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

O

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

Open container means a container without roof.

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

Open wagon means a wagon without roof.

Operator of a tank-container, portable tank or tank-wagon means any enterprise in whose name the tank-container, portable tank or tank-wagon is registered or approved for transport.

Over-moulded cylinder means a cylinder intended for the carriage of LPG with a water capacity not exceeding 13 litres made of a coated welded steel inner cylinder body with an over-moulded protective case made from cellular plastic, which is non-removable and bonded to the outer surface of the steel cylinder wall.

Overpack means an enclosure used (by a single consignor in the case of radioactive material) to contain one or more packages, consolidated into a single unit easier to handle and stow during carriage.

Examples of overpacks:

a) a loading tray such as a pallet, on which several packages are placed or stacked and secured by a plastics strip, shrink or stretch wrapping or other appropriate means; or

b) an outer protective packaging such as a box or a crate.

P

Package means the complete product of the packing operation, consisting of the packaging or large packaging or IBC and its contents prepared for dispatch. The term includes pressure receptacles for gases as defined in this section as well as articles which, because of their size, mass or configuration may be carried unpackaged or carried in cradles, crates or handling devices. Except for the carriage of radioactive material, the term does not apply to goods which are carried in bulk, nor to substances carried in tanks.

Note: *For radioactive material, see 2.2.7.2, 4.1.9.1.1 and Chapter 6.4.*

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

Note: For radioactive material, see 2.2.7.2.

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

Note: *The term "inner packaging" used for combination packagings shall not be confused with the term "inner receptacle" used for composite packagings.*

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

Note: *The term "inner receptacle" used for composite packagings shall not be confused with the term "inner packaging" used for combination packagings. For example, the inner of a 6HA1 composite packaging (plastics material) is such an inner receptacle since it is normally not designed to perform a containment function without its outer packaging and is not therefore an inner packaging. Where a material is mentioned in brackets after the term "composite packaging", it refers to the inner receptacle.*

Inner packaging means a packaging for which an outer packaging is required for carriage.

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

Large salvage packaging means a special packaging which

a) is designed for mechanical handling; and

b) exceeds 400 kg net mass or 450 litres capacity but has a volume of not more than 3 m3; into which damaged, defective or leaking dangerous goods packages, or dangerous goods that have spilled or leaked are placed for purposes of carriage for recovery or disposal.

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

a) is designed for mechanical handling;

b) exceeds 400 kg net mass or 0,45 m3 capacity but not more than 3.0 m3.

Light-gauge metal packaging means a packaging of circular, elliptical, rectangular or polygonal cross-section (also conical) and taper-necked and pail-shaped packaging made of metal, having a wall thickness of less than 0.5 mm (e.g. tinplate), flat or convex bottomed and with one or more orifices, which is not covered by the definitions for drums or jerricans.

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

Reconditioned packaging means in particular

a) metal drums that are:

- cleaned to original materials of construction, with all former contents, internal and external corrosion, and external coatings and labels removed;
- restored to original shape and contour, with chimes (if any) straightened and sealed and all non- integral gaskets replaced; and
- inspected after cleaning but before painting, with rejection of packagings with visible pitting, significant reduction in the material thickness, metal fatigue, damaged threads or closures or other significant defects;

b) plastics drums and jerricans that:

- are cleaned to original materials of construction, with all former contents, external coatings and labels removed;
- have all non-integral gaskets replaced; and
- are inspected after cleaning with rejection of packagings with visible damage such as tears, creases or cracks, or damaged threads or closures or other significant defects.

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

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

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

Remanufactured large packagings are subject to the same requirements of Annex 2 to SMGS that apply to new large packagings of the same type (see also design type definition in 6.6.5.1.2);

Remanufactured packaging means in particular

a) metal drums that:
   - are produced as a UN type complying with the requirements of Chapter 6.1 from a non-UN type;
   - are converted from one UN type complying with the requirements of Chapter 6.1 to another UN type; or
   - undergo the replacement of integral structural components (such as non-removable heads);

b) plastics drums that:
   - are converted from one UN type to another UN type (e.g. 1H1 to 1H2); or
   - undergo the replacement of integral structural components.

Remanufactured drums are subject to the requirements of Chapter 6.1 which apply to new drums of the same type.

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

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

Sift-proof packaging means a packaging impermeable to dry contents, including fine solid material produced during carriage.

Packer means any enterprise which puts dangerous goods into packagings, including large packagings and intermediate bulk containers (IBCs) and, where necessary, prepares packages for carriage.

Packing group means a group to which, for packing purposes, certain substances may be assigned in accordance with their degree of danger. The packing groups have the following meanings which are ex- plained more fully in Part 2:

Packing group I: Substances presenting high danger;

Packing group II: Substances presenting medium danger; and

Packing group III: Substances presenting low danger;

Piggyback transport means the carriage of road vehicles loaded with dangerous goods in combined road/rail transport.

Plastics – polymer material, which has to be moulded.

Plastics, fibre-reinforced means material consisting of reinforcement (fibrous and/or particulate) contained within a thermoset or thermoplastic polymer (matrix).

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

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

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

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

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

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

Pressurized gas cartridge, see "Aerosol packaging";

Protective lining (for tanks) means a lining or coating protecting the metallic tank material against the substances to be carried;

Note: *This definition does not apply to a lining or coating used only to protect the substance to be carried.*

Q

Quality assurance means a systematic programme of controls and inspections applied by any organization or body which is aimed at providing confidence that the safety prescriptions in Annex 2 to SMGS are met in practice.

R

Radiation detection system means an apparatus that contains radiation detectors as components.

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

Railway infrastructure manager – See Article 2 § 1 SMGS “Definitions”.

Receptacle (Class 1) includes boxes, bottles, cans, drums, jars and tubes, including any means of closure used in the inner or intermediate packaging.

Receptacle means a containment vessel for receiving and holding substances or articles, including any means of closing. This definition does not apply to shells (see also " Closed cryogenic receptacle", "Open cryogenic receptacle", "Inner receptacle", "Pressure receptacle", "Rigid inner receptacle" and "Gas cartridge").

Recycled plastics material means material recovered from used industrial packagings that has been cleaned and prepared for processing into new packagings.

Reel (Class 1) means a device made of plastics, wood, fibreboard, metal or other suitable material comprising a central spindle with, or without, side walls at each end of the spindle. Articles and substances can be wound onto the spindle and may be retained by side walls;

Reference steel means a steel with a tensile strength of 370 N/mm2 and an elongation at fracture of 27%.

RID («МПОГ)» means the Regulations concerning the international carriage of dangerous goods by rail (Appendix C to the Convention concerning international carriage by rail (COTIF)).

Rigid inner receptacle (for composite IBCs) means a receptacle which retains its general shape when empty without its closures in place and without benefit of the outer casing. Any inner receptacle that is not "rigid" is considered to be "flexible".

Road vehicle means motor vehicle, articulated vehicle, trailer or semi-trailer within the meaning of ADR, by means of which dangerous goods are carried;

Rolling stock means a vehicle suitable to circulate on its own wheels on railway lines with or without traction.

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

a) Cleaning;

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

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

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

a) Cleaning;

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

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

S

SADT: See "Self-accelerating decomposition temperature".

Safety valve means a spring-loaded device which is activated automatically by pressure the purpose of which is to protect the tank against unacceptable excess internal pressure.

Salvage pressure receptacle means a pressure receptacle with a water capacity not exceeding 3000 litres into which are placed damaged, defective, leaking or non-conforming pressure receptacle(s) for the purpose of carriage e.g. for recovery or disposal.

SAPT: see "Self-accelerating polymerization temperature".

Self-accelerating decomposition temperature means the lowest temperature at which self- accelerating decomposition may occur with substance in the packaging as used during carriage. Provisions for determining the SADT and the effects of heating under confinement are contained in Part II of the Manual of Tests and Criteria.

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

Self-operating ventilation valve means a venting device on shells with bottom discharge which is connected to the bottom valve and in normal operation is only opened during loading or unloading for the ventilation of shells.

Service equipment

a) of the tank means filling and discharge, breather, safety, heating and heat insulating devices and measuring instruments.

Note: *For portable tanks, see Chapter 6.7.*

b) of the elements of a battery-wagon or of a MEGC means filling and discharge devices, including the manifold, safety devices and measuring instruments;

c) of an IBC means the filling and discharge devices and any pressure-relief or venting, safety, heating and heat insulating devices and measuring instruments;

d) of a pressure receptacle, means closures, manifolds, piping, porous, absorbent or adsorbent material and any structural devices, e.g. for handling.

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

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

Sheeted bulk container means an open top bulk container with rigid bottom (including hopper-type bottom), side and end walls and a non-rigid covering.

Sheeted container means an open container equipped with a sheet to protect the goods loaded.

Sheeted wagon means an open wagon provided with a sheet to protect the load.

Shell (for tanks) means the part of the tank which retains the substance intended for carriage, including openings and their closures, but does not include service equipment or external structural equipment;

Note: *For portable tanks, see Chapter 6.7.*

Small container means a container which has an internal volume of not more than 3 m³. Any other container shall be considered large container.

Note: *With regard to radioactive materials see 2.2.7.2.*

Small receptacle containing gas (gas cartridge) means a non-refillable receptacle having a water capacity not exceeding 1000 ml for receptacles made of metal and not exceeding 500 ml for receptacles made of synthetic material or glass, containing, under pressure, a gas or a mixture of gases. It may be fitted with a reliefe valve.

Solid means:

a) a substance with a melting point or initial melting point of more than 20 °C at a pressure of 101.3 kPa, or

b) a substance which is not liquid according to the ASTM D 4359-90 test method or which is pasty according to the criteria applicable to the test for determining fluidity (penetrometer test) described in 2.3.4;

Structural equipment

a) for tanks of a tank-wagon, means the external or internal reinforcing, fastening or protective members of the shell;

b) for tanks of a tank-container, means the external or internal reinforcing, fastening, protective or stabilizing members of the shell**.**

Note: *For portable tanks, see Chapter 6.7.*

c) for elements of a battery-wagon or an MEGC means the external or internal reinforcing, fastening, protective or stabilizing members of the shell or receptacle;

d) for IBCs other than flexible IBCs means the reinforcing, fastening, handling, protective or stabilizing members of the body (including the base pallet for composite IBCs with plastics inner receptacle).

Swap body is a container which has the following characteristics (See also the List, document No.1):

– it is only built for carriage on a wagon or a vehicle on land or by roll-on roll-of ship;

– it cannot be stacked;

– it can be loaded into and unloaded from vehicles by means of equipment on board the vehicle.

Swap-body – demountable tank is considered tank-container.

T

Tank documentation set means technical tank documents in any form or on any media containing all technical information on tanks, battery-wagons or multiple-element gas containers (MEGC), as well as certificates referred to in 6.8.2.3, 6.8.2.4 and 6.8.3.4.

Tank means a shell, including its service and structural equipment. When used alone, the term tank means a tank-container, portable tank, fixed tank, tank-wagon, and

demountable tank as defined in this Section, including tanks forming elements of battery-wagons or MEGCs.

***Note**: For portable tanks, see 6.7.4.1.*

Demountable tank means a tank designed to fit the special apparatus of the wagon but which can only be removed from it after dismantling their means of attachment.

Fixed tank means a tank having a capacity of more than 1 000 litres which is permanently attached to a wagon (which then becomes a tank-wagon) or is an integral part of the frame of such wagon.

Hermetically closed tank means a tank that:

– is not equipped with safety valves, bursting discs, other similar safety devices or vacuum valves or with self-operating ventilation valves, or

– is equipped with safety valves preceded by a bursting disc according to 6.8.2.2.10, but is not equipped with vacuum valves or with self-operating ventilation valves.

A tank intended for the carriage of liquid substances with a calculation pressure of at least 4 bar or intended for the carriage of solid substances (powdery or granular) regardless of its calculation pressure is also considered hermetically closed if it:

– is equipped with safety valves preceded by a bursting disc according to 6.8.2.2.10 and vacuum valves or self-operating ventilation valves, in accordance with the requirements of 6.8.2.2.3.

– is not equipped with safety valves, bursting discs or other similar safety devices, but is equipped with vacuum valves or with self-operating ventilation valves, in accordance with the requirements of 6.8.2.2.3.

Portable tank means a multimodal tank having, when used for the carriage of gases as defined in 2.2.2.1.1, a capacity of more than 450 litres in accordance with the definitions in Chapter 6.7 or the IMDG Code and indicated by a portable tank instruction (T-Code) in Column (10) of Table A of Chapter 3.2.

Vacuum-operated waste tank means a tank-container or tank swap body primarily used for the carriage of dangerous wastes, with special constructional features and/or equipment to facilitate the filling and discharging of wastes as specified in Chapter 6.10. A tank which fully complies with the requirements of Chapter 6.7 or 6.8 is not considered to be a vacuum-operated waste tank.

Tank-container means an article of transport equipment meeting the definition of a container, and comprising a shell and items of equipment, including the equipment to facilitate movement of the tank-container without significant change of attitude, used for the carriage of gases, liquid, powdery or granular substances and, when used for the carriage of gases as defined in 2.2.2.1.1, having a capacity of more than 0.45 m3 (450 litres);

***Note:** IBCs which meet the requirements of Chapter 6.5 are not considered to be tank-containers.*

In addition:

Extra-large tank-container means a tank-container with a capacity of more than 40 000 litres.

Tank-container or portable tank operator means any enterprise in whose name the tank-container or portable tank is operated;

Tank-wagon means a wagon intended for the carriage of gases, liquids, powdery or granular substances, consisting of one or more shells, which are permanently underframe-mounted;

Note: *Tank-wagon also includes mounted tanks and wagons with demountable tanks.*

Tank-wagon operator means any enterprise in whose name the tank-wagon is registered or approved for transport;

Technical name means a recognized chemical name, if relevant a biological name, or other name currently used in scientific and technical handbooks, journals and texts (see 3.1.2.8.1.1).

Test pressure means the required pressure applied during a pressure test for initial or periodic inspection.

Note: *For portable tanks, see Chapter 6.7*.

Through or into, for the carriage of radioactive material, means through or into the countries in which a consignment is carried but specifically excludes countries "over" which a consignment is carried by air provided that there are no scheduled stops in those countries.

TI[3] means "Transport index (TI)" assigned to a package, overpack or container, or to unpackaged LSA-I or SCO-I or SCO-III, for the carriage of radioactive material, means a number which is used to provide control over radiation exposure

Tube (Class 2) means a pressure receptacle of seamless or composite construction having a water capacity exceeding 150 litres and of not more than 3 000 litres.

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

Tray (Class 1) means a sheet of metal, plastics, fibreboard or other suitable material which is placed in the inner, intermediate or outer packaging and achieves a close-fit in such packaging. The surface of the tray may be shaped so that packagings or articles can be inserted, held secure and separated from each other.

U

UIC (МСЖД) - means the International Union of Railways (UIC, 16 rue Jean Rey, F-75015 Paris).

UN Model Regulations means the Model Regulations annexed to the twenty-second revised edition of the Recommendations on the Transport of Dangerous Goods published by the United Nations (ST/SG/AC.10/1/Rev.22).

UN (United Nations) number means the four-figure identification number of the substance or article taken from the United Nations Model Regulations on the Transport of Dangerous Goods.

UN Regulation means a regulation annexed to the Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted and or used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions (1958 Agreement, as amended).

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

Unilateral approval, for the carriage of radioactive material, means an approval of a design which is required to be given by the competent authority of the country of origin of the design only. If the country of origin is not an SMGS Contracting State, the approval

[3] *«TI» - «Transport Index»*

shall require validation by the competent authority of an SMGS Contracting State (see 6.4.22.8).

Unloader means any enterprise which:

a) Removes a container, bulk-container, MEGC, tank-container, portable tank or road vehicle from a wagon; or

b) Unloads packaged dangerous goods, small containers or portable tanks out of or from a wagon or a container; or

c) Discharges dangerous goods from a tank (tank-wagon, demountable tank, portable tank or tank-container) or from a battery-wagon or MEGC or from a wagon, large container or small container for carriage in bulk or a bulk-container.

Unloading means all actions carried out by the unloader, in accordance with the definition of unloader.

V

Vacuum valve means a spring-loaded device which is activated automatically by pressure the purpose of which is to protect the tank against unacceptable negative internal pressure.

W

Wagon means a railway vehicle, not provided with a means of traction, which is intended to carry goods.

Wastes means substances, solutions, mixtures or articles for which no direct use is envisaged but which are carried for reprocessing, dumping, elimination by incineration or other methods of disposal.

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

Working pressure:

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

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

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

Note: *For tanks, see "Maximum working pressure (gauge pressure)".*

the settled pressure of a compressed gas at a reference temperature of 15 °C in a full pressure receptacle;

Note: *For tanks, see Maximum working pressure (gauge pressure).*

Woven plastics (for flexible IBCs) mean a material made from stretch tapes or

1.2.2. UNITS OF MEASUREMENT

1.2.2.1 The following units of measurement are applicable in Annex 2 to SMGS [a)]

Measurement of	**SI Unit[b)]**	**Acceptable alternative unit together with SI-Units**	**Relationship between units**
Length	m (metre)	-	-
Area	m² (square metre)	-	-
Volume	m³ (cubic metre)	l (litre)	1l = 10^{-3}m³
Time	s (second)	min (minute) h (hour) d (day)	1 min = 60 s 1 h = 3600 s 1 day = 86 400 s
Mass	kg (kilogram)	g (gramme) t (ton)	1 г = 10^{-3} kg 1 т = 10^{3} kg
Density	kg/m³	kg/l	1 kg/l = 10^{3} kg/m³
Temperature	K (kelvin)	°C (degree Celsius)	0°C = 273,15K
Temperature difference	K (kelvin)	°C (degree Celsius)	+/-1°C = +/-1 K
Force	N (Newton)	-	1 N = 1 kg•m/s²
Pressure	Pa (Pascal)	bar (bar)	1 Pa = 1 N/m² 1 bar = 10^{5} Pa
Stress (metal stress)	N/m²	N/mm²	1 N/mm² = 1 MPa
Work Energy Quantity of heat	J (Joule)	kWh (Kilowatt hours) eV (electronvolt)	1 J = 1N•m = 1 W•s 1 eV = 0,1602•10^{-18}J
Power	W (Watt)	-	1 W = 1 J/s = 1N•m/s
Electrical resistance	Ω (ohm)	-	1 Ω = 1 kg · m² / s³ / A²
Kinematic viscosity	m²/s	mm²/s	1 mm²/s = 10^{-6}m²/s
Dynamic viscosity	Pa•s	mPa•s	1mPa•s = 10^{-3} Pa•s
Activity	Bq (Becquerel)		
Dose equivalen	Sv (Sievert)		

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

Force:
1 kg = 9,807 H
1 N = 0,102 kg

Stress (Metal stress)
1 kg/mm² = 9,807 N/mm²
1 N/mm² = 0,102 kg/mm²
1 N/mm² = 1 MPa = 10^{6} Pa

Pressure
1 Pa = 1N/m² = 10^{-5} bar = 1,02 • 10^{-5} kg/cm² = 0,75 • 10^{-2} torr
1 bar = 10^{5} Pa = 1,02 kg/cm² = 750 torr
1 kg/cm² = 9,807 • 10^{4} Pa = 0,9807 bar = 736 torr
1 torr = 1,33 • 10^{2} Pa = 1,33 • 10^{-3} bar = 1,36 • 10^{-3} kg/cm²

Energy, Work, Quantity of heat
1 J = 1 Nm = 0,278 • 10^{-6} kWh = 1,102 kgm = 0,239 • 10^{-3} kcal
1 kWh = 3,6 • 10^{6} J = 367 • 10^{3} kgm = 860 kcal
1 kgm = 9,807 J = 2,72 • 10^{-6} kWh = 2,34 • 10^{-3} kcal
1 kcal = 4,19 • 10^{3} J = 1,16 • 10^{-3} kWh = 427 kgm

Power
1 W = 0,102 кгм/с = 0,86 kcal/h
1 kgm/s = 9,807 W = 8,43 kcal/h
1 kcal/h = 1,16 W = 0,119 kgm/s

Kinematic viscosity
1 m²/s = 10^{4} St (Stokes)
1 St = 10^{-4} m²/s

Dynamic viscosity
1 Pa • s = 1 Ns/m² = 10 P (poise) = 0,102 kg s/m²
1 P = 0,1 Pa • s = 0,1 N s/m² = 1,02 • 10^{-2} kg s/m²
1 kg s/m² = 9,807 Pa • c = 9,807 N s/m² = 98,07 P

[b)] The International System of Units (SI) is the result of decisions taken at the General Conference on Weights and Measures (Address: Pavillon de Breteuil, Parc de St-Cloud, F-92 310 Sèvres).

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

Factor		Prefix	Symbol
1 000 000 000 000 000 000 = 10^{18}	Quintillion	exa	E
1 000 000 000 000 000 = 10^{15}	Quadrillion	peta	P
1 000 000 000 000 = 10^{12}	Trillion	tera	T
1 000 000 000 = 10^{9}	Billion	giga	G
1 000 000 = 10^{6}	Million	mega	M
1 000 = 10^{3}	Thousand	kilo	k
100 = 10^{2}	Hundred	hecto	h
10 = 10^{1}	Ten	deca	da
0,1 = 10^{-1}	Tenth	deci	d
0,01 = 10^{-2}	Hundredth	centi	c
0,001 = 10^{-3}	Thousandth	milli	m
0,000 001 = 10^{-6}	Millionth	micro	μ
0,000 000 001 = 10^{-9}	Billionth	nano	n
0,000 000 000 001 = 10^{-12}	Trillionth	pico	p
0,000 000 000 000 001 = 10^{-15}	Quadrillionth	femto	f
0,000 000 000 000 000 001 = 10^{-18}	Quintillionth	atto	a

1.2.2.2 Unless expressly stated otherwise, the sign "%" in Annex 2 to SMGS represents:

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

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

(c) In the case of mixtures of liquefied gases and dissolved gases, the proportion of the mass indicated as a percentage of the total mass of the mixture.

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

1.2.2.4 Where Annex 2 to SMGS specifies a degree of filling for receptacles, this is always related to a reference temperature of the substances of 15 °C, unless some other temperature is indicated.

1.2.3 List of abbreviations

In Annex 2 to SMGS, abbreviations, acronyms and abbreviated designations of regulatory texts are used, with the following meaning:

A

“ADN" means the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.

“ADR” means the Agreement concerning the International Carriage of Dangerous Goods by Road, including all special agreements signed by those states involved in the transport operation.

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

C

“CGA” means the Compressed Gas Association, 8484 Westpark Drive, Suite 220, McLean, Virginia 22102, United States of America, www.cganet.com.

CNG means compressed natural gas (see 1.2.1);

CSC means the International Convention for Safe Containers (Geneva, 1972) as amended and published by the International Maritime Organization (IMO), London;

"CSI"* means criticality safety index (see 1.2.1);

E

EIGA means European Industrial Gas Association, 30 Avenue de l'Astronomie, 1210 Brussels (Belgium), www.eiga.eu.

"EN" (standard) means a European standard published by the European Committee for Standardization (CEN) (CEN, Avenue Marnix 17, 1000 Brussels, Belgium), www.cen.eu;

F

FRP means fibre-reinforced plastics (see 1.2.1);

G

GHS means Globally Harmonized System of Classification and Labelling of Chemicals (see 1.2.1);

I

IAEA means the International Atomic Energy Agency, P.O. Box 100, 1400 Vienna, Austria, www.iaea.org;

IBC means intermediate bulk container (see 1.2.1);

ICAO means the International Civil Aviation Organization, 999 University Street, Montreal, Quebec H3C 5H7, Canada, www.icao.org;

IMDG – Code (МК МПОГ) means the International Maritime Dangerous Goods Code, for the implementation of Chapter VII, Part A, of the International Convention for the Safety of Life at Sea, 1974 (SOLAS Convention), published by the International Maritime Organization (IMO), London.

IMO means the International Maritime Organization, 4 Albert Embankment, London SE1 7SR, United Kingdom, www.imo.org;

"ISO"** (standard) means an international standard published by the International Organization for Standardization, 1, rue de Varembé, 1204 Geneva 20, Switzerland, www.iso.org;

L

LNG means liquefied natural gas (see 1.2.1);

"LPG" means liquefied petroleum gas (see 1.2.1);

"LSA"*** (material) means low specific activity material (see 2.2.7.1.3);

M

"MEGC" means multiple-element gas container (see 1.2.1);

"MEMU" means a unit, or a vehicle mounted with a unit, for manufacturing and charging explosives from dangerous goods that are not explosives. The unit consists of various tanks and bulk containers and process equipment as well as pumps and related equipment. The MEMU may have special compartments for packaged explosives.

N

N.O.S. see entry N.O.S. (see 1.2.1);

R

RID means the Regulations concerning the international carriage of dangerous goods by rail (Appendix C to the Convention concerning international carriage by rail (COTIF)).

S

SADT means self-accelerating decomposition temperature (see 1.2.1);

SAPT means self-accelerating polymerization temperature (see 1.2.1);

"SCO"**** means an object with surface radioactive contamination (see 2.2.7.1.3);

T

"TI"***** means transport index (see 1.2.1);

U

UIC means the International Union of Railways, 16 rue Jean Rey, 75015 Paris, France, www.uic.org;

UNECE means the United Nations Economic Commission for Europe, Palais des Nations, 8-14 avenue de la Paix, 1211 Geneva 10, Switzerland, www.unece.org.

* "CSI" is an acronym for the English term "Criticality Safety Index".

** "ISO" is an acronym for the English term "International Organization for Standardization".

*** "LSA" is an acronym for the English term "Low Specific Activity".

**** "SCO" is an acronym for the English term "Surface Contaminated Object".

***** "TI" is an acronym for the English term "Transport Index".

CHAPTER 1.3
TRAINING OF PERSONS INVOLVED IN THE CARRIAGE OF DANGEROUS GOODS

1.3.1 SCOPE OF APPLICATION

Persons involved in the carriage of dangerous goods shall be trained in the requirements governing the carriage of such goods appropriate to their responsibilities and duties. Employees shall be trained in accordance with 1.3.2 before assuming responsibilities and shall only perform functions, for which required training has not yet been provided, under the direct supervision of a trained person. Training requirements specific to security of dangerous goods in Chapter 1.10 shall also be addressed.

Note 1: *Training of personnel involved in the carriage of dangerous goods shall be carried out in all cases in compliance with national law and rules.*

Note 2: *With regard to the training for the safety adviser, see 1.8.3 instead of this section.*

Note 3: *With regard to the training of personnel involved in the carriage of goods of Class 7, see also 1.7.2.5.*

Note 4: *Training of personnel involved in the carriage of dangerous goods shall be carried out before they start work on their allotted task and fulfill their obligations.*

1.3.2 NATURE OF TRAINING

The training shall take the following form, appropriate to the responsibility and duties of the individual concerned.

1.3.2.1 General awareness training

Personnel shall be familiar with the general requirements of the provisions for the carriage of dangerous goods.

1.3.2.2 Function-specific training

Personnel shall be trained, commensurate directly with their duties and responsibilities in the requirements of the regulations concerning the carriage of dangerous goods.

Where the carriage of dangerous goods involves a multimodal transport operation, the personnel shall be aware of the requirements concerning other transport modes.

The carrier's and railway infrastructure manager's personnel shall also be trained in matters specific to rail transport. This training shall be in the form of basic training and specialized training.

a) Basic training for all personnel:

   All personnel shall be trained in the meaning of the danger labels and of the orange-coloured marking. In addition, personnel shall be aware of the procedure for reporting irregularities.

b) Specialized training for operational personnel directly involved in the carriage of dangerous goods:

   In addition to the basic training described under (a), personnel shall be trained commensurate with their duties.

Personnel shall be trained on the subjects covered by the specialized training, which are divided into three categories in 1.3.2.2.2, on the basis of the groups in 1.3.2.2.1.

1.3.2.2.1 Categories of personnel:

Category	Description of category	Personnel
1	Operations personnel involved directly in the transport of dangerous goods	Drivers and marshalling staff or personnel with an equivalent function
2	Personnel responsible for the technical control of wagons used for the transport of dangerous goods	Rolling stock technician or personnel with an equivalent function
3	Personnel responsible for guiding and controlling rail and marshalling services and management personnel of the railway infrastructure manager	Train dispatchers, station operators, switchmen, signalers, control centre personnel or personnel with an equivalent function

1.3.2.2.2 Special subjects to be covered by the specialized training shall be, at least:

a) For personnel of category 1.

Drivers or personnel with an equivalent function:

- gaining of necessary information concerning the composition of the train, the presence of dangerous goods and where they are situated in the train;
- dealing in critical (emergency) situations with irregularities, taking measures relating to the protection of their own train and nearby traffic.

Marshallers or personnel with an equivalent function:

- understanding the meaning of the shunting labels in accordance with Models 13 and 15 of Annex 2 to SMGS (see 5.3.4.2) as well as 7.5.6;
- observing the protective distances for goods of Class 1 in accordance with 7.5.3 (Annex 2 to SMGS);
- dealing in critical (emergency) situation with irregularities.

b) For personnel of category 2.

Wagon technician or personnel with an equivalent function:

- carrying out wagon inspection;
- performing inspections and checks in compliance with 1.4.2.2.1;
- dealing in critical (emergency) situation with irregularities.

c) For personnel of category 3.

Dispatchers, station operators, switchmen, control centre personnel or personnel with an equivalent function:

- dealing in critical (emergency) situation with irregularities;
- observing the internal emergency plans for marshaling yards in compliance with Chapter 1.11.

1.3.2.3 Safety training

Personnel involved in the carriage of dangerous goods shall get familiar with the characteristics of dangerous goods, conditions of their carriage, shall be trained in the hazards and dangers presented by dangerous goods The training provided shall aim to make personnel aware of the safe handling and emergence response procedures

1.3.2.4 Refresher training

The training shall be periodically supplemented with refresher training to take account of changes in regulations.

1.3.3 Documentation

Records of training received in the field of carriage of dangerous goods shall be kept in compliance with national law.

CHAPTER 1.4
SAFETY OBLIGATION OF THE PARTICIPANTS IN THE CARRIAGE OF DANGEROUS GOODS

1.4.1 GENERAL SAFETY MEASURES

1.4.1.1 The participants in the carriage of dangerous goods shall take appropriate measures so as to avoid damage or injury and, if necessary, to minimize their effects. They shall, in all events, comply with the requirements of Annex 2 to SMGS in their respective fields.

1.4.1.2 In the case of an emergency situation, depending on its nature and extent the participants shall immediately notify the emergency services and shall make available to them the information they require to take emergency response action.

1.4.1.3 Annex 2 to SMGS may specify certain of obligations falling to the various participants.
If the SMGS Contracting States consider that no lessening of safety is involved, they may in their domestic legislation transfer the obligations falling to a specific participant to one or several other participants, provided that the obligations of 1.4.2 and 1.4.3 are met.

The requirements of 1.2.1, 1.4.2 and 1.4.3 concerning the definitions of participants and their respective obligations shall not affect the provisions of domestic law concerning the legal consequences (civil liability, criminal liability, etc.) stemming from the fact that the participant in question is e.g. a legal entity, a self-employed worker, an employer or an employee.

1.4.2 OBLIGATIONS OF THE PARTICIPANTS IN THE CARRIAGE

Note 1. *Several participants to which safety obligations are assigned in this section may be one and the same enterprise. Also, the activities and the corresponding safety obligations of a participant can be assumed by several enterprises*.

Note 2: *For radioactive materials see also 1.7.6.*

1.4.2.1 Consignor

1.4.2.1.1 The consignor of dangerous goods is required to hand over for carriage only consignments which conform to the requirements of Annex 2 to SMGS. As regards the observance of general safety regulations of paragraph 1.4.1 he shall in particular:

a) ascertain that the dangerous goods are classified and authorized for carriage in accordance with Annex 2 to SMGS,

b) furnish the carrier with information and data in a traceable form and, if necessary, the required transport documents and accompanying documents (authorizations, approvals, notifications, certificates, etc.), taking into account in particular the requirements of Chapter 5.4 and of Table A of Chapter 3.2,

c) use packagings, large packagings, intermediate bulk containers (IBCs) and tanks (tank-wagons, wagons with demountable tanks, battery-wagons, MEGCs, portable tanks and tank-containers) approved for and suited to the carriage of the substances concerned and bearing the marks prescribed by Annex 2 to SMGS,

d) comply with the requirements on the means of dispatch and on forwarding restrictions,

e) ensure that even empty uncleaned and not degassed tanks (tank-wagons, wagons with demountable tanks, battery-wagons, MEGCs, portable tanks and tank-containers) or empty uncleaned wagons and containers for carriage in bulk are placarded, marked and labelled in accordance with Chapter 5.3 and that empty uncleaned tanks are closed and present the same degree of leakproofness as if they were full,

f) ensure (also in agreement with the consignee) the fulfillment of requirements of special additional provisions of CW46-CW58 and CW60-CW69 as provided for in 7.5.11 during transshipment of goods from standard gauge wagons (1435 mm) onto broad gauge wagons (1520 mm).

If the consignor does not use the services of other participants (loader, packer, filler), for which operations and activities he, as a party to the contract of carriage, would bear liability, as provided by Article 38 of SMGS, he shall take appropriate measures to ensure that the consignment meets the requirements of Annex 2 to SMGS including those which fulfillment shall be ensured by participants in compliance with paragraph 1.4.3, whose operations and activities fall under the responsibility of the parties to the contract of carriage .

1.4.2.1.2 If the consignor uses the services of other participants (packer, loader, filler, etc.), for which operations and activities he, as a party to the contract of carriage, would bear liability, as provided by Article 38 of SMGS, he shall take appropriate measures to ensure that the consignment meets the requirements of Annex 2 to SMGS.

1.4.2.1.3 When the consignor acts on behalf of a third party, the latter shall inform the consignor in writing that dangerous goods are involved and make available to him all the information and documents he needs to perform his obligations.

1.4.2.2 Carrier

1.4.2.2.1 As regards the observance of general safety regulations of paragraph 1.4.1 the carrier by taking over the dangerous shall in particular:

a) ascertain that the dangerous goods are classified and authorized for carriage in accordance with Annex 2 to SMGS;

b) ascertain that all information prescribed in Annex 2 to SMGS related to the dangerous goods to be taken over for the carriage has been provided by the consignor before carriage, that the prescribed data or documentation is attached to the transport document, and transport documents are drawn up by the consignor in compliance with requirements of SMGS or if electronic data processing (EDP) or if electronic data interchange (EDI) techniques are used instead of paper documentation, that data is available during transport in a manner at least equivalent to that of paper documentation;

c) ascertain visually that the wagons or containers have no obvious defects, leakages or cracks, missing equipment, etc.;

d) ascertain that the date specified for the next test for tank-wagons, battery-wagons, wagons with demountable tanks, portable tanks, tank-containers and MEGCs has not expired;

***Note**: Tanks, battery-wagons and MEGCs may exceptionally be carried after the expiry of this deadline under the conditions of 4.1.6.10 (in the case of battery-wagons and MEGCs containing pressure receptacles as elements), 4.2.4.4, 4.3.2.3.7, 4.3.2.4.4, 6.7.2.19.6, 6.7.3.15.6 or 6.7.4.14.6.*

e) verify that the wagons are not overloaded;

f) ascertain that the placards, marks and orange-coloured plates as well as white-coloured plates prescribed for the wagons in Chapter 5.3 have been affixed;

g) ascertain that the equipment prescribed in the instructions in writing is in the driver's cab (See 5.4.3).

This shall be done on the basis of the consignment note and accompanying documents, by a visual inspection of the wagon or the containers and, where appropriate, the load.

1.4.2.2.2 The carrier may, however, in the case of 1.4.2.2.1 (a), (b), (d), (e) and (f), rely on information and data made available to him by other participants in the carriage (See paragraph 1.4.2) or by persons, whose operations and activities fall under the responsibility of the parties to the contract of carriage (See paragraph 1.4.3). In the case of 1.4.2.2.1 (c) the carrier may rely on what is certified in the "container/vehicle packing certificate" provided in accordance with 5.4.2.

1.4.2.2.3 If the carrier observes an infringement of the requirements of 1.4.2.2.1, he shall not take over the goods for the carriage until the matter has been rectified..

1.4.2.2.4 If, during the journey, an infringement which could jeopardize the safety of the operation is observed, the consignment shall be halted as soon as possible bearing in mind the requirements of traffic safety, of the safe immobilisation of the consignment, and of public safety.

The transport operation may only be continued once the consignment complies with applicable regulations. The competent authority concerned by the rest of the journey may grant an authorization to pursue the transport operation.

In case the required compliance cannot be achieved and no authorization is granted for the rest of the journey, the competent authority shall provide the carrier with the necessary administrative assistance. The same shall apply in case the carrier informs this/these competent authority that the dangerous nature of the goods carried was not communicated to him by the consignor and that he wishes, by virtue of the law applicable in particular to the contract of carriage, to unload, destroy or render the goods harmless.

1.4.2.2.5 The carrier shall ensure that the manager of the railway infrastructure being used is able to obtain at any time during carriage rapid and unrestricted access to the information allowing him to meet the requirements of 1.4.3.6 (b).

Note: The arrangements by which the data are provided shall be laid down in the rules for using the railway infrastructure.

1.4.2.2.6 The carrier shall provide the locomotive crew with the instructions in writing as prescribed in 5.4.3.

1.4.2.2.7 The carrier shall inform the driver of the dangerous goods on board and their position on the train before the train starts its journey.

1.4.2.2.8 (reserved)

1.4.2.3 Consignee

1.4.2.3.1 The consignee has the obligation not to defer acceptance of the goods without compelling reasons and to verify, after unloading, that the requirements of Annex 2 to SMGS concerning him have been complied with.

1.4.2.3.2 A wagon or container may only be returned or reused once the requirements of Annex 2 to SMGS concerning the unloading have been complied with.

1.4.2.3.3 If the consignee makes use of the services of other participants (unloader, cleaner, decontamination facility, etc.) for which operations and activities he, as a party to the contract of carriage, would bear liability, as provided by Article 38 of SMGS, he shall take appropriate measures to ensure that the requirements of 1.4.2.3.1 and 1.4.2.3.2 of Annex 2 to SMGS have been complied with.

1.4.2.3.4 The consignee shall ensure (also in agreement with the consignor) the fulfillment of requirements of special additional provisions of CW46-CW58 and CW60-CW-69 as provided for in 7.5.1 during transshipment of goods from standard gauge wagons (1435 mm) onto broad gauge wagons (1520 mm).

1.4.3 OBLIGATIONS OF OTHER PARTICIPANTS FOR WHICH OPERATIONS AND ACTIVITIES THE PARTIES TO THE CONTRACT OF CARRIAGE BEAR LIABILITY AS PROVIDED BY ARTICLE 38 OF SMGS.

A non-exhaustive list of the other participants and their respective obligations is given below. The obligations of the other participants whose operations and activities fall under the responsibility of the parties to the contract of carriage, flow from section 1.4.1 above insofar as they know or should have known that their duties are performed as part of a transport operation subject to Annex 2 to SMGS.

1.4.3.1 Loader

1.4.3.1.1. As regards the observance of general safety regulations of paragraph 1.4.1 the loader shall in particular:

a) hand over the dangerous goods to the carrier if they are allowed to be transported in compliance with the requirements of Annex 2 to SMGS;

b) he shall, when handing over for carriage packed dangerous goods or uncleaned empty packagings, check whether the packaging is damaged. He shall not hand over a package the packaging of which is damaged, especially if it is not leakproof, and there are leakages or the possibility of leakages of the dangerous substance, until the damage has been repaired; this obligation also applies to empty uncleaned packagings;

c) he shall comply with the special requirements concerning loading and handling;

d) he shall, when he hands dangerous goods over for carriage directly, comply with the requirements concerning placarding, marking and orange-coloured plates and white-coloured plates on the wagon or large container conforming to Chapter 5.3;

e) he shall, when loading packages, comply with the prohibitions on mixed loading taking into account dangerous goods already in the wagon or large container and requirements concerning the separation of foodstuffs, other articles of consumption or animal feedstuffs.

1.4.3.1.2 The loader may, however, in the case of 1.4.3.1.1 (a), (d) and (e), rely on information and data made available to him by other participants in the carriage (See paragraph 1.4.2) or by participants for which operations and activities the parties to the contract of carriage shall bear liability (See paragraph 1.4.3).

1.4.3.2 Packer

As regards the observance of general safety regulations of paragraph 1.4.1 the packer shall comply with in particular:

a) the requirements concerning packaging conditions, or mixed packing conditions and,

b) when he prepares packages for carriage, the requirements concerning marking and labeling of the packages.

1.4.3.3 Filler

As regards the observance of general safety regulations of paragraph 1.4.1 the filler has the following obligations in particular:

a) he shall ascertain prior to the filling of tanks that both they and their equipment are technically in a satisfactory condition

b) he shall ascertain that the date specified for the next inspection for tank-wagons, battery-wagons, wagons with demountable tanks, portable tanks, tank-containers and MEGCs has not expired;

c) he shall only fill tanks with the dangerous goods authorized for carriage in those tanks;

d) he shall, during the filling of the tank, comply with the requirements concerning dangerous goods in adjoining compartments;

e) he shall, during the filling of the tank, observe the permissible degree of filling or the permissible mass of contents per litre of capacity for the substance being filled;

f) he shall, after filling the tank, ensure that all closures are in a closed position and that there is no leakage;

g) he shall ensure that no dangerous residue of the filling substance adheres to the outside of the tanks filled by him

h) he shall, in preparing the dangerous goods for carriage, ensure that the placards, marks, orange-coloured plates and labels (being used for environmentally hazardous substances or for elevated temperature substances etc.) and as well as shunting labels, white-coloured plates and emergency card numbers are affixed on the tanks, on the wagons and on the containers in accordance with the Chapter 5.3;

i) he shall, before and after filling tank-wagons with a liquefied gas, observe the applicable special checking requirements;

j) he shall, when filling wagons or containers with dangerous goods in bulk, ascertain that the relevant provisions of Chapter 7.3 are complied with.

Note: *The filler shall establish procedures to ensure that he fulfils all his obligations.*

1.4.3.4 Tank-container/portable tank operator

As regards the observance of general safety regulations of paragraph 1.4.1 the tank-container/portable tank operator shall in particular:

a) ensure compliance with the requirements for construction, equipment, tests and marking;

b) ensure that the maintenance of shells and their equipment is carried out in such a way as to ensure that, under normal operating conditions, the tank-container/portable tank satisfies the requirements of Annex 2 to SMGS until the next inspection;

c) have an exceptional check made when the safety of the shell or its equipment is liable to be impaired by a repair, an alteration or an accident;

1.4.3.5 Tank-wagon operator

As regards the observance of general safety regulations of paragraph 1.4.1 the tank-wagon operator shall in particular:

a) ensure compliance with the requirements for construction, equipment, tests and marking;

b) ensure that the maintenance of tank-wagons and their equipment is carried out in such a way as to ensure that, under normal operating conditions, the tank-wagon satisfies the requirements of Annex 2 to SMGS;

c) have an exceptional check made when the safety of the shell or its equipment is liable to be impaired by a repair, an alteration or an accident;

d) ensure that all results of actions, which have been undertaken in compliance with a) and b), would be included in the set of technical documents relating to a tank.

1.4.3.6 Railway infrastructure manager

As regards the observance of general safety regulations of paragraph 1.4.1 the railway infrastructure manager has the following obligations in particular. The railway infrastructure manager

a) shall ensure that internal emergency plans for marshalling yards are prepared in accordance with Chapter 1.11;

b) shall ensure that he has rapid and unrestricted access to the following information:

- composition of the train by indicating the number of each wagon and the wagon type if this is not included in the wagon number,
- UN numbers of the dangerous goods being carried in or on each wagon insofar as they are required to be shown in the consignment note, or if only dangerous goods packed in limited quantities in accordance with Chapter 3.4 are being carried, information indicating their presence when marking of the wagon or large container in accordance with Chapter 3.4 is required,

- position of each wagon in the train (wagon order).

This information shall only be disclosed to those parties that require it for safety, security or emergency response purposes.

Note: *The arrangements by which the data are provided shall be laid down in the rules for using the railway infrastructure.*

1.4.3.7 Unloader

1.4.3.7.1 As regards the observance of general safety regulations of paragraph 1.4.1 the unloader shall in particular:

a) ascertain that the correct goods are unloaded by comparing the relevant information in the consignment note with the information on the package, container, tank, MEGC or wagon;

b) before and during unloading, check whether the packagings, the tank, the wagon or container have been damaged to an extent which would endanger the unloading operation. If this is the case, ascertain that unloading is not carried out until appropriate measures have been taken;

c) comply with all relevant requirements concerning unloading and handling;

d) immediately following the unloading of the tank, wagon or container:

1) remove any dangerous residues which have adhered to the outside of the tank, wagon or container during the process of unloading; and

2) ensure the closure of valves and inspection openings;

e) ensure that the prescribed cleaning and decontamination of the wagons or containers is carried out;

f) ensure that the wagons and containers once completely unloaded, cleaned, degassed and decontaminated, no longer display placards, marks, orange-coloured plates and white-coloured plates that had been displayed in accordance with Chapter 5.3.

Note: *The unloader shall establish procedures to ensure that he fulfils all his obligations.*

1.4.3.7.2 If the unloader makes use of the services of other participants (cleaner, decontamination facility, etc.) whose operations and activities fall under the responsibility of the parties to the contract of carriage, he shall take appropriate measures to ensure that the requirements of Annex 2 to SMGS have been complied with.

1.4.3.8 (reserved)

CHAPTER 1.5
DEROGATIONS

1.5.1 TEMPORARY DEROGATIONS

1.5.1.1 In contrast to the regulations under Annex 2 to SMGS certain dangerous goods, which don't fully meet the requirements of Annex 2 to SMGS may be allowed to be transported, provided that safety is not compromised thereby and the transport of such dangerous goods is agreed by the parties involved in its carriage.

The consignor shall request the carrier from the country of dispatch to conclude the special agreement and provide relevant data to be required for the conclusion of such special agreement.

The carrier from the country of dispatch shall submit these data to the carriers of the countries involved in the carriage, in order to agree the content of such agreement. The carriers from the involved countries shall inform each other as soon as possible of their decisions concerning this matter.

The carriers shall make special arrangements with competent authorities of their countries about the carriage of such dangerous goods.

The carrier from the country of dispatch, who has been requested to conclude the special agreement, shall inform the consignor about the conclusion of the special agreement concerning the carriage of such dangerous goods and submit to him the specified number of this special agreement (for example RZD I/2005. The consignor shall enter in the consignment note (box "Description of the goods") the following additional information "Agreed under the SMGS, Annex 2 RZD I/2005" in conjunction with data prescribed in 5.4.1.1.

Note: *"Special arrangement" in accordance with 1.7.4 is not considered to be a temporary derogation in accordance with this section.*

1.5.1.2 The period of validity of the temporary derogation shall not be more than five years from the date of its entry into force. The temporary derogation shall automatically cease as from the date of the entry into force of a relevant amendment to Annex 2 to SMGS.

1.5.1.3 Transport operations on the basis of temporary derogations shall constitute transport operations in compliance with the requirements of the Annex 2 to SMGS.

1.5.2 MILITARY CONSIGNMENTS

Other provisions shall apply to military consignments, i.e. consignments with substances or articles of Class 1 belonging to the armed forces or for which the armed forces are responsible (see 5.2.1.5, sub-sections 5.2.2.1.8, 5.3.1.1.2 and 5.4.1.2.1(f) and 7.2.4, special requirement W2).

CHAPTER 1.6
TRANSITIONAL MEASURES

1.6.1 GENERAL PROVISIONS

1.6.1.1 Unless otherwise provided, the substances and articles falling within the scope of Annex 2 to SMGS may be carried until 31 December 2023 in accordance with the requirements of Annex 2 to SMGS applicable up to 1 July 2023.

Note: *For the information in the consignment note, see 5.4.1.1.12.*

1.6.1.2 – 1.6.1.5 (reserved)

1.6.1.6 Intermediate bulk containers (IBCs) manufactured before 1 January 2005 in accordance with the requirements applicable up to 1 July 2005 and which do not conform to the requirements applicable as from 1 July 2005 may continue to be used.

1.6.1.7 Type approvals for drums, jerricans and composite packagings made of high or medium molecular mass polyethylene issued before 1 July 2006 in accordance with the requirements of 6.1.5.2.6 in force until 1 July 2006, but which are not in accordance with the requirements of 4.1.1.21, continue to be valid until 1 January 2010. Any such packagings manufactured and marked on the basis of these type approvals may be used until the end of their period of use determined in 4.1.1.15.

1.6.1.8 Existing orange-coloured plates which meet the requirements of 5.3.2.2 applicable up to 1 July 2006 may continue to be used, provided that the requirements of 5.3.2.2.1 and 5.3.2.2.2 that the plate, numbers and letters shall remain affixed irrespective of the orientation of the wagon are met even when the wagon overturns).

1.6.1.9 (reserved)

1.6.1.10 (reserved)

1.6.1.11 Type approvals for drums, jerricans and composite packagings made of high or medium molecular mass polyethylene, and for high molecular mass polyethylene IBCs, issued before 1 July 2007 in accordance with the requirements of 6.1.6 (a) in force until 1 July 2007, but which are not in accordance with the requirements of 6.1.6.1 (a) applicable as from 1 July 2007, continue to be valid.

1.6.1.12 (reserved)

1.6.1.13 (reserved)

1.6.1.14 IBCs manufactured before 1 July 2011 and conforming to a design type which has not passed the vibration test of 6.5.6.13 or which was not required to meet the criteria of 6.5.6.9.5 (d) at the time it was subjected to the drop test, may still be used.

1.6.1.15 IBCs manufactured, remanufactured or repaired before 1 January 2011 need not be marked with the maximum permitted stacking load in accordance with 6.5.2.2.2. Such IBCs, not marked in accordance with 6.5.2.2.2, may still be used after 31 December 2010. If they are remanufactured or repaired after that date, then they must be marked in accordance with 6.5.2.2.2.

1.6.1.1 – 1.6.1.25 (reserved)

1.6.1.26 Large packagings manufactured or remanufactured before 1 January 2014 and which do not conform to the requirements of 6.6.3.1 regarding the height of letters, numerals and symbols applicable as from 1 January 2013 may continue to be used. Those manufactured or remanufactured before 1 January 2015 need not be marked with the maximum permitted stacking load in accordance with 6.6.3.3. Such large packagings not marked in accordance with 6.6.3.3 may still be used after 31 December 2014 but must be marked in accordance with 6.6.3.3 if they are remanufactured after 31 December 2014.

Large packagings manufactured or remanufactured between 1 January 2011 and 31 December 2016 and marked with the maximum permitted stacking load in accordance with 6.6.3.3 in force until 1 July 2015 may continue to be used.

1.6.1.27 Means of containment integral to equipment or machinery containing liquid fuels of UN Nos. 1202, 1203, 1223, 1268, 1863 and 3475 constructed before 1 July 2013, which do not conform to the requirements of paragraph (a) of special provision 363 of Chapter 3.3 applicable as from 1 July 2013, may still be used.

1.6.1.28 (reserved)

1.6.1.29 Lithium cells and batteries manufactured according to a type meeting the requirements of sub-section 38.3 of the revised version of Manual of Tests and Criteria, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be carried, unless otherwise provided in Annex 2 to SMGS.

Lithium cells and batteries manufactured before 1 July 2003 meeting the requirements of the revised version of Manual of Tests and Criteria may continue to be carried if all other applicable requirements are fulfilled.

1.6.1.30 – 1.6.1.32 (reserved)

1.6.1.33 Electric double layer capacitors of UN No. 3499, manufactured before 1 January 2014, need not be marked with the energy storage capacity in Wh as required by paragraph (e) of special provision 361 of Chapter 3.3.

1.6.1.34 Asymmetric capacitors of UN No. 3508, manufactured before 1 January 2016, need not be marked with the energy storage capacity in Wh as required by paragraph (c) of special provision 372 of Chapter 3.3.

1.6.1.35 – **1.6.1.37** (reserved)

1.6.1.38 SMGS Contracting States may continue to issue training certificates for dangerous goods safety advisers conforming to the model applicable until 30 June 2019, instead of those conforming to the requirements of 1.8.3.18 applicable from 1 July 2019, until 31 December 2019. Such certificates may continue in use to the end of their five year validity."

1.6.1.39 – 1.6.1.42 (reserved)

1.6.1.43 Vehicles registered or brought into service before 1 July 2019, as defined in special provisions 388 and 669 of Chapter 3.3, and their equipment intended for use during carriage, which conform to the requirements of Annex 2 to SMGS applicable until 1 July 2019 but containing lithium cells and batteries which do not conform to the provisions of 2.2.9.1.7 may continue to be carried as a load in accordance with the requirements of special provision 666 of Chapter 3.3.

1.6.1.44 (reserved)

1.6.1.45 SMGS Contracting States may, until 31 December 2020, continue to issue training certificates for dangerous goods safety advisers conforming to the model applicable until 1 July 2019, instead of those conforming to the requirements of 1.8.3.18 applicable from 1 July 2019. Such certificates may continue in use to the end of their five year validity.

1.6.1.46 – 1.6.1.48 (reserved)

1.6.1.49 The mark shown in Figure 5.2.1.9.2 applicable until 1 July 2023, may continue to be applied until 31 December 2026.

1.6.1.50 For articles that meet the definition for "DETONATORS, ELECTRONIC" as described in 2.2.1.4 Glossary of names, and assigned to UN Nos. 0511, 0512 and 0513, the entries for "DETONATORS, ELECTRIC" (UN Nos. 0030, 0255 and 0456) may continue to be used until 30 June 2025.

1.6.1.51 Adhesives, paint and paint related materials, printing inks and printing ink related materials and resin solutions assigned to UN 3082 environmentally hazardous substance, liquid, n.o.s., packing group III in accordance with 2.2.9.1.10.6 as a consequence of 2.2.9.1.10.5* containing 0.025 % or more of the following substances, on their own or in combination:

– 4,5-dichloro-2-octyl-2H-isothiazol-3-one (DCOIT);

– octhilinone (OIT); and

– zinc pyrithione (ZnPT);

may be carried until 30 June 2025 in steel, aluminium, other metal or plastic packagings, which do not meet the requirements of 4.1.1.3, when carried in quantities of 30 litres or less per packaging as follows:

a) In palletized loads, a pallet box or unit load device, e.g. individual packagings placed or stacked and secured by strapping, shrink or stretch-wrapping or other suitable means to a pallet; or

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

* See Document No. 9A0 of the *List.*

1.6.1.52 Inner receptacles of composite IBCs manufactured before 1 July 2021 in accordance with the requirements of 6.5.2.2.4 in force up to 31 December 2020 and which are not in accordance with the requirements of 6.5.2.2.4 regarding the marks on the inner receptacles that are not readily accessible for inspection due to the design of the outer casing applicable as from 1 January 2021 may continue be used until the end of their period of use determined in 4.1.1.15.

1.6.1.53 High consequence dangerous goods of Class 1 carried in packages in a wagon or large container in quantities not exceeding those of 1.1.3.6.3 which, in accordance with 1.10.4 in force until 31 December 2022, could be carried without applying the requirements of Chapter 1.10 may still be carried without applying the requirements of Chapter 1.10 until 31 December 2024.

1.6.2 PRESSURE RECEPTACLES FOR CLASS 2

1.6.2.1 Receptacles built before 1 July 2000 and which do not conform to the requirements of Annex 2 to SMGS applicable as from 1 July 2000, but the carriage of which was permitted under the requirements of Annex 2 to SMGS applicable up to 30 June 2000, may continue to be transported after that date if the periodic test requirements in packing instructions P200 and P203 are complied with.

1.6.2.2 (reserved)

1.6.2.3 Receptacles intended for the carriage of Class 2 substances constructed before 1 July 2005, may continue to bear, after 1 July 2005, the marks conforming to the requirements of Annex 2 to SMGS applicable until 1 July 2005.

1.6.2.4 Pressure receptacles designed and constructed in accordance with technical rules no longer recognized according to 6.2.5 may still be used.

1.6.2.5 Pressure receptacles and their closures designed and constructed in accordance with standards applicable at the time of their construction (see 6.2.4) according to the provisions of Annex 2 to SMGS which were applicable at that time may still be used unless restricted by a specific transitional measure.

1.6.2.6 Pressure receptacles for substances other than those of Class 2, built before 1 July 2010 in accordance with the requirements of 4.1.4.4 in force up to 30 June 2009, but which do not conform to the requirements of 4.1.3.6 applicable as from 1 July 2009, may continue

to be used, provided that the requirements of 4.1.4.4 in force up to 30 June 2009 are complied with.

1.6.2.7 – **1.6.2.8** (reserved)

1.6.2.9 The provisions of packing instruction P 200 (10), special packing provision v of 4.1.4.1 applicable until 1 July 2011 may be applied by SMGS Contracting States to cylinders constructed before 1 January 2015.

1.6.2.10 Refillable welded steel cylinders for the carriage of gases of UN Nos. 1011, 1075, 1965, 1969 or 1978, granted 15 year intervals for periodic inspection in accordance with packing instruction P 200 (10), special packing provision v of 4.1.4.1 as applicable until 1 July 2011 by the competent authority of the country (countries) of carriage, may continue to be periodically inspected according to those provisions.

1.6.2.11 Gas cartridges constructed and prepared for carriage before 1 January 2013 for which the requirements of 1.8.6, 1.8.7 or 1.8.8 for the conformity assessment of gas cartridges have not been applied may still be carried after this date, provided all the other applicable provisions of Annex 2 to SMGS are met.

1.6.2.12 Salvage pressure receptacles may continue to be constructed and approved according to national regulations up to 31 December 2013. Salvage pressure receptacles constructed and approved in accordance with national regulations before 1 January 2014 may continue to be used with the approval of the competent authorities of the countries of use.

1.6.2.13 Bundles of cylinders manufactured before 1 July 2013 which are not marked in accordance with 6.2.3.9.7.2 and 6.2.3.9.7.3 applicable from 1 July 2013 or 6.2.3.9.7.2 applicable from 1 July 2015 may be used until the next periodic inspection after 1 July 2015.

1.6.2.14 Cylinders constructed before 1 January 2016 in accordance with 6.2.3 and a specification approved by the competent authorities of the countries of transport and use, but not in accordance with ISO 11513:2011 or ISO 9809-1:2010 as required in 4.1.4.1, packing instruction P 208 (1), may be used for the carriage of adsorbed gases provided the general packing requirements of 4.1.6.1 are met.

1.6.2.15. Bundles of cylinders periodically inspected before 1 July 2015 which are not marked in accordance with 6.2.3.9.7.3 applicable from 1 July 2015 may be used until the next periodic inspection after 1 July 2015.

1.6.2.16 (reserved)

1.6.2.17 The requirements of Note 3 of 6.2.1.6.1 applicable until 31 December 2022 may continue to be applied until 31 December 2024.

1.6.2.18 Closed cryogenic receptacles constructed before 1 July 2023 which were subject to the initial inspection and test requirements of 6.2.1.5.2 applicable until 1 July 2023 but which do not however conform to the requirements of 6.2.1.5.2 relating to the initial inspection and test applicable as from 1 July 2023, may continue to be used.

1.6.2.19 Acetylene cylinders constructed before 1 July 2023 which are not marked in accordance with 6.2.2.7.3 k) or l) applicable from 1 July 2023 may continue to be used until the next periodic inspection and test after 1 July 2023.

1.6.2.20 Closures of refillable pressure receptacles constructed before 1 July 2023 which are not marked in accordance with 6.2.2.11 or 6.2.3.9.8 applicable from 1 July 2023 may continue to be used.

1.6.2.21 Document of *List No. 23G* referenced in packing instruction P 200 (12) 3.4 of 4.1.4.1 in force up to 1 July 2023 may continue to be used for valve refurbishing or inspection until 31 December 2024.

1.6.2.22 Standard EN ISO 22434:2011 referenced in packing instruction P 200 (13) 3.4 of 4.1.4.1 in force up to 1 July 2023 may continue to be used for valve refurbishing or inspection until 31 December 2024.

1.6.3 TANK-WAGONS AND BATTERY-WAGONS

1.6.3.1 Tank-wagons built before 1 January 2005 in compliance with the requirements of Annex 2 to SMGS applicable up to 31 December 2004 and which do not conform to the requirements of Annex 2 to SMGS applicable as from 1 January 2005, may continue to be used after that date taking account of transitional provisions as prescribed in 1.6.3.4 – 1.6.3.7.

1.6.3.2 Periodic inspections (examinations) of the tank-wagons, which are still used in compliance with the transitional provisions, shall be carried out in accordance with the requirements applicable to different goods.

1.6.3.3 Tank-wagons built before 1 July 2005 in compliance with the requirements of Annex 2 to SMGS applicable up to 31 December 2004 and which do not conform to the requirements of Annex 2 to SMGS applicable as from 1 July 2005, may continue to be used after that date.

1.6.3.4 Bottom discharge tank-wagons intended for the carriage of petroleum products built before 1 January 2005 may be equipped with two independent closures (main closure and stopper, which is installed on the discharging device), provided that all parts of discharging device ensure the operational safety and the environmental protection. These tank-wagons shall be used only for the carriage of substances of Class 3 presenting no additional risk as well as of UN No. 3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S (Class 9).

1.6.3.5 (reserved)

1.6.3.6 Plates may be affixed to the transverse beam ends of broad-gauge tank-wagons (1520 mm) built before 1 January 2005.

1.6.3.7 The tank-wagons which are currently in operation may be allowed to be used without valves and closure devices as prescribed in 6.8.3.2.3 and 6.8.3.2.4 until 1 January 2014 provided that safety and environmental requirements are met.

1.6.3.8 When, because of amendments to Annex 2 to SMGS, some proper shipping names of gases have been modified, it is necessary to modify the names on the plate or on the shell itself (see 6.8.3.5.2 or 6.8.3.5.3). The names of the gases on the tank-wagons, battery-wagons and wagons with demountable tanks or on the plates (see 6.8.3.5.6 (b) or (c)) shall be adapted at the first periodic test thereafter.

1.6.3.9 – 1.6.3.15 (Reserved)

1.6.3.16 For tank-wagons and battery-wagons constructed before 1 January 2007 which do not conform to the requirements of 4.3.2, 6.8.2.3, 6.8.2.4 and 6.8.3.4 concerning the tank record, the retention of files for the tank record shall start at the latest at the first periodic inspection after 30 June 2007.

1.6.3.17 (reserved)

1.6.3.18 The tank-wagons without an assigned code, relevant marks and alphanumeric codes of special provisions TC and TE in compliance with 6.8.4 may be allowed to be used until 1 July 2011.

Date of test (certification) to be identified in compliance with 6.8.2.5.2 shall be mentioned after most recent date periodic test (certification) in compliance with 6.8.2.5.2 after 1 January 2012.

1.6.3.19 (reserved)

1.6.3.20 Tank-wagons constructed before 1 July 2006 in accordance with the requirements in force up to 30 June 2006 but which do not, however, conform to the requirements of 6.8.2.1.7 applicable as from 1 July 2006 and special provision TE15 of 6.8.4 (b) applicable from 1 July 2006 to 1 July 2007 may still be used.

1.6.3.21 Tank-wagons constructed before 1 July 2006 in accordance with the requirements in force up to 30 June 2006 and which conform to the requirements of 6.8.2.2.10, but which are not, however, equipped with a pressure gauge or other appropriate measurement instrument, shall be regarded as leak-proof until the next periodic test (certification) in compliance with 6.8.2.4.2 but not later than 31 December 2010.

1.6.3.22 – 1.6.3.25 (Reserved)

1.6.3.26 Tank-wagons constructed before 1 January 2008 in accordance with the requirements in force up to 30 June 2007 but which do not, however, conform to the requirements applicable as from 1 Jul 2007 regarding the marking of the external design pressure in accordance with 6.8.2.5.1, may still be used**.**

External pressure design data may be shown on shells of tank-wagons, which are built from 1 January 2008 until 1 January 2009, in printed letters and digits using data entry screen.

1.6.3.27 (a) For tank-wagons and battery-wagons not fitted with automatic couplers

- for gases of Class 2 with classification codes containing the letter(s) T, TF, TC, TO, TFC or TOC, and
- for substances of classes 3 to 8 carried in the liquid state and to which tank code L15CH, L15DH or L21DH is assigned in column (12) of Table A of Chapter 3.2,

constructed before 1 July 2006 the devices defined in special provision TE 22 of 6.8.4 need to be capable of absorbing at least 500 kJ of energy at each end of the wagon.

b) Tank-wagons and battery-wagons not fitted with automatic couplers

- for gases of Class 2 with classification codes containing only the letter F, and
- for substances of classes 3 to 8 carried in the liquid state and to which tank code L10BH, L10CH or L10DH is assigned in column (12) of Table A of Chapter 3.2,

constructed before 1 January 2007 and which do not conform to the applicable requirements of special provision TE 22 of 6.8.4 in force from 1 January 2007, may still be used.

Tank-wagons and battery-wagons for the carriage of these gases and substances fitted with automatic couplers, constructed before 1 July 2015 and which do not conform to the applicable requirements of special provision TE 22 of 6.8.4 in force from 1 July 2015, may still be used.

1.6.3.28 Tank-wagons constructed before 1 July 2006 in accordance with the requirements applicable up to 30 June 2006 and which do not conform to the requirements of the second paragraph of 6.8.2.2.1, shall be refitted at the latest at the time of the next refurbishment or the next repair, where this is practicable.

1.6.3.29 Tank-wagons constructed before 1 July 2006 and which do not conform to the requirements of 6.8.2.2.4 in force from 1 July 2006, may still be used.

1.6.3.30 – 1.6.3.31 (Reserved)

1.6.3.32 Tank-wagons

– for gases of Class 2 with classification codes containing the letter(s) T, TF, TC, TO, TFC or TOC, and

– for liquids of classes 3 to 8 to which tank code L15CH, L15DH or L21DH is assigned in column (12) of Table A of Chapter 3.2,

constructed before 1 July 2007 and which do not conform to the applicable requirements of special provision TE 25 of 6.8.4 (b) in force from 1 July 2007 may still be used.

1.6.3.33 Tank-wagons and battery-wagons intended for the carriage of gases of Class 2 built before 1 January 1986, which don't conform to the requirements of 6.8.3.1.6 concerning the buffers and energy absorption devices may be allowed to be used.

1.6.3.34 – 1.6.3.37 (Reserved)

1.6.3.38 Tank-wagons and battery-wagons designed and constructed in accordance with standards applicable at the time of their construction (see 6.8.2.6 and 6.8.3.6) according to the provisions of Annex 2 to SMGS which were applicable at that time may still be used unless restricted by a specific transitional measure.

1.6.3.39 Tank-wagons constructed before 1 July 2011 in accordance with the requirements of 6.8.2.2.3 in force up to 30 June 2011 but which do not, however, conform to the requirements of 6.8.2.2.3, third paragraph, concerning the position of the flame trap or flame arrester may still be used.

1.6.3.40 (reserved)

1.6.3.41 Tank-wagons constructed before 1 July 2013 in accordance with the requirements in force up to 30 June 2013, but which do not, however, meet the marking provisions of 6.8.2.5.2 or 6.8.3.5.6 applicable as from 1 July 2013, may continue to be marked in accordance with the requirements applicable up to 30 June 2013 until the next periodic inspection after 1 July 2013.

1.6.3.42 – 1.6.3.44 (Reserved)

1.6.3.45 Tank-wagons for refrigerated liquefied gases constructed before 1 July 2019 in accordance with the requirements in force up to 30 June 2019 but which do not conform to the requirements of 6.8.3.4.10, 6.8.3.4.11 and 6.8.3.5.4 applicable from 1 July 2019 may continue to be used until the next inspection after 1 July 2019. Until this time, to meet the requirements of 4.3.3.5 and 5.4.1.2.2 (d), the actual holding times may be estimated without recourse to the reference holding time.

1.6.3.46 (reserved)

1.6.3.47 Tank-wagons constructed before 1 July 2019, fitted with safety valves meeting the requirements in force up to 1 July 2019 but which do not meet the requirements of 6.8.3.2.9 last sub-paragraph concerning their design or protection applicable from 1 July 2019 may continue to be used until the next intermediate or periodic inspection after 1 January 2021.

1.6.3.48 Notwithstanding the requirements of special provision TU 42 of 4.3.5 applicable from 1 July 2019, tank-wagons with a shell constructed of aluminium alloy, including those with protective lining, which were used before 1 July 2019 for the carriage of substances with a pH value less than 5.0 or more than 8.0, may continue to be used for the carriage of such substances until 31 December 2026.

1.6.3.49 Tank-wagons constructed before 1 July 2019 in accordance with the requirements in force up to 1 July 2019 but which do not conform to the requirements of 6.8.2.2.10 concerning the burst pressure of the bursting disc applicable as from 1 July 2019 may continue to be used.

1.6.3.50 – 1.6.3.51 (reserved)

1.6.3.52 Tank-wagons constructed before 1 July 2019 in accordance with the requirements in force up to 1 July 2019 but which however do not conform to the requirements of 6.8.2.2.11 applicable from 1 July 2019 may continue to be used.

1.6.3.53 Type approval certificates issued for tank-wagons and battery-wagons before 1 July 2019 in accordance with the requirements of 6.8.2.3.1 in force up to 1 July 2019 but which do not, however, conform to the requirements of 6.8.2.3.1 relating to the distinguishing sign used on vehicles in international road traffic[4] of the state whose territory the approval was granted and a registration number applicable as from 1 July 2019 may continue to be used.

1.6.3.54 Procedures used by the competent authority for the approval of experts performing activities concerning tank-wagons intended for the carriage of substances other than those for which TA4 and TT9 of 6.8.4 apply which conform to the requirements of Chapter 6.8 in force up to 31 July 2023 but which do not conform to the requirements of 1.8.6 applicable to inspection bodies from 1 July 2023 may continue to be used until 31 December 2032.

Note: *The term "expert" has been replaced by the term "inspection body".*

1.6.3.55 Type approval certificates issued for tank-wagons intended for the carriage of substances other than those for which TA4 and TT9 of 6.8.4 apply, issued before 1 July 2023 in compliance with Chapter 6.8 which not comply with 1.8.7 as applicable from 1 July 2023 may continue to be used until the end of their validity.

1.6.3.56 (reserved)

1.6.3.57 Tank-wagons constructed before 1 January 2024 in accordance with the requirements in force up to 1 July 2023 but which do not, however, conform to the requirements applicable as from 1 July 2023 regarding the fitting of safety valves in accordance with 6.8.3.2.9, may still be used.

1.6.3.58 Procedures used by the competent authority for the approval of experts, the performance of inspections concerning tank-wagons and the mutual recognition of such inspections in accordance with the requirements of 6.8.2.4.6 in force up to 1 July 2023, but which do not, however, conform to the requirements applicable as from 1 July 2023, may continue to be used until 31 December 2032.

1.6.3.59 Tank-wagons constructed before 1 July 2023 in accordance with the requirements in force up to 1 July 2023, but which do not, however, meet the requirements of special provision TE26 of 6.8.4 b) applicable as from 1 July 2023 may continue to be used.

1.6.3.60 Tank-wagons that meet the requirements of Chapter 6.8, and that are already fitted with safety valves meeting the requirements of 6.8.3.2.9 as applicable from 1 July 2023 do not need to display the marks in accordance with 6.8.3.2.9.6 until the next intermediate or periodic inspection after 31 December 2023.

1.6.3.61 – 1.6.3.149 (reserved)

1.6.3.150 Tank-wagons constructed before 1 July 2007 in accordance with the requirements in force up to 30 June 2007 but which don't, however, conform to the requirements of 6.8.2.1.8 and 6.8.2.1.10 concerning allowable temperature range applicable as from 1 July 2007 may still be used.

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[4] *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.*

1.6.3.151 When the shell of a tank-container was already divided by partitions or surge plates into sections of not more than 7 500 litres capacity before 1 July 2009 , the capacity of the shell needs not to be supplemented with the symbol "S" in the particulars required by 6.8.2.5.1 until the next periodic inspection according to 6.8.2.4.2 is performed.

1.6.3.152 Notwithstanding the provisions of 4.3.2.2.4, tank-containers intended for the carriage of liquefied gases or refrigerated liquefied gases, which meet the applicable construction requirements of Annex 2 to SMGS but which were not divided, before 1 July 2009, by partitions or surge plates into sections of more than 7 500 litres capacity may still be filled to more than 20% and less than 80% of their capacity.

Note: *The requirements of this paragraph shall not be applied for the carriage through the territory of Russia.*

1.6.3.153 Tank-wagons may be marked until 1 July 2023 with the strips in accordance with the requirements of 5.3.5.2 in force until 1 July 2015.

1.6.3.154 Broad-gauge tank-wagons (1520 mm) constructed before 1 July 2021 with the shells which do not conform the current requirements of 6.8.2.1.8 concerning allowable temperature range but meet the requirements of 6.8.2.1.8 in force until 1 July 2019 may continue to be used

1.6.3.155 Broad-gauge tank-wagons (1520 mm) constructed before 1 July 2021 with the shells which do not conform the current requirements of 6.8.2.1.10 concerning allowable temperature range but meet the requirements of 6.8.2.1.10 in force until 1 July 2019 may continue to be used.

1.6.3.156 Manifolds constructed before 1 July 2021 for the use on broad-gauge rail networks, which do not conform the current requirements of 6.8.3.2.20 concerning allowable temperature range but meet the requirements of 6.8.3.2.20 in force up until 1 July 2019 may continue to be used.

1.6.3.157 (reserved)

1.6.3.158 Tank-wagons constructed before 1 January 2023 for the use on broad-gauge 1520 mm rail networks in compliance with requirements of Chapter 6.8 in force until 1 July 2022 may continue to be used.

1.6.3.159 Tank-wagons constructed before 1 January 2023 for the use on broad-gauge 1520 mm rail networks with the shells which do not conform the current requirements of 6.20.2.1.8 concerning allowable temperature range but meet the requirements of 6.8.2.1.8 in force until 1 July 2022 may continue to be used.

1.6.3.160 Tank-wagons constructed before 1 January 2023 for the use on broad-gauge 1520 mm rail networks with the shells which do not conform the current requirements of 6.20.2.1.10 concerning allowable temperature range but meet the requirements of 6.8.2.1.10 in force until 1 July 2022 may continue to be used.

1.6.3.161 Tank-wagons constructed before 1 January 2023 for the use on broad-gauge 1520 mm rail networks which do not conform the current requirements of 6.20.2.1.27 but meet the requirements of 6.8.2.1.27 may continue to be used.

1.6.3.162 Tank-wagons constructed before 1 July 2014 for the use on broad-gauge 1520 mm rail networks with the energy-absorbing devices which do not conform the current requirements of 6.20.2.1.28 may continue to be used in compliance with technical specifications concerning use of a tank-wagon before the expiry of the next maintenance or overall repair period.

1.6.3.163 Tank-wagons constructed before 1 January 2023 for the use on broad-gauge 1520 mm rail networks with the safety devices which do not conform the current requirements of 6.20.2.2.7 or 6.20.2.2.8 but meet the requirements of 6.8.2.2.7 or 6.8.2.2.8 in force until 1 July 2022 may continue to be used.

1.6.3.164 Tank-wagons constructed before 1 July 2014 for the use on broad-gauge 1520 mm rail networks with the energy-absorbing devices which do not conform the current requirements of 6.20.3.1.6 may continue to be used in compliance with technical specifications concerning the use of a tank-wagon before the expiry of the next maintenance or overall repair period.

1.6.3.165 Tank-wagons constructed before 1 January 2023 for the use on broad-gauge 1520 mm rail networks with the shells which do not conform the current requirements of 6.20.5 but meet the requirements of 6.8.5 in force until 1 July 2022 may continue to be used.

1.6.3.166 Tank-wagons for the carriage of petroleum products constructed between 1985 and 1 July 2023 which don't conform the current requirements of 6.20.2.4.2 may be submitted to an periodic inspection (certification) before the expiry of the service life at least once per 13 years unless the shorter tme is not provided by the technical specifications concerning the use of a tank-wagon. The decision on the use of tank-wagons for the carriage of petroleum products constructed after 1985 after the expiry of 8 years after last periodic repair shall be taken by the competent authorities of Belarus, Hungary, Iran, Kazakhstan, Poland, Russia, Romania, Slovakia, Uzbekistan, Ukraine in compliance with the separate agreements.

1.6.3.167 Tank-wagons for the carriage of spirits constructed between 1985 and 1 July 2023, which don't conform the current requirements of 6.20.2.4.2 may be submitted to an periodic inspection (certification) before the expiry of the service life at least once per 10 years unless the shorter tme is not provided by the technical specifications concerning the use of a tank-wagon. The decision on the use of tank-wagons for the carriage of spirits constructed after 1985 after the expiry of 8 years after last periodic repair shall be taken by the competent authorities of Belarus, Hungary, Iran, Kazakhstan, Poland, Russia, Romania, Slovakia, Uzbekistan, Ukraine in compliance with the separate agreements.

1.6.4 TANK-CONTAINERS, PORTABLE TANKS AND MEGCs

1.6.4.0.1 Tank-containers and MEGCs constructed before 30 June 2015 in compliance with the requirements of Annex 2 to SMGS in force up to 30 June 2015 but which don't fully conform to the requirements of Annex 2 to SMGS applicable as from 1 July 2015, may still be used.

1.6.4.0.2 Tank-containers and MEGCs constructed before 30 June 2015 in compliance with the transitional provisions of paragraph 1.6.4 of RID in force up to 30 June 2015 but which don't meet to the requirements of Annex 2 to SMGS and RID applicable as from 1 July 2015 and as from 1 January 2015 respectively may still be used.

1.6.4.1 Tank-containers and MEGCs constructed before 31 December 2004, which don't fully conform to the requirements of Annex 2 to SMGS applicable as from 1 January 2005, may still be used provided that the conditions laid down by the relevant provisions of 6.8.2.4.2 and 6.8.2.4.3 are met.

1.6.4.2 Tank-containers and MEGCs constructed before 1 July 2005, which don't fully conform to the requirements of Annex 2 to SMGS applicable as from 1 July 2005, may still be used.

1.6.4.3 – 1.6.4.4 (reserved)

1.6.4.5 When, because of amendments to Annex 2 to SMGS, some proper shipping names of gases have been modified, it is necessary to modify the names on the plate or on the shell itself (see 6.8.3.5.2 or 6.8.3.5.3), as well as the names of the gases on the tank-containers and MEGCs or on the plates (see 6.8.3.5.6 (b) or (c)) at the first periodic inspection (certification).

1.6.4.6 Tank-containers constructed before 1 January 2007 in accordance with the requirements in force up to 30 June 2007 but which do not, however, conform to the requirements applicable as from 1 July 2007 regarding the marking of the external design pressure in accordance with 6.8.2.5.1, may still be used.

1.6.4.7 – 1.6.4.8 (reserved)

1.6.4.9 Tank-containers and MEGCs designed and constructed in accordance with a technical code which was recognized at the time of their construction according to the provisions of 6.8.2.7 which were applicable at that time may still be used.

1.6.4.10 – 1.6.4.11 (Reserved)

1.6.4.12 Tank-containers and MEGCs constructed before 1 July 2005 in accordance with the requirements applicable up to 30 June 2005, but which do not, however, conform to the requirements applicable as from 1 July 2005, may still be used. However, they shall be marked with the relevant tank code and if applicable the relevant alphanumeric codes of special provisions TC and TE in accordance with 6.8.4.

1.6.4.13 Tank-containers constructed before 1 July 2006 in accordance with the requirements in force up to 30 June 2006 but which do not, however, conform to the requirements of 6.8.2.1.7 applicable as from 1 July 2006 and special provision TE15 of 6.8.4 (b) applicable from 1 July 2006 to 1 July 2007 may still be used.

1.6.4.14 – 1.6.4.17 (reserved)

1.6.4.18 For tank-containers and MEGCs constructed before 1 January 2007 which do not conform to the requirements of 4.3.2, 6.8.2.3, 6.8.2.4 and 6.8.3.4 concerning the tank record, the retention of files for the tank record shall start at the latest at the first periodic inspection after 30 June 2007.

1.6.4.19 (reserved)

1.6.4.20 Vacuum-operated waste tank-containers constructed before 1 July 2006 but which don't conform to the requirements of 6.10.3.9 applicable as from 1 July 2006, may still be used.

1.6.4.21 – 1.6.4.29 (reserved)

1.6.4.30 Portable tanks and UN MEGCs which do not meet the design requirements applicable as from 1 July 2007 but which have been constructed according to a design approval certificate which has been issued before 1 January 2008 may continue to be used.

1.6.4.31 - 1.6.4.32 (reserved)

1.6.4.33 Notwithstanding the provisions of 4.3.2.2.4, tank-containers intended for the carriage of liquefied gases or refrigerated liquefied gases, which meet the applicable construction requirements of Annex 2 to SMGS but which were not divided, before 1 July 2009, by partitions or surge plates into sections of more than 7 500 litres capacity may still be filled to more than 20% and less than 80% of their capacity.

Note: *The requirements of this paragraph shall not be applied for the carriage through the territory of Russia.*

1.6.4.34 – 1.6.4.36 (reserved)

1.6.4.37 Portable tanks and MEGCs manufactured before 1 January 2012, that conform to the marking requirements of 6.7.2.20.1, 6.7.3.16.1, 6.7.4.15.1 or 6.7.5.13.1 applicable up to 30 June 2011, as relevant, may continue to be used if they comply with all other relevant requirements of Annex 2 to SMGS applicable as from 1 July 2011 including, when applicable, the requirement of 6.7.2.20.1 (g) for marking the symbol "S" on the plate when the shell or the compartment is divided by surge plates into sections of not more than 7 500 litres capacity.

1.6.4.38 (reserved)

1.6.4.39 Tank-containers and MEGCs designed and constructed in accordance with standards applicable at the time of their construction (see 6.8.2.6 and 6.8.3.6) according to the provisions of Annex 2 to SMGS which were applicable at that time may still be used unless restricted by a specific transitional measure.

1.6.4.40 Tank-containers constructed before 1 July 2011 in accordance with the requirements of 6.8.2.2.3 in force up to 30 June 2011 but which do not, however, conform to the requirements of 6.8.2.2.3, last paragraph, concerning the position of the flame trap or flame arrester may still be used.

1.6.4.41 (reserved)

1.6.4.42 Tank-containers constructed before 1 July 2013 in accordance with the requirements in force up to 30 June 2013, but which do not, however, meet the marking provisions of 6.8.2.5.2 or 6.8.3.5.6 applicable as from 1 July 2013, may continue to be marked in accordance with the requirements applicable up to 30 June 2013 until the next periodic inspection (certification) after 1 July 2013.

1.6.4.43 Portable tanks and MECGs manufactured before 1 January 2014 need not comply with the requirements of 6.7.2.13.1 (f), 6.7.3.9.1 (e), 6.7.4.8.1 (e) and 6.7.5.6.1 (d) concerning the marking of the pressure relief devices.

1.6.4.44 – 1.6.4.45 (reserved)

1.6.4.46 Tank-containers constructed before 1 July 2013 in accordance with the requirements in force up to 30 June 2013, but which do not however conform to the requirements of 6.8.2.6 relating to standards mentioned in the List (documents Nos. 4,5) applicable as from 1 July 2013, may still be used. In the case of transportation of tank-wagons on broad gauge tracks (1520 mm) the requirements of paragraph 4.3.2.1.8 shall be met additionally.

1.6.4.47 Tank-containers for refrigerated liquefied gases constructed before 1 July 2017 in accordance with the requirements in force up to 30 June 2019 but which do not conform to the requirements of 6.8.3.4.10, 6.8.3.4.11 and 6.8.3.5.4 applicable from 1 July 2019 may continue to be used until the next inspection after 1 July 2019. Until this time, to meet the requirements of 4.3.3.5 and 5.4.1.2.2 (d), the actual holding times may be estimated without recourse to the reference holding time.

1.6.4.48 (reserved)

1.6.4.49 Tank-containers constructed before 1 July 2019, fitted with safety valves meeting the requirements in force up to 30 June 2019 but which do not meet the requirements of 6.8.3.2.9 last sub-paragraph concerning their design or protection applicable from 1 July 2019 may continue to be used until the next intermediate or periodic inspection after 1 January 2021.

1.6.4.50 Notwithstanding the requirements of special provision TU 42 of 4.3.5 applicable from 1 July 2019, tank-containers with a shell constructed of aluminium alloy, including those with a protective lining, which were used before 1 July 2019 for the carriage of substances with a pH value less than 5.0 or more than 8.0, may continue to be used for the carriage of such substances until 31 December 2026.

1.6.4.51 Tank-containers constructed before 1 July 2019 in accordance with the requirements in force up to 30 June 2019 but which do not conform to the requirements of 6.8.2.2.10 concerning the burst pressure of the bursting disc applicable as from 1 July 2019 may continue to be used.

1.6.4.52 Tank-containers constructed before 1 July 2019 in accordance with the requirements of 6.8.2.2.3 in force up to 30 June 2019 but which however do not conform to the requirements of 6.8.2.2.3 last paragraph concerning the flame arresters on breather devices applicable from 1 July 2019 may continue to be used.

1.6.4.53 (reserved)

1.6.4.54 Tank-containers constructed before 1 July 2019 in accordance with the requirements in force up to 30 June 2019 but which however do not conform to the requirements of 6.8.2.2.11 applicable from 1 July 2019 may continue to be used.

1.6.4.55 Fibre-reinforced plastics tank-containers constructed before 1 July 2021 in accordance with the requirements in force up to 31 December 2020 but which do not, however, meet the requirements for the marking of the tank code of 6.9.6.1 applicable as from 1 January 2021 may continue to be marked in accordance with the requirements applicable up to 31 December 2020 until the next periodic inspection after 1 July 2021.

1.6.4.56 Tank-containers not complying with the requirements of 6.8.3.4.6 applicable from 1 July 2022 may continue to be used, if intermediate inspection is performed at least every 6 years after each periodic inspection carried out after 1 July 2023.

1.6.4.57 Except in relation to 6.8.1.5, second paragraph, second indent, procedures used by the competent authority for the approval of experts performing activities concerning tank-containers intended for the carriage of substances other than those for which TA4 and TT9 of 6.8.4 apply which conform to the requirements of Chapter 6.8 in force up to 1 July 2023 but which do not conform to the requirements of 1.8.6 applicable to inspection bodies from 1 January 2023 may continue to be used until 31 December 2032.

Note: *The term "expert" has been replaced by the term "inspection body".*

1.6.4.58 Type approval certificates issued for tank-containers intended for the carriage of substances other than those for which TA4 and TT9 of 6.8.4 apply, issued before 1 July 2023 in compliance with Chapter 6.8, but which do not comply with 1.8.7 as applicable from 1 July 2023, may continue to be used until the end of their validity.

1.6.4.59 Tank-containers constructed before 1 July 2033 in accordance with the requirements of Chapter 6.9 in force up to 1 July 2023, may still be used.

1.6.4.60 Tank-containers constructed before 1 January 2024 in accordance with the requirements in force up to 1 July 2023 but which do not, however, conform to the requirements applicable as from 1 July 2023 regarding the fitting of safety valves in accordance with 6.8.3.2.9, may still be used.

1.6.4.61 Tank-containers constructed before 1 July 2023 in accordance with the requirements in force up to 1 July 2023, but which do not meet the requirements of 6.8.2.2.4, second and third paragraph, applicable from 1 July 2023, may still be used.

1.6.4.62 Extra-large tank-containers constructed before 1 July 2023 in accordance with the requirements in force up to 1 July 2023, but which do not meet the requirements of 6.8.2.1.18, third paragraph, concerning the minimum thickness of the shell applicable as from 1 July 2023 may still be used.

1.6.4.63 Tank-containers constructed before 1 July 2023 in accordance with the requirements in force up to 1 July 2023, but which do not, however, meet the requirements of special provision TE26 of 6.8.4 b) applicable as from 1 July 2023 may continue to be used.

1.6.4.64 Tank-containers that are already fitted with safety valves meeting the requirements of 6.8.3.2.9 as applicable from 1 July 2023 do not need to display the marks in accordance with 6.8.3.2.9.6 until the next intermediate or periodic inspection after 31 December 2023.

1.6.5 (reserved)

1.6.6 CLASS 7

1.6.6.1 Packages not requiring competent authority approval of design under the 1985, 1985 (as amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material.

Packages not requiring competent authority approval of design (excepted packages, Type IP-1, Type IP-2, Type IP-3 and Type A packages) shall meet the requirements of Annex 2 to SMGS in full, except

a) that packages that meet the requirements of the 1985 or 1985 (as amended 1990) Editions of IAEA Regulations for the Safe Transport of Radioactive Material (IAEA Safety Series No.6:

1) may continue to be carried provided that they were prepared for carriage prior to 31 December 2003, and are subject to the requirements of 1.6.6.2.3, if applicable;

2) may continue to be used provided that all the following conditions are met:

- they were not designed to contain uranium hexafluoride;

- the applicable requirements of 1.7.3 are applied;

- the activity limits and classification in 2.2.7 are applied;

- the requirements and controls for carriage in Parts 1, 3, 4, 5 and 7 are applied;

- the packaging was not manufactured or modified after 31 December 2003;

b) Packages that meet the requirements of the 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material:

1) may continue to be carried provided that they were prepared for carriage prior to 31 December 2025 and are subject to the requirements of 1.6.6.2.3, if applicable; or

2) may continue to be used, provided that all the following conditions are met:

– the applicable requirements of 1.7.3 are applied;

– the activity limits and classification in 2.2.7 are applied;

– the requirements and controls for carriage in Parts 1, 3, 4, 5 and 7 are applied; and

– the packaging was not manufactured or modified after 31 December 2025.

1.6.6.2 Package designs approved under the 1985, 1985 (as amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material

1.6.6.2.1 Packages requiring competent authority approval of the design shall meet the requirements of Annex 2 to SMGS in full except that:

a) packagings that were manufactured to a package design approved by the competent authority under the provisions of the 1985 or 1985 (as amended 1990) or the 1985 or 1985 (as amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material may continue to be used provided that all of the following conditions are met;

1) the package design is subject to multilateral approval;

2) the applicable requirements of 1.7.3 are applied;

3) the activity limits and classification in 2.2.7 are applied;

4) the requirements and controls for carriage in Parts 1, 3, 4, 5 and 7 are applied;

5) (reserved)

b) complete packagings that were manufactured to a package design approved by the competent authority under the provisions of the 1996, 1996 (revised), 1996

(as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material may continue to be used provided that all of the following conditions are met:

1) the package design is subject to multilateral approval after 31 December 2025;

2) the applicable requirements of 1.7.3 are applied;

3) the activity limits and material restrictions of 2.2.7 are applied;

4) the requirements and controls for carriage in Parts 1, 3, 4, 5 and 7 are applied.

1.6.6.2.2 No new manufacture of packagings to a package design meeting the provisions of the 1985 and 1985 (as amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material shall be permitted to commence.

1.6.6.2.3 No new manufacture of packagings of a package design meeting the provisions of the 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material shall be permitted to commence after 31 December 2028.

1.6.6.3 Packages excepted from the requirements for fissile materials under the 2011 and 2013 editions of Annex 2 to SMGS (2009 Edition of the IAEA Regulations for the Safe Transport of Radioactive Material)

Packages containing fissile material that is excepted from classification as "FISSILE" according to 2.2.7.2.3.5 a) 1) or 3) of the 2011 and 2013 editions of Annex 2 to SMGS (paras. 417 a) i) or iii) of the 2009 Edition of IAEA Regulations for the Safe Transport of Radioactive Material) prepared for carriage before 1 July 2015 may continue in carriage and may continue to be classified as non-fissile or fissile-excepted except that the consignment limits in Table 2.2.7.2.3.5 of these editions shall apply to the wagon. The consignment shall be carried under exclusive use.

1.6.6.4 Special form radioactive material approved under the 1985, 1985 (as amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material

Special form radioactive material manufactured to a design that had received unilateral approval by the competent authority under the 1985, 1985 (as amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material may continue to be used when in compliance with the mandatory management system in accordance with the applicable requirements of 1.7.3. There shall be no new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1985 or 1985 (as amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material. No new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1996, 1996 (revised), 1996 (as amended 2003), 2005, 2009 or 2012 editions of the IAEA Regulations for the Safe Transport of Radioactive Material shall be permitted to commence after 31 December 2025.

CHAPTER 1.7
GENERAL PROVISIONS CONCERNING RADIOACTIVE MATERIAL

1.7.1 SCOPE OF APPLICATION

***Note 1**: In the event of a nuclear or radiological emergency during the carriage of radioactive material, provisions as established by relevant national and/or international organizations, shall be observed to protect persons, property and the environment. This includes arrangements for preparedness and response established in accordance with the national and/or international requirements and in a consistent and coordinated manner with the national and/or international emergency arrangements.*

***Note 2**: The arrangements for preparedness and response shall be based on the graded approach and take into consideration the identified hazards and their potential consequences, including the formation of other dangerous substances that may result from the reaction between the contents of a consignment and the environment in the event of a nuclear or radiological emergency. Guidance for the establishment of such arrangements is contained in "Preparedness and Response for a Nuclear or Radiological Emergency", IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015); "Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency", IAEA Safety Standards Series No. GSG-2, IAEA, Vienna (2011); "Arrangements for Preparedness for a Nuclear or Radiological Emergency", IAEA Safety Standards Series No. GS-G2.1, IAEA, Vienna (2007), and "Arrangements for the Termination of a Nuclear or Radiological Emergency", IAEA Safety Standards Series No. GSG-11, IAEA, Vienna (2018).*

1.7.1.1 Annex 2 to SMGS establishes standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to people, property and the environment that are associated with the carriage of radioactive material. Anex 2 to SMGS is based on the 2018 edition of the IAEA Regulations for the Safe Transport of Radioactive Material. Explanatory material can be found in "Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (2018 Edition)", Safety Standard Series No. SSG-26 (Rev.1), IAEA, Vienna (2019).

1.7.1.2 The objective of Annex 2 to SMGS is to establish requirements that shall be satisfied to ensure safety and to protect people, property and the environment from harmful effects of ionizing radiation during the carriage of radioactive material.

This protection is achieved by requiring:

a) Containment of the radioactive contents;

b) Control of external dose rate;

c) Prevention of criticality; and

d) Prevention of damage caused by heat.

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

1.7.1.3 Annex 2 to SMGS applies to the carriage of radioactive material by rail including carriage which is incidental to the use of the radioactive material. Carriage comprises operations and conditions associated with and involved in the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation,

consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of loads of radioactive material and packages. A graded approach is applied to the conditions of carriage of radioactive material, three general levels of which approach may be characterized as follows:

a) routine conditions of carriage (incident free);

b) normal conditions of carriage (minor mishaps);

c) accident conditions of carriage.

1.7.1.4 The provisions laid down in Annex 2 to SMGS do not apply to:

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

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

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

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

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

f) natural material and ores containing naturally occurring radionuclides (which may have been processed), provided the activity concentration of the material does not exceed 10 times the values specified in Table 2.2.7.2.2.1, or calculated in accordance with 2.2.7.2.2.2 a) and 2.2.7.2.2.3 to 2.2.7.2.2.6. For natural materials and ores containing naturally occurring radionuclides that are not in secular equilibrium the calculation of the activity concentration shall be performed in accordance with 2.2.7.2.2.4;

g) non-radioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the limit set out in the definition for "radioactive contamination" in 2.2.7.1.2

1.7.1.5 Specific provisions for the carriage of excepted packages

1.7.1.5.1 Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles or empty packagings as specified in 2.2.7.2.4.1 shall be subject only to the following provisions of Parts 5 to 7:

a) the applicable provisions specified in 5.1.2.1, 5.1.3.2, 5.1.5.2.2, 5.1.5.2.3, 5.1.5.4, 5.2.1.10, 5.4.1.2.5.1 f) 1) and 2), 5.4.1.2.5.1 1), 7.5.11 CW 33 (3.1), (4.3), (5.1) to (5.4) and (6); and

b) the requirements for excepted packages specified in 6.4.4,

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

1.7.1.5.2 Excepted packages are subject to the relevant provisions of all other parts of Annex 2 to SMGS.

1.7.2 RADIATION PROTECTION PROGRAMME

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

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

1.7.2.3 The nature and extent of the measures to be employed in the programme shall be related to the magnitude and likelihood of radiation exposures. The programme shall incorporate the requirements in 1.7.2.2, 1.7.2.4, 1.7.2.5 and 7.5.11 CW 33 (1.1). Programme documents shall be available, on request, for inspection by the relevant competent authority.

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

a) is likely to be between 1 mSv and 6 mSv in a year, a dose assessment programme via work place monitoring or individual monitoring shall be conducted; or

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

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

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

1.7.2.5 Workers (see 7.5.11, CW 33 Note 3) shall be appropriately trained in radiation protection including the precautions to be observed in order to restrict their occupational exposure and the exposure of other persons who might be affected by their actions.

1.7.3 MANAGEMENT SYSTEM

1.7.3.1 A management system based on international, national or other standards acceptable to the competent authority shall be established and implemented for all activities within the scope of Annex 2 to SMGS, as identified in 1.7.1.3, to ensure compliance. Certification that the design specification has been fully implemented shall be available to the competent authority. The manufacturer, consignor or user shall be prepared:

a) to provide facilities for inspection during manufacture and use:

and

b) to demonstarate compliance with Annex 2 to SMGS to the competent authority.

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

1.7.4 SPECIAL ARRANGEMENT

1.7.4.1 Special arrangement shall mean those provisions, approved by the competent authority, under which consignments which do not satisfy all the requirements of Annex 2 to SMGS applicable to radioactive material may be carried.

Note: *Special arrangement is not considered to be a temporary derogation in accordance with 1.5.1.*

1.7.4.2 Consignments for which conformity with any provision applicable to radioactive material is impracticable shall not be carried except under special arrangement. Provided the competent authority is satisfied that conformity with the radioactive material provisions of Annex 2 to SMGS is impracticable and that the required standards of safety have been

met through through means alternative to the other provisions of Annex 2 to SMGS, the competent authority may approve special arrangement transport operations for single or a planned series of multiple consignments. The overall level of safety in carriage shall be at least equivalent to that which would be provided if all the applicable requirements of Annex 2 to SMGS had been met. For international consignments of this type, multilateral approval shall be required.

1.7.5 RADIOACTIVE MATERIAL POSSESSING OTHER DANGEROUS PROPERTIES

In addition to the radioactive and fissile properties, any subsidiary hazard of the contents of the package, such as explosiveness, flammability, pyrophoricity, chemical toxicity and corrosiveness, shall also be taken into account in the documentation, packing, labelling, marking, placarding, stowage, segregation and carriage, in order to be in compliance with all relevant provisions for dangerous goods of Annex 2 to SMGS.

1.7.6 NON-COMPLIANCE

1.7.6.1 In the event of non-compliance with any limit in Annex 2 to SMGS applicable to radiation level or contamination,

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

1) the carrier if the non-compliance is identified during carriage; or

2) the consignee if the non-compliance identified at receipt;

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

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

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

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

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

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

CHAPTER 1.8

CHECKS AND OTHER SUPPORT MEASURES TO ENSURE COMPLIANCE WITH SAFETY REQUIREMENTS [5]

1.8.1 ADMINISTRATIVE CONTROLS OF DANGEROUS GOODS

1.8.1.1 **T**he competent authorities may on their national territory, at any time, conduct checks to verify whether the requirements concerning the carriage of dangerous goods have been met, including the requirements of 1.10.1.5.

These checks shall be made without endangering persons, property or the environment and without major disruption of rail services.

1.8.1.2 Participants in the carriage of dangerous goods (Chapter 1.4) shall, without delay, in the context of their respective obligations, provide the competent authorities and their agents with the necessary information for carrying out the checks.

1.8.1.3 The competent authorities may also, for the purposes of carrying out checks on the premises of the enterprises participating in the carriage of dangerous goods (Chapter 1.4), make inspections, consult the necessary documents and remove samples of dangerous goods or packagings for examination, provided that safety is not jeopardized thereby. The participants in the carriage of dangerous goods (Chapter 1.4) shall also make the wagons or parts of wagons and the equipment and installations accessible for the purpose of checking where this is possible and reasonable. They may, if they deem necessary, designate a person from the enterprise to accompany the representative of the competent authority.

1.8.1.4 If the competent authorities establish that the requirements of Annex 2 to SMGS have not been met, they may prohibit a consignment or interrupt a transport operation until the defects observed are rectified, or they may prescribe other appropriate measures. Immobilization may take place on the spot or at another place selected by the authorities for safety reasons. These measures shall not cause a major disruption in rail services.

1.8.2 MUTUAL ADMINISTRATIVE SUPPORT

1.8.2.1 The SMGS Contracting States shall agree on mutual administrative support for the implementation of Annex 2 to SMGS.

1.8.2.2 When one of the SMGS Contracting States has reasons to observe that the safety of the carriage of dangerous goods on its territory is compromised as a result of serious or repeated infringements by an enterprise which has its headquarters on the territory of another SMGS Contracting State, it shall notify the competent authorities of this SMGS Contracting State of such infringements. The competent authorities of the SMGS Contracting State on the territory of which the serious or repeated infringements were observed may request the competent authorities of the SMGS Contracting State on the territory of which the enterprise has its headquarters to take appropriate measures against the offender(s). The transmission of data referring to persons shall not be permitted unless it is necessary for the prosecution of serious or repeated infringements.

1.8.2.3 The authorities notified shall communicate to the competent authorities of the State on the territory of which the infringements were observed, the measures which have, if necessary, been taken with respect to the enterprise.

1.8.3 SAFETY ADVISER

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[3] *Provisions of Chapter 1.8 shall be applied so far as it is authorized by national law.*

1.8.3.1 Each undertaking, the activities of which include the consigning or the carriage of dangerous goods by rail, or the related packing, loading, filling or unloading shall appoint one or more safety advisers for the carriage of dangerous goods, responsible for helping to prevent the danger inherent in such activities with regard to persons, property and the environment.

1.8.3.2 Competent authorities may provide that these requirements shall not apply to undertakings:

a) the activities of which include the carriage of dangerous goods in means of transport belonging to the armed forces or for which the armed forces are responsible, or
b) the activities of which concern quantities in each wagon not exceeding than those referred to in 1.1.3.6, 1.7.1.4 and in Chapters 3.3, 3.4 and 3.5

1.8.3.3 The main task of the adviser shall be, under the responsibility of the head of the undertaking, to seek by all appropriate means and by all appropriate action, within the limits of the relevant activities of that undertaking, to facilitate the conduct of those activities in accordance with the requirements applicable and in the safest possible way.

With regard to the undertaking's activities, the adviser has the following duties in particular:

– monitoring compliance with the requirements governing the carriage of dangerous goods;
– advising his undertaking on the carriage of dangerous goods;
– preparing an annual report to the management of his undertaking or a local public authority, as appropriate, on the undertaking's activities in the carriage of dangerous goods. Such annual reports shall be preserved for five years and made available to the national authorities at their request.

The adviser's duties also include monitoring the following practices and procedures relating to the relevant activities of the undertaking:

– the procedures for compliance with the requirements governing the identification of dangerous goods being transported;
– the undertaking's practice in taking account, when purchasing or leasing means of transport, of any special requirements in connection with the dangerous goods being transported;
– the procedures for checking the equipment used in connection with the carriage, packing, filling, loading or unloading of dangerous goods;
– the proper training of the undertaking's employees, including on the changes to the regulations, and the maintenance of records of such training;
– the implementation of proper emergency procedures in the event of any accident or incident that may affect safety during the carriage, packing, filling, loading or unloading of dangerous goods;
– investigating and, where appropriate, preparing reports on serious accidents, incidents or serious infringements recorded during the carriage, packing, filling, loading or unloading of dangerous goods;
– the implementation of appropriate measures to avoid the recurrence of accidents, incidents or serious infringements;
– the account taken of the legal prescriptions and special requirements associated with the carriage of dangerous goods in the choice and use of sub-contractors or third parties;
– verification that employees involved in the consigning, carriage, packing, filling, loading or unloading of dangerous goods have detailed operational procedures and instructions,
– the introduction of measures to increase awareness of the risks inherent in the carriage, packing, filling, loading and unloading of dangerous goods;

– the implementation of verification procedures to ensure the presence on board means of transport of the documents and safety equipment which must accompany transport and the compliance of such documents and equipment with the regulations;
– the implementation of verification procedures to ensure compliance with the requirements governing packing, filling, loading and unloading;
– the existence of the security plan indicated in 1.10.3.2.

1.8.3.4 The adviser may also be the head of the undertaking, a person with other duties in the undertaking, or a person not directly employed by that undertaking, provided that that person is capable of performing the duties of adviser.

1.8.3.5 Each undertaking concerned shall, on request, inform the competent authority of the identity of its adviser.

1.8.3.6 Whenever an accident affects or may affect persons, property or the environment or results or may result in damage to property or the environment during carriage, packing, filling, loading or unloading carried out by the undertaking concerned, the adviser shall, after collecting all the relevant information, prepare an accident report to the management of the undertaking or to a local public authority, as appropriate. That report shall not replace any report by the management of the undertaking which might be required under any other international or national legislation.

1.8.3.7 An adviser shall hold a vocational training certificate, valid for transport by rail. That certificate shall be issued by the competent authority or the body designated for that purpose.

1.8.3.8 To obtain a certificate, a candidate shall undergo training and pass an examination approved by the competent authority.

1.8.3.9 The main aims of the training shall be to provide candidates with sufficient knowledge

– of the risks inherent in the carriage, packing, filling, loading or unloading of dangerous goods,
– of the applicable laws, regulations and administrative provisions,
– of the duties listed in 1.8.3.3.

1.8.3.10 The examination shall be organized by the competent authority or by an examining body designated by the competent authority. The examining body shall not be a training provider.

The examining body shall be designated in writing. This approval may be of limited duration and shall be based on the following criteria:

– competence of the examining body;

– specifications of the form of the examinations the examining body is proposing, including, if necessary, the infrastructure and organisation of electronic examinations (see 1.8.3.12.5), if these are to be carried out;

– measures intended to ensure that examinations are impartial;

– independence of the body from all natural or legal persons employing safety advisers.

1.8.3.11 The aim of the examination is to ascertain whether candidates possess the necessary level of knowledge to carry out the duties incumbent upon a safety adviser (see 1.8.3.3), for the purpose of obtaining the certificate prescribed in sub-section 1.8.3.7, and it shall cover at least the following subjects:

a) knowledge of the types of consequences which may be caused by an accident involving dangerous goods and knowledge of the main causes of accidents;

b) requirements under national law, international conventions and agreements, with regard to the following in particular:

- classification of dangerous goods (procedure for classifying solutions and mixtures, structure of the list of substances, classes of dangerous goods and principles for their classification, nature of dangerous goods transported, physical, chemical and toxicological properties of dangerous goods);
- general packing provisions, provisions for tanks and tank-containers (types, code, marking, construction, initial and periodic inspection (certification) and testing);
- marking and labelling, placarding and orange-coloured plate and white-coloured plate marking (marking and labelling of packages, placing and removal of placards and orange-coloured and white-coloured plates);
- particulars in the consignment note (required information);
- method of consignment and forwarding restrictions (full wagon load or full container load, carriage in bulk, carriage in intermediate bulk containers, carriage in containers, carriage in fixed or demountable tanks);
- transport of passengers;
- prohibitions and precautions relating to mixed loading;
- segregation of goods;
- limitation of the quantities carried and quantities exemptions;
- handling and stowage (packing, filling, loading and unloading – filling ratios –, stowage and segregation);
- cleaning and/or degassing after unloading;
- crews, vocational training;
- documents to be carried on board (consignment note, copies of any derogations, other documents);
- instructions in writing, emergency cards (implementation of the instructions, emergency cards and equipment for personal protection);
- operational discharges or accidental leaks of pollutants;
- requirements relating to transport equipment.

1.8.3.12 Examinations

1.8.3.12.1 The examination shall consist of a written test which may be supplemented by an oral examination.

1.8.3.12.2 The competent authority or an examining body designated by the competent authority shall invigilate every examination. Any manipulation and deception shall be ruled out as far as possible. Authentication of the candidate shall be ensured. The use in the written test of documentation other than international or national regulations is not permitted. All examination documents shall be recorded and kept as a print-out or electronically as a file.

1.8.3.12.3 Electronic media may be used only if provided by the examining body. There shall be no means of a candidate introducing further data to the electronic media provided; the candidate may only answer the questions posed.

1.8.3.12.4 The written test shall consist of two parts:

a) Candidates shall receive a questionnaire. It shall include at least 20 open questions covering at least the subjects mentioned in the list in 1.8.3.11. However, multiple choice questions may be used. In this case, two multiple choice questions count as one open question. Amongst these subjects particular attention shall be paid to the following subjects:

- general preventive and safety measures;
- classification of dangerous goods;
- general packing provisions, including tanks, tank-containers, tank-wagons, etc.;
- danger markings, labeling and placarding orange-coloured plates and white-coloured plates ;

– information in the consignment note;
– handling and stowage;
– crew, vocational training;
– accompanying documents;
– instructions in writing;
– requirements concerning means of transport.

b) Candidates shall undertake a case study in keeping with the duties of the adviser referred to in 1.8.3.3, in order to demonstrate that they have the necessary qualifications to fulfill the task of adviser.

1.8.3.12.5 Written examinations may be performed, in whole or in part, as electronic examinations, where the answers are recorded and evaluated using electronic data processing (EDP) processes, provided the following conditions are met:

a) The hardware and software shall be checked and accepted by the competent authority or by an examining body designated by the competent authority;

b) Proper technical functioning shall be ensured. Arrangements as to whether and how the examination can be continued shall be made for a failure of the devices and applications. No aids shall be available on the input devices (e.g. electronic search function), the equipment provided according to 1.8.3.12.3 shall not allow the candidates to communicate with any other device during the examination;

c) Final inputs of each candidate shall be logged. The determination of the results shall be transparent.

1.8.3.13 The Competent authorities may decide that candidates who intend working for undertakings specializing in the carriage of certain types of dangerous goods need only be questioned on the substances relating to their activities.

These types of specialization are:

– Class 1;
– Class 2;
– Class 7;
– Classes 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 8 and 9;
– UN Nos. 1202, 1203, 1223, 3475 and aviation fuel classified under UN Nos. 1268 or 1863.

The certificate prescribed in 1.8.3.7 shall clearly indicate that it is only valid for one type of the dangerous goods referred to in this sub-section and on which the adviser has been questioned under the conditions defined in 1.8.3.12.

1.8.3.14 The competent authority or the examining body shall keep a running list of the questions that have been included in the examination.

1.8.3.15 The certificate prescribed in 1.8.3.7 shall take the form laid down in 1.8.3.18 and shall be recognized by all SMGS Contracting States.

1.8.3.16 Validity and renewal of certificates

1.8.3.16.1 The certificate shall be valid for five years, and the period of the validity of a certificate shall be extended from the date of its expiry for five years at a time where, during the year before its expiry, its holder has undergone refresher training and passed an examination. The examination results shall be approved by the competent authority.

1.8.3.16.2 The aim of the examination is to ascertain that the holder has the necessary knowledge to carry out the duties set out in 1.8.3.3. The knowledge required is set out in 1.8.3.11 b) and shall include the amendments to the regulations introduced since the award of the last certificate. The examination shall be held and supervised on the same basis as in 1.8.3.10

and 1.8.3.12 to 1.8.3.14. However, the holder of a valid certificate needs not undertake the case study specified in 1.8.3.12.4 b).

1.8.3.17 (reserved)

1.8.3.18 Model of certificate (confirmation)

Certificate of training as safety adviser for the transport of dangerous goods

Certificate No: …….

Distinguishing sign of the State issuing the certificate:…….

Surname: …….

Forename(s): ……

Date and place of birth: …….

Nationality: ……..

Signature of holder: ……

Valid until …….. (date) for undertakings which transport dangerous goods and for undertakings carry out related consigning, packing, filling, loading or unloading:

- ☐ by road
- ☐ by rail
- ☐ by inland waterway

Issued by: ……

Date: ……Signature: ……..

1.8.3.19 Extention of the certificate

Where an adviser extends the scope of his certificate during its period of validity by meeting the requirements of 1.8.3.16.2, the period of validity of a new certificate shall remain that of the previous certificate.

1.8.4 LIST OF COMPETENT AUTHORITIES AND BODIES DESIGNATED BY THEM

The SMGS Contracting States shall communicate to the Committee of OSJD the address of the authority or organization that under the national law has the competence in carriage of dangerous goods (including any issues related to the actions of competent authorities or organizations designated by them) in its State.

The SMGS Contracting States shall also communicate to the OSJD Committee the names and addresses of the authorities and organizations which are competent in accordance with national law in specific issues of implementing Annex 2 to SMGS, referring in each case to the relevant requirement of Annex 2 to SMGS.

The OSJD Committee shall establish a list on the basis of the information received and shall keep it up-to-date and communicate this list to the SMGS Contracting States.

***Note*:** *For the purpose of the implementation of Annex 2 to SMGS, each State shall designate the competent authorities or bodies having competence for the specific issues of implementation of Annex 2 to SMGS, such as:*

- *general conditions of carriage;*
- *verification of compliance with the requirements of Annex 2 to SMGS (1.8.1);*
- *safety advisers (1.8.3);*
- *statistical information on accidents (1.8.5);*
- *classification requirements, packaging requirements, certification, carriage of radioactive materials of Class 7;*
- *classification of dangerous goods, including:*
- *explosive substances of Class 1;*

- *self-reacting substances of Class 4.1 and organic peroxides of Class 5.2;*
- *infectious substances of Class 6.2;*
- *requirements for the construction and testing of packagings (Chapter 6.1);*
- *requirements for the construction and testing of pressure receptacles, aerosol dispensers, small receptacles containing gas (gas cartridges)(Chapter 6.2);*
- *requirements for the construction and testing of packagings for class 6.2 infectious substances (Chapter 6.3);*
- *requirements for the construction and testing of intermediate bulk containers (IBCs) (Chapter 6.5);*
- *requirements for the construction and testing of large packagings (Chapter 6.6);*
- *requirements for the design, construction, inspection and testing of portable tanks and UN multiple element gas containers (Chapter 6.7);*
- *requirements for the construction, equipment, type approval, inspections and tests, and marking of tank-wagons, demountable tanks and tank-containers and tank swap bodies, battery-wagons and multiple element gas containers (MEGCs) (Chapter 6.8)*
- *requirements for the design, construction, inspection and testing of bulk containers (Chapter 6.11);*

As well as inspection bodies or testing experts shall be designated for the verificatino of:

- *pressure receptacles (Chapter 6.2);*
- *intermediate bulk containers (IBCs) (Chapter 6.5);*
- *portable tanks and UN multiple elements gas containers (UN MEGCs) (Chapter 6.7);*
- *tank-wagons, demountable tanks and tank-containers and battery-wagons and multiple element gas containers (MEGCs) (Chapter 6.8)*

1.8.5 NOTIFICATIONS OF ACCIDENTS OR OCCURENCES

1.8.5.1 If a serious accident or incident takes place during loading, filling, carriage or unloading of dangerous goods on the territory of an SMGS Contracting State, the loader, filler, carrier, unloader, consignee or if the case may be the railway infrastructure manager, respectively, shall ascertain that a report conforming to the model prescribed in 1.8.5.4 is made to the competent authority of the SMGS Contracting State concerned at the latest one month after the occurrence.

1.8.5.2 (reserved)

1.8.5.3 An occurrence subject to report in accordance with 1.8.5.1 has occurred if the occurrence satisfies one or more of the following criteria has/have been met:

– dangerous goods were released or if there was an imminent risk of loss of product;
– personal injury, material or environmental damage occurred;
– the authorities were involved.

Personal injury means an occurrence in which death or injury directly relating to the dangerous goods carried has occurred, and where the injury

a) requires intensive medical treatment,
b) requires a stay in hospital of at least one day, or
c) results in the inability to work for at least three consecutive days.

Loss of product means the release of dangerous goods depending on transport category (see 1.1.3.6) in quantities:

Transport category	Quantity of dangerous goods
0 or 1	50 kg/50 l or more
2	333 kg/333 l or more
3, 4	1 000 / 1 000 or more

The loss of product criterion also applies if there was an imminent risk of loss of product in the above-mentioned quantities. As a rule, this has to be assumed if, owing to structural damage, the means of containment is no longer suitable for further carriage or if, for any other reason, a sufficient level of safety is no longer ensured (e.g. owing to distortion of tanks or containers, overturning of a tank or fire in the immediate vicinity).

If dangerous goods of Class 6.2 are involved, the obligation to report applies without quantity limitation.

In occurrences involving radioactive material, the criteria for loss of product are:

a) Any release of radioactive material from the packages;

b) Exposure leading to a breach of the limits set out in the regulations for protection of workers and members of the public against ionizing radiation ("Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards", IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014)); or

c) Where there is reason to believe that there has been a significant degradation in any package safety function (containment, shielding, thermal protection or criticality) that may have rendered the package unsuitable for continued carriage without additional safety measures.

Note: *See the requirements of 7.5.11 CW33 (6) for undelivered consignments.*

Material damage or environmental damage means the release of dangerous goods, irrespective of the quantity, where the estimated amount of damage exceeds 80,000 CHF. Damage to any directly involved means of carriage containing dangerous goods and to the modal infrastructure shall not be taken into account for this purpose.

Involvement of authorities means the direct involvement of the authorities or emergency services during the occurrence involving dangerous goods and the evacuation of persons or closure of public traffic routes (roads/railways) for at least three hours owing to the danger posed by the dangerous goods.

If necessary, the competent authority may request further relevant information.

1.8.5.4 Model for report on occurrences during the carriage of dangerous goods

Report on occurrences during the carriage of dangerous goods in accordance with Annex 2 to SMGS (See 1.8.5)

Railway (Carrier or railway infrastructure manager):

……...

Address: ……..

Contact name: ……Phone:……Fax:……..

1. Mode of transport	
☐ Railway transport Wagon number …….....	
2. Date and location of occurrence	
Year: …….. Month: …… Day: …….. Time: ……...	
State/Location description**:** …… ☐ Station ☐ Shunting/Marshalling yard ☐ Place of loading/unloading/transshipment or ☐ Open line Description of line: …… Kilometers: ……	
3. Topography	
☐ Gradient/incline ☐ Tunnel ☐ Bridge/Underpass ☐ Crossing ☐ Platform	
4. Particular weather conditions	
☐ Rain ☐ Snow ☐ Ice ☐ Fog ☐ Thunderstorm ☐ Storm Temperature: … °C	
5 Description of occurrence	

□ Derailment
□ Collision
□ Overturning/Rolling over
□ Fire
□ Explosion
□ Loss (leakage/spillage) of product
□ Technical fault

Additional description of occurrence
……
……..……
……

6. Dangerous goods involved

UN Number[1]	Class	Packing Group	Estimated quantity of loss of products (kg or l)[2]	Means of containment[3]	Means of containment material	Type of failure of means of containment[4]

[1] For dangerous goods assigned to collective entries to which special provision 274 applies, also the technical name shall be indicated.

[2] For Class 7, indicate values according to the criteria in 1.8.5.3.

[3]Indicate the appropriate number:

1 Packaging
2 IBC
3 Large packaging
4 Small container
5 Wagon
7 Tank-wagon
9 Battery-wagon
11 Wagon with demountable tanks
12 Demountable tank
13 Large container
14 Tank-container
15 MEGC
16 Portable tank
17 MEMU
19 Extra-large tank container

[4] Indicate the appropriate number:

1 Leakage/spillage
2 Fire
3 Explosion
4 Structural failure

7. Cause of occurrence (indicate precisely)

□ Technical fault ……..
□ Faulty load securing: …….
□ Operational cause: ……..
□ Other: …….

8. Consequences of occurrence

Personal injury in connection with the dangerous goods involved:

□ Death (number of deaths: ……)

□ Body injured (number of injured people: ……)

Loss of product:

□ Yes

□ No

□ Imminent risk of loss of product

Material/Environmental damage

□ Estimated level of damage ≤ 80 000 Swiss francs

□ Estimated level of damage > 80 000 Swiss francs

Involvement of authorities:

□ Yes

□ Evacuation of persons for a duration of at least three hours caused by the dangerous goods involved

□ Closure of public traffic routes for a duration of at least three hours caused by the dangerous goods involved.

□ No

If necessary, the competent authority may request further relevant information.

1.8.6 ADMINISTRATIVE CONTROLS FOR THE ACTIVITIES DESCRIBED IN 1.8.7 AND 1.8.8.

Note 1: *For the purposes of this section the terms:*

– *"approved inspection body" means an inspection body approved by the competent authority to perform different activities according to 1.8.6.1; and*

– *"recognized inspection body" means an approved inspection body recognized by another competent authority.*

Note 2: *An inspection body may be designated by the competent authority to act as the competent authority (see the definition of competent authority in 1.2.1).*

Note 3 *In this section, the term "inspection" includes the terms "inspection and testing" and "inspection" as used in Chapters 6.2 and 6.8.*

1.8.6.1 General provisions

The competent authority of an SMGS Contracting State may approve inspection bodies for the following activities: conformity assessments, periodic inspections, intermediate inspections, exceptional inspections, entry into service verifications and surveillance of the in-house inspection service as relevant in Chapters 6.2 and 6.8.

1.8.6.2 Obligations of the competent authority

1.8.6.2.1 When the competent authority approves an inspection body to perform the activities specified in 1.8.6.1, the accreditation of the inspection body shall be according to EN ISO/IEC 17020:2012 (except clause 8.1.3) type A requirements.

When the competent authority approves an inspection body to perform periodic inspections of pressure receptacles according to Chapter 6.2, the accreditation of the inspection body shall be according to EN ISO/IEC 17020:2012 (except clause 8.1.3) type A requirements or type B requirements.

The accreditation shall clearly cover the activities of the approval.

When the competent authority does not approve inspection bodies, but performs these tasks itself, the competent authority shall comply with the provisions of 1.8.6.3.

1.8.6.2.2 *Approval of inspection bodies*

1.8.6.2.2.1 Type A inspection bodies shall be established under domestic law and be a legal entity in the SMGS Contracting State where the application for approval is made.

Type B inspection bodies shall be established under domestic law and be part of a legal entity supplying gas in the SMGS Contracting State where the application for approval is made.

1.8.6.2.2.2 The competent authority shall ascertain that the inspection body continuously meets the conditions for its approval and shall revoke the approval if these conditions are not met. However, in the case of suspension of the accreditation, the approval is only suspended during the suspension period of the accreditation.

1.8.6.2.2.3 An inspection body starting a new activity may be approved temporarily. Before temporary approval, the competent authority shall ensure that the inspection body meets the requirements of 1.8.6.3.1. The inspection body shall be accredited according to EN ISO/IEC 17020:2012 (except clause 8.1.3) in its first year of activity to be able to continue this new activity.

1.8.6.2.3 *Monitoring of inspection bodies*

1.8.6.2.3.1 Wherever the activities of an inspection body are performed, the competent authority that approved this body shall ensure the monitoring of the activities of this body, including on-

site monitoring. The competent authority shall revoke or restrict the approval given if this body is no longer in compliance with the approval, the requirements of 1.8.6.3.1 or does not follow the procedures specified in the provisions of Annex 2 to SMGS.

Note: *Monitoring of subcontractors as mentioned in 1.8.6.3.3 by the inspection body shall also be included in the monitoring of the inspection body.*

1.8.6.2.3.2 If the approval of the inspection body is revoked or restricted or if the inspection body ceased activity, the competent authority shall take the appropriate steps to ensure that the files are either processed by another inspection body or kept available.

1.8.6.2.4 *Information obligations*

1.8.6.2.4.1 SMGS Contracting States shall publish their national procedures for the assessment, approval and monitoring of inspection bodies and of any changes to that information.

1.8.6.2.4.2 The competent authority of the SMGS Contracting State shall publish an up-to-date list of all the inspection bodies it has approved, including inspection bodies approved temporarily as described in 1.8.6.2.2.3. This list shall at least contain the following information:

a) Name, address(es) of the office(s) of the inspection body;

b) The scope of activities for which the inspection body is approved;

c) Confirmation that the inspection body is accredited according to EN ISO/IEC 17020:2012 (except clause 8.1.3) by the national accreditation body and that the accreditation covers the scope of activities for which the inspection body is approved;

d) The identity mark or stamp, as specified in Chapters 6.2 and 6.8, of the inspection body and the mark of any in-house inspection service authorized by the inspection body.

A reference to this list shall be made on the OSJD website.

1.8.6.2.4.3 An inspection body approved by a competent authority may be recognized by another competent authority.

Where a competent authority wishes to engage the services of an inspection body already approved by another competent authority to carry out activities related to conformity assessments and inspections on its behalf, then that competent authority shall add this inspection body, the scope of activities for which it is recognized, and the competent authority that approved the inspection body, to the list mentioned in 1.8.6.2.4.2 and inform the OSJD Committee. If the approval is withdrawn or suspended, the recognition is no longer valid.

Note: *In that context, reciprocal recognition agreements between SMGS Contracting States shall be respected.*

1.8.6.3 Obligations of the inspection bodies

1.8.6.3.1 *General rules*

The inspection body shall:

a) Have a staff with an organisational structure, capable, trained, competent and skilled, to satisfactorily perform its technical functions;

b) Have access to suitable and adequate facilities and equipment;

c) Operate in an impartial manner and be free from any influence which could prevent it from doing so;

d) Ensure commercial confidentiality of the commercial and proprietary activities of the manufacturer and other bodies;

e) Maintain clear demarcation between actual inspection body functions and unrelated functions;

f) Have a documented quality system, equivalent to that set out in EN ISO/IEC 17020:2012 (except clause 8.1.3);

g) Ensure that the tests and inspections specified in the relevant standards and in Annex 2 to SMGS are performed;

h) Maintain an effective and appropriate report and record system in accordance with 1.8.7 and 1.8.8;

i) Be free from any commercial or financial pressure and not remunerate its personnel depending on the number of the inspections carried out or on the results of those inspections;

j) Have a liability insurance covering the risks in relation to the conducted activities;

Note: *This is not necessary if the SMGS Contracting State assumes liability in accordance with domestic law.*

k) Appoint person(s) responsible for carrying out the inspections who shall:

1) Not be directly involved in the design, manufacture, supply, installation, purchase, ownership, use or maintenance of the product (pressure receptacle, tank, battery-wagon or MEGC) to be inspected;

2) Have been trained in all aspects of the activities in relation to which the inspection body has been approved;

3) Have appropriate knowledge, technical skills and understanding of the applicable requirements, of the applicable standards and of the relevant provisions of Parts 4 and 6;

4) Have the ability to draw up certificates, records and reports demonstrating that assessments have been carried out;

5) Observe professional secrecy with regard to information obtained in carrying out their tasks or any provision of domestic law giving effect to it, except in relation to the competent authorities of the SMGS Contracting State in which its activities are carried out. At the request of other inspection bodies, information may be shared as far as necessary for the performance of inspections and tests.

The inspection body shall additionally be accredited according to the standard EN ISO/IEC 17020:2012 (except clause 8.1.3).

1.8.6.3.2 *Operational obligations*

1.8.6.3.2.1 The competent authority or inspection body shall carry out conformity assessments, periodic inspections, intermediate inspections, exceptional inspections and entry into service verifications in a proportionate manner, avoiding unnecessary burdens. The competent authority or inspection body shall perform its activities taking into consideration the size, the sector and the structure of the undertakings involved, the relative complexity of the technology and the serial character of production.

1.8.6.3.2.2 The competent authority or inspection body shall respect the degree of rigour and the level of protection required for the compliance with the provisions of Parts 4 and 6 as applicable.

1.8.6.3.2.3 Where a competent authority or inspection body finds out that requirements laid down in Parts 4 or 6 have not been met by the manufacturer, it shall require the manufacturer to take appropriate corrective measures and it shall not issue any type approval certificate or initial inspection and test certificate until the appropriate corrective measures have been implemented.

1.8.6.3.3 *Delegation of inspection tasks*

Note: *The following provisions only apply to type A inspection bodies. Type B inspection bodies are not allowed to delegate the activities for which they are approved. For in-house inspection services see 1.8.7.7.2.*

1.8.6.3.3.1 Where an inspection body uses the services of a subcontractor to carry out specific tasks connected with its activities, the subcontractor shall be assessed and monitored by the inspection body, or it shall be accredited separately. In the case of separate accreditation, the subcontractor shall be duly accredited according to EN ISO/IEC 17025:2017 (except clause 8.1.3) or EN ISO/IEC 17020:2012 (except clause 8.1.3) as an independent and impartial testing laboratory or inspection body in order to perform testing tasks in accordance with its accreditation. The inspection body shall ensure that this subcontractor meets the requirements set out for the tasks given to it with the same level of competence and safety as laid down for inspection bodies (see 1.8.6.3.1) and the inspection body shall monitor it. The inspection body shall inform the competent authority about the above-mentioned arrangements.

1.8.6.3.3.2 The inspection body shall take full responsibility for the tasks performed by such subcontractors wherever the tasks are performed by them.

1.8.6.3.3.3 The type A inspection body may delegate only a part of each of its activities. In any case, the assessment and the issue of certificates shall be carried out by the inspection body itself.

1.8.6.3.3.4 Activities shall not be delegated without the agreement of the manufacturer, owner or operator as appropriate.

1.8.6.3.3.5 The inspection body shall keep at the disposal of the competent authority the relevant documents concerning the assessment of the qualifications and the work carried out by the above-mentioned subcontractors.

1.8.6.3.4 *Information obligations*

Any inspection body shall inform the competent authority, which had approved it, of the following:

a) Except when the provisions of 1.8.7.2.2.2 apply, any refusal, restriction, suspension or withdrawal of type approval certificates;

b) Any circumstance(s) affecting the scope of and conditions for the approval as granted by the competent authority;

c) Any refusal of inspection certificates;

d) Any request for information on activities performed which they have received from competent authorities monitoring compliance according to this section;

e) On request, all activities performed within the scope of their approval, including delegation of tasks;

f) Any authorization or suspension or withdrawal of an in-house inspection service.

1.8.7 PROCEDURES FOR CONFORMITY ASSESSMENT, TYPE APPROVAL CERTIFICATE ISSUE AND INSPECTIONS

Note 1: *In this section, "relevant body" means a body assigned in Chapters 6.2 and 6.8.*

Note 2: *In this section, "manufacturer" means the enterprise who is responsible to the competent authority for all aspects of the conformity assessment and for ensuring the conformity of construction whose name and mark appear in the approvals and on the markings. It is not essential that the enterprise is directly*

involved in all stages of the construction of the product (see 1.8.7.1.5) which is subject to the conformity assessment.

Note 3: *In this section, the term "inspection" includes the terms "inspection and testing" and "inspection" as used in Chapters 6.2 and 6.8.*

1.8.7.1 General provisions

1.8.7.1.1 The procedures in section 1.8.7 shall be applied as specified in Chapters 6.2 and 6.8.

If the competent authority performs the tasks itself, the competent authority shall meet the provisions of this section.

1.8.7.1.2 Each application for

a) The type examination in accordance with 1.8.7.2.1;

b) The type approval certificate issue in accordance with 1.8.7.2.2;

c) The supervision of manufacture in accordance with 1.8.7.3; or

d) The initial inspection and tests in accordance with 1.8.7.4

shall be lodged by the manufacturer with a competent authority or an inspection body, as applicable, in conformity with Chapters 6.2 and 6.8.

Each application for

e) The entry into service verification in accordance with 1.8.7.5; or

f) The periodic inspection, intermediate inspection and exceptional inspection in accordance with 1.8.7.6

shall be lodged by the owner or its authorized representative, or by the operator or its authorized representative, with a competent authority or an inspection body.

When the in-house inspection service is authorized for c), d), or f), it is not necessary to lodge an application for c), d), or f).

1.8.7.1.3 The application shall include:

a) The name and address of the applicant according to 1.8.7.1.2;

b) A written declaration that the same application has not been lodged with any other competent authority or inspection body;

c) The relevant technical documentation in 1.8.7.8;

d) A statement allowing the competent authority or the inspection body, as appropriate, access for conformity assessment or inspection purposes to the locations of manufacture, inspection, testing and storage and providing it with all necessary information to perform their tasks.

1.8.7.1.4 Where the manufacturer or an enterprise with a testing facility is allowed to establish an in-house inspection service according to 6.2.2.12, 6.2.3.6.1, 6.8.1.5.3 (b) or 6.8.1.5.4 (b), it shall demonstrate to the satisfaction of the inspection body that the in-house inspection service is able to perform inspections and tests in conformity with 1.8.7.

1.8.7.1.5 Type approval certificates, inspection certificates and reports for the products (pressure receptacles, tanks, service equipment and the assembly of the elements, structural equipment and service equipment of battery-wagons or MEGCs), including the technical documentation, shall be kept:

a) By the manufacturer for a period of at least 20 years from the expiry date of the type approval;

b) By the issuing competent authority or the issuing inspection body, for a period of at least 20 years from the issuing date;

c) By the owner or operator for a period of at least 15 months after the product is taken out of service.

1.8.7.2 Type examination and type approval certificate issue

1.8.7.2.1 *Type examination*

1.8.7.2.1.1 The manufacturer shall:

a) In the case of pressure receptacles, place at the disposal of the inspection body representative samples of the production envisaged. The inspection body may request further samples if required by the test programme;

b) In the case of tanks, battery-wagons or MEGCs, give access to the prototype for type testing;

c) In the case of service equipment, place at the disposal of the inspection body representative samples of the production envisaged. The inspection body may request further samples if required by the test programme.

Note: *The results of assessments and tests according to other regulations or standards may be taken into account.*

1.8.7.2.1.2 The inspection body shall:

a) Examine the technical documentation specified in 1.8.7.8.1 to verify that the design is in accordance with the relevant provisions of Annex 2 to SMGS, and the prototype or the prototype lot has been manufactured in conformity with the technical documentation and is representative of the design;

b) Perform the examinations and the tests, or perform the examinations and verify the test conditions and supervise the tests on site, as specified in Annex 2 to SMGS, including the relevant standards, to determine that the provisions have been applied and fulfilled, and the procedures adopted by the manufacturer meet the requirements;

c) Check the material(s) certificate(s) issued by the manufacturer(s) of the materials against the relevant provisions of Annex 2 to SMGS;

d) As applicable, approve the procedures for the permanent joining of parts or check that they have been previously approved, and verify that the staff undertaking the permanent joining of parts and the non-destructive tests are qualified or approved;

e) Agree with the manufacturer the location(s) where the examinations and necessary tests are to be carried out.

The inspection body shall issue a report of the type examination to the manufacturer.

1.8.7.2.2 *Type approval certificate issue*

Type approvals authorize the construction of products within the period of validity of that approval.

1.8.7.2.2.1 Where the type satisfies all applicable provisions, the competent authority or the inspection body, shall issue a type approval certificate to the manufacturer in conformity with Chapters 6.2 and 6.8.

This certificate shall contain:

a) The name and address of the issuer;

b) The competent authority under whom the certificate is issued;

c) The name and address of the manufacturer;

d) A reference to the version of Annex 2 to SMGS and standards used for the type examination;

e) Any requirements resulting from the type examination;

f) The data contained in the documents for the type-examination according to 1.8.7.8.1, necessary for the identification of the type and variation, as defined by the relevant standards. The documents, or a list identifying the documents, containing the data shall be included or annexed to the certificate;

g) The reference to the type examination report(s);

h) The maximum period of validity of the type approval; and

i) Any specific requirements in accordance with Chapters 6.2 and 6.8.

1.8.7.2.2.2 The type approval shall be valid for a maximum of ten years. If within that period the relevant technical requirements of RID have changed so that the approved type is no longer in conformity with them, then the type approval is no longer valid. If within that period, the withdrawal date according to column (3) of the tables in 6.2.2.1 and 6.2.2.3 or column (5) of the tables in 6.2.4.1, 6.8.2.6.1 and 6.8.3.6 applies, the type approval is also no longer valid. It shall then be withdrawn by the competent authority or the inspection body which issued the type approval certificate.

Note: *For the latest date for withdrawal of existing type approvals, see column (5) of the tables in 6.2.4.1 and 6.8.2.6.1 or 6.8.3.6 as appropriate.*

If a type approval has expired, or has been withdrawn, the manufacture of the products according to that type approval is no longer authorized.

Note: *The relevant provisions concerning the use, periodic inspection and intermediate inspection of products contained in a type approval which has expired or has been withdrawn shall continue to apply to the products constructed according to that type approval before its expiry or its withdrawal if they may continue to be used.*

Type approvals may be renewed on the basis of a new type examination. Results of the previous type examination tests shall be taken into account if these tests are still in accordance with the provisions of Annex 2 to SMGS including the standards applicable at the date of renewal. Renewal is not permitted after a type approval has been withdrawn.

Note: *The type examination for renewal may be performed by an inspection body other than the one which issued the original type examination report.*

Interim amendments of an existing type approval (e.g. for pressure receptacles minor amendments such as the addition of further sizes or volumes not affecting conformity, or for tanks see 6.8.2.3.3) do not extend or modify the original validity of the certificate.

1.8.7.2.2.3 In the case of a modification of a product with a valid, expired or withdrawn type approval, the relevant type examination, testing, inspection and approval are limited to the parts of the product that have been modified.

The modification shall meet the provisions of RID applicable at the time of the modification. For all parts of the product not affected by the modification, the documentation of the initial type approval remains valid.

A modification may apply to one or more product(s) covered by the same type approval.

Where the modified product satisfies all applicable provisions, a supplementary approval certificate for the modification shall be issued to the owner or operator by the competent authority or inspection body of any RID Contracting State in conformity with Chapters 6.2 and 6.8. For tanks, battery-wagons or MEGCs, a copy shall be kept as part of the tank record.

1.8.7.3 Supervision of manufacture

1.8.7.3.1 The manufacturer shall take all the necessary measures to ensure that the manufacturing process complies with the applicable provisions of Annex 2 to SMGS and of the type approval certificate, the technical documentation according to 1.8.7.8.3 and reports.

1.8.7.3.2 The manufacturing process shall be subject to supervision by the relevant body.

The relevant body shall:

a) Verify the conformity with the technical documentation specified in 1.8.7.8.3 and with the applicable provisions of Annex 2 to SMGS and of the type approval certificate and reports;

b) Verify that the manufacturing process produces products in conformity with the requirements and the documentation which apply to it;

c) Verify the traceability of materials and check the material(s) certificate(s) against the specifications;

d) As applicable, verify that the personnel undertaking the permanent joining of parts and the non-destructive tests are properly attested or approved;

e) Agree with the manufacturer on the location where the examinations and necessary tests are to be carried out

f) Provide a written report of the results of the supervision of manufacture.

1.8.7.4 Initial inspection and tests

1.8.7.4.1 The manufacturer shall:

a) Affix the marks specified in Annex 2 to SMGS;

b) Supply to the relevant body the technical documentation specified in 1.8.7.8.4.

1.8.7.4.2 The relevant body shall:

a) Perform the examinations and the tests, or perform the examinations and verify the test conditions and supervise the tests on site to ensure that the product is manufactured in accordance with the type approval and the relevant provisions;

b) Check the certificates supplied by the manufacturers of service equipment against the service equipment;

c) Issue an initial inspection and tests report relating to the detailed tests and verifications carried out and the verified technical documentation;

d) Issue an initial inspection and tests certificate and affix its mark in accordance with Annex 2 to SMGS when the manufacture satisfies the provisions; and;

e) Check if the type approval remains valid after provisions of Annex 2 to SMGS (including the referenced standards) relevant to the type approval have changed. If the type approval is no longer valid, the relevant body shall issue a refusal inspection report and inform the competent authority or the inspection body which issued the type approval certificate.

The certificate in d) and report in c) may cover a number of items of the same type (group certificate or report).

1.8.7.4.3 The certificate in 1.8.7.4.2 d) shall contain as a minimum:

a) The name and address of the inspection body and the name and address of the in-house inspection service when applicable;

b) The name and address of the manufacturer;

c) The location of the initial inspection;

d) A reference to the version of Annex 2 to SMGS and the standards used for the initial inspections and tests;

e) The results of the inspections and tests;

f) The data for identification of the inspected product(s), at least the serial number or for non-refillable cylinders the batch number;

g) The type approval number, and

h) The reference to the certificate of authorization of the in-house inspection service when applicable.

1.8.7.5 Entry into service verification

1.8.7.5.1 If an entry into service verification is required by the competent authority under 6.8.1.5.5, the owner or operator shall engage a single inspection body to perform the entry into service verification and shall provide it with the type approval certificate and the technical documentation specified in 1.8.7.8.4.

1.8.7.5.2 The inspection body shall review the documentation and:

a) Perform external checks (e.g. marking, condition);

b) Verify conformity with the official type approval certificate;

c) Verify the validity of the official approvals of the inspection bodies who performed the previous inspections and tests;

d) Verify that the transitional measures of 1.6.3 or 1.6.4 have been fulfilled.

1.8.7.5.3 The inspection body shall issue an entry into service verification report that contains the results of the assessment. The owner or operator shall present this report at the request of the competent authority requiring the entry into service verification, and to the inspection body(ies) in charge of subsequent inspections and tests.

In the event of a failed entry into service verification, the non-conformities shall be rectified and a new entry into service verification passed before the tank is used.

The inspection body in charge of the entry into service verification shall, without delay, inform its competent authority of any refusal.

1.8.7.6 Periodic inspection, intermediate inspection and exceptional inspection

1.8.7.6.1 The relevant body shall:

a) Perform the identification and verify the conformity with the documentation;

b) Perform the inspections and the tests, or perform the inspections and verify the test conditions and supervise the tests on site in order to check that the requirements are met;

c) Issue reports and certificates, as appropriate, of the results of the inspections and tests, which may cover a number of products; and

d) Ensure that the required marks are applied.

1.8.7.6.2 Reports of periodic inspections and tests of pressure receptacles shall be retained by the owner or operator at least until the next periodic inspection.

Note: *For tanks, see provisions for tank records in 4.3.2.1.7.*

1.8.7.7 Surveillance of the in-house inspection service

1.8.7.7.1 Where an in-house inspection service is used according to 6.2.2.12, 6.2.3.6.1, 6.8.1.5.3 b) or 6.8.1.5.4 b), the manufacturer or the testing facility shall:

a) Implement a quality system for the in-house inspection service, including technical procedures, for conducting inspections and tests documented in 1.8.7.8.6 and subject to surveillance;

b) Fulfil the obligations arising out of the quality system as approved and ensure that it remains satisfactory and efficient, in particular:

1) Authorize trained and competent personnel for the in-house inspection service; and

2) Affix the identity mark or stamp, as specified in Chapters 6.2 and 6.8, of the inspection body, and the mark of the in-house inspection service where appropriate on the product to ensure traceability

1.8.7.7.2 The inspection body shall carry out an initial audit at each site. If satisfactory the inspection body shall inform the competent authority of the authorization of the in-house inspection service and issue a certificate of authorization for a period not exceeding three years. The following provisions shall be met:

a) This audit shall be undertaken at each site to confirm that the inspections and tests performed on the product are in compliance with the requirements of Annex 2 to SMGS;

b) The inspection body may authorise the in-house inspection service to affix identity mark or stamp, as specified in Chapter 6.2 and 6.8, of the inspection body to each approved product;

c) The authorisation may be renewed after a satisfactory audit at each site in the last year prior to the expiry. The new period of validity shall begin with the date of expiry of the authorisation;

d) The inspectors of the inspection body undertaking the audits shall be competent to carry out the assessment of conformity of the product covered by the quality system and to assess the quality system itself; and

e) The in-house inspection service shall be engaged in activities at a frequency which ensures the necessary level of competence.

The in-house inspection service may, in specific cases only, subcontract specific parts of its activities if approved by the inspection body which has authorized it. The subcontractor shall additionally be accredited according to EN ISO/IEC 17025:2017 (except clause 8.1.3) or EN ISO/IEC 17020:2012 (except clause 8.1.3) as an independent and impartial testing laboratory or inspection body in order to perform testing tasks in accordance with its accreditation.

1.8.7.7.3 The certificate of authorization shall contain as a minimum:

a) The name and address of the inspection body;

b) The name and address of the manufacturer or testing facility and addresses of all in-house inspection service sites;

c) A reference to the version of Annex 2 to SMGS used for authorization of the in-house inspection service and standards or recognised technical codes according to 6.2.5 used for initial inspection and tests or periodic inspections;

d) The reference to the initial audit report;

e) As necessary, further information to define the scope of the in-house inspection service (e.g. type approvals of the products for initial inspection and tests);

f) The mark of the in-house inspection service, if applicable; and

g) The expiry date.

1.8.7.7.4 The inspection body shall carry out periodic audits at each site within the duration of the authorisation to make sure that the in-house inspection service maintains and applies the quality system, including the technical procedures. The following provisions shall be met:

a) The audits shall be carried out no later than every six months;

b) The inspection body may require additional visits, training, technical changes, modifications of the quality system, restrict or prohibit the inspections and tests to be done by the in-house inspection service;

c) The inspection body shall assess any changes in the quality system and decide whether the modified quality system still satisfies the requirements of the initial audit or whether a full reassessment is required;

d) The inspectors of the inspection body undertaking the audits shall be competent to carry out the assessment of conformity of the product covered by the quality system and to assess the quality system itself; and;

e) The inspection body shall provide the manufacturer or the testing facility, as applicable, and the in-house inspection service, with the report of the audit and, if tests have taken place, with a test report.

1.8.7.7.5 In cases of non-conformity with the relevant requirements the inspection body shall ensure that corrective measures are taken. If corrective measures are not taken in due time, the inspection body shall suspend or withdraw the permission for the in-house inspection service to carry out its activities. The notice of suspension or withdrawal shall be transmitted to the competent authority. A report shall be provided to the manufacturer or the testing facility, as applicable, and to the in-house inspection service giving detailed reasons for the decisions taken by the inspection body.

1.8.7.8 Documents

The technical documentation shall enable an assessment to be made of conformity with the relevant requirements

1.8.7.8.1 *Documents for the type examination*

The manufacturer shall provide as appropriate:

a) The list of standards used for the design and manufacture;

b) A description of the type including all variations;

c) The instructions according to the relevant column of Table A of Chapter 3.2 or a list of dangerous goods to be carried for dedicated products;

d) A general assembly drawing or drawings;

e) The detailed drawings, including the dimensions used for the calculations, of the product, the service equipment, the structural equipment, the marking and the labelling necessary to verify the conformity;

f) The calculation notes, results and conclusions;

g) The list of the service equipment with the relevant technical data and information on the safety devices including the calculation of the relief capacity if relevant;

h) The list of material requested in the standard for manufacture used for every part, sub-part, lining, service and structural equipment and the corresponding material specifications or the corresponding declaration of conformity to Annex 2 to SMGS;

i) The approved qualification of the staff carrying out permanent joining process (for example, welding);

j) The description of the heat treatment process;

k) The procedures, descriptions and records of all relevant tests listed in the standards or Annex 2 to SMGS for the type approval and for the manufacture.

1.8.7.8.2 *Documents for the type approval certificate issue*

The manufacturer shall provide as appropriate:

a) A list of standards used for the design and manufacture;

b) A description of the type, including all variations;

c) The instructions according to the relevant column of table A of Chapter 3.2 or a list of dangerous goods to be carried for dedicated products;

d) A general assembly drawing or drawings;

e) The list of materials in contact with the dangerous goods;
f) The list of service equipment;
g) The type-examination report; and
h) Further documents mentioned under 1.8.7.8.1 on request of the competent authority or inspection body

1.8.7.8.3 *Documents for the supervision of manufacture*

The manufacturer shall make available as appropriate:

a) The documents listed in 1.8.7.8.1 and 1.8.7.8.2;
b) A copy of the type approval certificate;
c) The manufacturing procedures including test procedures;
d) The manufacturing records;
e) The approved qualifications of permanent joining operators (for example, welding operators);
f) The approved qualifications of the non destructive test operators;
g) The reports of the destructive and non destructive tests;
h) The heat treatment records; and
i) The calibration records.

1.8.7.8.4 *Documents for initial inspection and tests, and for entry into service verification*

The manufacturer for initial inspection and tests, and the owner or operator for the entry into service verification shall provide as appropriate:

a) The documents listed in 1.8.7.8.1, 1.8.7.8.2 and 1.8.7.8.3;
b) The material certificates of the product and any sub-parts including the service equipment;
c) The certificates of conformity of the service equipment; and
d) A declaration of conformity including the description of the product and all the variations adopted from the type approval.

1.8.7.8.5 *Documents for periodic inspections, intermediate inspections and exceptional inspection*

The owner or operator, or its authorized representative shall provide as appropriate:

a) For pressure receptacles, the documents specifying special requirements when the manufacturing and periodic inspections and tests standards so require;
b) For tanks,
   - the tank record (see 1.2.1);
   - any relevant document mentioned in 1.8.7.8.1 to 1.8.7.8.4 if requested by the inspection body.

1.8.7.8.6 *Documents for the surveillance of in-house inspection service*

The in-house inspection service shall provide the quality system documentation as appropriate:

a) The organisational structure and responsibilities of the staff;
b) The relevant inspection and test, quality control, quality assurance and process operation instructions;
c) The quality data records, such as inspection reports, test data, calibration data and certificates;
d) The management reviews to ensure the effective operation of the quality system arising from the on-site audits in accordance with 1.8.7.7;
e) The process describing how customer and regulation requirements are met;

f) The process for control of documents and their revision;

g) The procedures for dealing with non-conforming products;

h) The training programmes and qualification procedures for relevant personnel.

1.8.8 PROCEDURES FOR CONFORMITY ASSESSMENT OF GAS CARTRIDGES

When assessing the conformity of gas cartridges, one of the following procedures shall be applied:

a) The procedure in section 1.8.7 for non-UN pressure receptacles, with the exception of 1.8.7.6;

b) The procedure in sub-sections 1.8.8.1 to 1.8.8.7.

1.8.8.1 General provisions

1.8.8.1.1 The supervision of manufacture shall be carried out by an Xa body and the tests as required in 6.2.6 shall be carried out either by that Xa body or by an IS authorized by that Xa body; for definition of Xa and IS see definitions in 6.2.3.6.1. Conformity assessment shall be carried out by the competent authority, its delegate or its approved inspection body of an SMGS Contracting State.

1.8.8.1.2 By the application of 1.8.8, the applicant shall demonstrate, ensure and declare on his sole responsibility the conformity of gas cartridges with the provisions of 6.2.6 and all further applicable provisions of Annex 2 to SMGS.

1.8.8.1.3 The applicant shall

a) Carry out a design type examination of each type of gas cartridges (including materials to be used and variations of that type, e.g. volumes, pressures, drawings and closing and release devices) according to 1.8.8.2;

b) Operate an approved quality system for design, manufacture, inspection and testing according to 1.8.8.3;

c) Operate an approved testing regime according to 1.8.8.4 for the tests required in 6.2.6;

d) Apply for the approval of his quality system for supervision of manufacture and for testing to one Xa body of his choice of the SMGS Contracting State; if the applicant is not established in an SMGS Contracting State he shall apply to one Xa body of an SMGS Contracting State prior to first transport into an SMGS Contracting State;

e) If the gas cartridge is finally assembled from parts manufactured by the applicant by one or more other enterprise(s), provide written instructions how to assemble and fill the gas cartridges to meet the provisions of his type examination certificate.

1.8.8.1.4 Where the applicant and enterprises assembling or filling gas cartridges according to the instructions of the applicant, can demonstrate to the satisfaction of the Xa body conformity with the provisions of 1.8.7.7 excluding 1.8.7.7.1 d) and 1.8.7.7.2 b), they may establish an in-house inspection service which may perform part or all of the inspections and tests specified in 6.2.6.

1.8.8.2 Design type examination

1.8.8.2.1 The applicant shall establish technical documentation for each type of gas cartridges including the technical standard(s) applied. If he chooses to apply a standard not referenced in 6.2.6, he shall add the standard applied to the documentation.

1.8.8.2.2 The applicant shall retain the technical documentation together with samples of that type at the disposal of the Xa body during production and afterwards for a period of minimum five years starting from the last date of production of gas cartridges according to that type examination certificate.

1.8.8.2.3 The applicant shall after careful examination issue a design type certificate which shall be valid for a maximum period of ten years; he shall add this certificate to the documentation. This certificate authorises him to produce gas cartridges of that type for that period.

1.8.8.2.4 If within that period the relevant technical requirements of Annex 2 to SMGS (including referenced standards) have changed so that the design type is no longer in conformity with them, the applicant shall withdraw his type examination certificate and inform the Xa body.

1.8.8.2.5 The applicant may after careful and complete review reissue the certificate for another period of maximum ten years.

1.8.8.3 Supervision of manufacture

1.8.8.3.1 he procedure of design type examination as well as the manufacturing process shall be subject to a survey by the Xa body to ensure the type certified by the applicant and the product as produced are in conformity with the provisions of the design type certificate and the applicable provisions of Annex 2 to SMGS. If 1.8.8.1.3 (e) applies, the assembling and filling enterprises shall be included in that procedure.

1.8.8.3.2 The applicant shall take all the necessary measures to ensure that the manufacturing process complies with the applicable provisions of Annex 2 to SMGS and of his design type certificate and its annexes. If 1.8.8.1.3 (e) applies, the assembling and filling enterprises shall be included in that procedure.

1.8.8.8.8 The Xa body shall:

a) Verify the conformity of the design type examination of the applicant and conformity of the type of gas cartridges with the technical documentation specified in 1.8.8.2;

b) Verify that the manufacturing process produces products in conformity with the requirements and the documentation which apply to it; if the gas cartridge is finally assembled from parts manufactured by the applicant by one or more enterprise(s), the Xa body shall also verify that the gas cartridges are in full conformity with all applicable provisions after final assembly and filling and that the instructions of the applicant are correctly applied;

c) Verify that the personnel undertaking the permanent joining of parts (for example, welding) and the tests are qualified or approved;

d) Record the results of its surveys.

1.8.8.3.4 If the findings of the Xa body show non-conformity of the design type certificate of the applicant or the manufacturing process, he shall require appropriate corrective measures or withdrawal of the certificate from the applicant.

1.8.8.4 Leakproofness test

1.8.8.4.1 The applicant and enterprises finally assembling and filling gas cartridges according to the instructions of the applicant shall:

a) Carry out the tests required in 6.2.6;

b) Record the test results;

c) Issue a certificate of conformity only for gas cartridges, which are in full compliance with the provisions of his design type examination and the applicable provisions of Annex 2 to SMGS and have successfully passed the tests as required in 6.2.6;

d) Retain the documentation as specified in 1.8.8.7 during production and afterwards for a period of minimum five years from the last date of production of gas cartridges belonging to one type approval for inspection by the Xa body;

e) Affix a durable and legible mark identifying the type of gas cartridge, the applicant and the date of production or batch number; where due to limited available space the mark cannot be fully applied to the body of the gas cartridge, he shall affix a durable tag with this information to the gas cartridge or place it together with a gas cartridge in an inner packaging.

1.8.8.4.2 The Xa body shall:

a) Perform the necessary examinations and tests at random intervals, but at least shortly after starting of manufacture of a type of gas cartridges and thereafter at least once every three years, in order to verify that the procedure for design type examination of the applicant as well as that the manufacture and testing of the product are carried out in accordance with the design type certificate and the relevant provisions;

b) Check the certificates supplied by the applicant;

c) Carry out the tests as required in 6.2.6 or approve the program of testing and the in-house inspection service to carry out the tests.

1.8.8.4.3 The certificate shall contain as a minimum:

a) The name and address of the applicant and, when the final assembly is not carried out by the applicant but by an enterprise or enterprises in accordance with the written instructions of the applicant, the name(s) and address(es) of these enterprises;

b) A reference to the version of Annex 2 to SMGS and the standard(s) used for manufacture and tests;

c) The result of inspections and tests;

d) The data for marking as required in 1.8.8.4.1 (e).

1.8.8.5 (reserved)

1.8.8.6 Surveillance of the in-house inspection service

When the applicant or enterprise assembling or filling gas cartridges has established an in-house inspection service, the provisions of 1.8.7.7 excluding 1.8.7.7.1 d) and 1.8.7.7.2 b) shall be applied. The enterprise assembling or filling gas cartridges shall comply with the provisions relevant to the applicant.

1.8.8.7 Documents

The provisions of 1.8.7.8.1, 1.8.7.8.2, 1.8.7.8.3, 1.8.7.8.4 and 1.8.7.8.6 shall be applied.

CHAPTER 1.9
RESTRICTIONS ON CARRIAGE IMPOSED BY THE COMPETENT AUTHORITIES

1.9.1 An SMGS Contracting State may apply to the international carriage of dangerous goods by rail on its territory certain additional provisions not included in Annex 2 to SMGS, provided that these additional provisions

– are in accordance with 1.9.2,

– do not conflict with the provisions of 1.1.2.1 (a),

– are contained in the SMGS Contracting State's domestic legislation applying equally to the domestic carriage of dangerous goods by rail on the territory of that SMGS Contracting State,

– do not result in the prohibition of carriage by rail of the dangerous goods covered by these provisions in the whole territory of the SMGS Contracting State.

1.9.2 The additional provisions referred to in 1.9.1 are:

a) safety requirements or restrictions on carriage,

- using certain structures such as bridges or tunnels,
- using combined transport installations such as transshipment installations, or
- where the transport operation begins or ends in ports, railway stations or other transport terminals

b) provisions according to which the carriage of certain dangerous goods on sections with special and local risks is prohibited, such as sections in residential areas, environmentally sensitive areas, economic centres or industrial zones containing hazardous installations, or to which special conditions, e.g. operational measures (reduced speed, specified journey times, prohibition on trains meeting each other, etc.) apply.

1.9.3 (reserved)

1.9.4 (reserved)

1.9.5 Notwithstanding with preceding paragraphs, SMGS Contracting States may lay down specific safety requirements for the international carriage of dangerous goods by rail, in so far as SMGS does not cover that area, in particular as regards:

- the running of trains;
- operating rules for operations ancillary to transport such as marshalling and stabling;
- management of information concerning the dangerous goods transported.

These specific requirements shall not concern the areas covered by Annex 2 to SMGS, in particular those listed in 1.1.2.1 a) and 1.1.2.1 b)

CHAPTER 1.10 SECURITY PROVISIONS [6]

Note: *For the purposes of this Chapter the term "security" means measures to be taken against danger to human life and health as well as against danger to the environment resulting from willful misconduct or acts of terror.*

1.10.1 GENERAL PROVISIONS

1.10.1.1 All persons engaged in the carriage of dangerous goods shall consider the security requirements set out in this Chapter commensurate with their responsibilities.

1.10.1.2 Dangerous goods shall only be offered for carriage to carriers that have been appropriately identified.

1.10.1.3 Areas within temporary storage terminals, temporary storage sites, vehicle depots, berthing areas and marshalling yards used for temporary storage during carriage of dangerous goods shall be properly secured, well lit and, where possible and appropriate, not accessible to the general public.

1.10.1.4 Each crew member of a train carrying dangerous goods shall carry with them means of identification, which includes their photograph, during carriage.

1.10.1.5 Safety inspections in accordance with 1.8.1 shall cover appropriate implementation of security measures.

1.10.1.6 (reserved)

1.10.2 SECURITY TRAINING

1.10.2.1 The training and the refresher training specified in Chapter 1.3 shall also include elements of security awareness. The security refresher training need not be linked to regulatory changes only.

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

1.10.2.3 Such training shall be provided or verified upon employment in a position involving dangerous goods trans- port and shall be periodically supplemented with refresher training.

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

1.10.3 PROVISIONS FOR HIGH CONSEQUENCE DANGEROUS GOODS

Note: *In addition to the security provisions of Annex 2 to SMGS, competent authorities may implement further security provisions for reasons other than safety during carriage. In order not to impede international and multimodal carriage by different explosives security marks, it is recommended that such marks be formatted*

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[6] *Provisions of Chapter 1.10 shall be applied so far as it is authorized by national law.*

consistent with an internationally harmonized standard (See also the document No 6 of the List).

1.10.3.1 ***Definition of high consequence dangerous goods***

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

1.10.3.1.2 High consequence dangerous goods in classes other than Class 7 are those listed in Table 1.10.3.1.2 below and carried in quantities greater than those indicated therein.

Table 1.10.3.1.2: List of high consequence dangerous goods

Class	Subclass	Substance or article	Quantity		
			Tank[a)] (l)	Bulk [б)] (kg)	Packages (kg)
1	1.1	Explosive substances and material	*Shall not be transported*	*Shall not be transported*	0
	1.2	Explosive substances and material	*Shall not be transported*	*Shall not be transported*	0
	1.3	Explosive substances and material , Compatibility group C	*Shall not be transported*	*Shall not be transported*	0
	1.4	Explosive substances and material UN Nos.0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456, 0500, 0512 and 0513.	*Shall not be transported*	*Shall not be transported*	0
	1.5	Explosive substances	0	*Shall not be transported*	0
	1.6	Explosive substances and articles	Shall not be transported	Shall not be ransported	0
2		Flammable, non-toxic gases (classification codes including only letters F or FC)	3 000	*Shall not be transported*	*Shall not be limited*
		Toxic gases (classification codes including letters T, TF, TC, TO, TFC or TOC) excluding aerosols	0	*Shall not be transported*	0
3		Flammable liquids of packing groups I and II	3 000	*Shall not be transported*	*Shall not be limited*
		Desensitized explosive substances	0	*Shall not be transported*	*0*
4.1		Desensitized explosive substances	*Shall not be transported*	*Shall not be transported*	*0*
4.2		Packing group I substances	*3 000*	*Shall not be transported*	*Shall not be limited*
4.3		Packing group I substances	*3 000*	*Shall not be transported*	*Shall not be limited*
5.1		Oxidizing liquids of packing group I	*3 000*	*Shall not be transported*	*Shall not be limited*

		Perchlorates, ammonium nitrate, ammonium nitrate fertilisers and ammonium nitrate emulsions or suspensions or gels	*3 000*	*3 000*	*Shall not be limited*
6.1		Toxic substances of packing group I	*0*	*Shall not be transported*	*0*
6.2		Infectious substances of Category A (UN Nos. 2814 and 2900, except for animal material) and medical waste of Category A (UN No. 3549)	*Shall not be transported*	*0*	*0*
8		Corrosive substances of packing group I	*3 000*	*Shall not be transported*	*Shall not be limited*

«0» - The requirements of 1.10.3 shall be met, despite the quantity of the goods to be transported;

«3000» - the requirements of 1.10.3 shall be met if 3000 or more are transported;

«Shall not be transported» – this method of carriage is not allowed;

«Shall not be limited» - the requirements of 1.10.3 do not apply if such a method of transport is implemented;

«a)» A value indicated in this column is applicable only if carriage in tanks is authorized, in accordance with Chapter 3.2, Table A, column (10) or (12). For substances that are not authorized for carriage in tanks, the instruction in this column is not relevant (Carriage of these goods is prohibited).

«b)□□» A value indicated in this column is applicable only if carriage in bulk is authorized, in accordance with Chapter 3.2, Table A, column (10) or (17). For substances that are not authorized for carriage in bulk, the instruction in this column is not relevant.

1.10.3.1.3 For dangerous goods of Class 7, high consequence radioactive material is that with an activity equal to or greater than a transport security threshold of 3 000 A2 per single package (see also 2.2.7.2.2.1) except for the following radionuclides where the transport security threshold is given in Table 1.10.3.1.3 below.

Table 1.10.3.1.3
Transport security thresholds for specific radionuclides

Element	***Radionuclide***	***Transport security thresholds (TBq)***
Americium	Am-241	0,6
Gold	Au-198	2
Cadmium	Cd-109	200
Californium	Cf-252	0,2
Curium	Cm-244	0,5
Cobalt	Co-57	7

Cobalt	Co-60	0,3
Caesium	Cs-137	1
Iron	Fe-55	8000
Germanium	Ge-68	7
Gadolinium	Gd-153	10
Iridium	Ir-192	0,8
Nickel	Ni-63	600
Palladium	Pd-103	900
Promethium	Pm-147	400
Polonium	Po-210	0,6
Plutonium	Pu-238	0,6
Plutonium	Pu-239	0,6
Radium	Ra-226	0,4
Ruthenium	Ru-106	3
Selenium	Se-75	2
Strontium	Sr-90	10
Thallium	Tl-204	200
Thulium	Tm-170	200
Ytterbium	Yb-169	3

1.10.3.1.4 For mixtures of radionuclides, determination of whether or not the transport security threshold has been met or exceeded can be calculated by summing the ratios of activity present for each radionuclide divided by the transport security threshold for that radionuclide. If the sum of the fractions is less than 1, then the radioactivity threshold for the mixture has not been met or exceeded.

This calculation can be made with the formula:

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

where

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

Ti = transport security threshold for radionuclide i (TBq).

1.10.3.1.5 When radioactive material possesses subsidiary hazards of other classes, the criteria of table 1.10.3.1.2 shall also be taken into account (see also 1.7.5).

1.10.3.2 Security plans

1.10.3.2.1 Carriers, consignors and other participants specified in 1.4.2 and 1.4.3 engaged in the carriage of high con- sequence dangerous goods (see Table 1.10.3.1.2) or high consequence radioactive material (see 1.10.3.1.3) shall adopt, implement and comply with a security plan that addresses at least the elements specified in 1.10.3.2.2.

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

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

(b) records of dangerous goods or types of dangerous goods concerned;

(c) review of current operations and assessment of security risks, including any stops necessary to the transport operation, the keeping of dangerous goods in the wagon, tank or container before, during and after the journey and the intermediate temporary storage of dangerous goods during the course of intermodal transfer or transshipment between units, as appropriate;

(d) clear statement of measures that are to be taken to reduce security risks, commensurate with the re- sponsibilities and duties of the participant, including:

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

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

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

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

(h) measures to ensure that the distribution of information relating to the transport operation contained in the security plan is limited to those who need to have it. Such measures shall not preclude the provision of information required elsewhere in Annex 2 to SMGS.

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

1.10.3.3 Devices, equipment or arrangements to prevent the theft of the train or wagon carrying high consequence dangerous goods (see Table 1.10.3.1.2) or high consequence radioactive material (see 1.10.3.1.3) and its cargo, shall be applied and measures taken to ensure that these are operational and effective at all times. The application of these protective measures shall not jeopardize emergency response.

Note: *When appropriate and already fitted, the use of transport telemetry or other tracking methods or devices should be used to monitor the movement of high consequence dangerous goods (see Table 1.10.3.1.2) or high consequence radioactive material (see 1.10.3.1.3).*

1.10.4 The provisions of 1.10.1, 1.10.2 and 1.10.3 do not apply when the quantities carried in packages in a wagon or large container do not exceed those referred to in 1.1.3.6.3, except for goods of Class 1 (in accordance with 1.10.3.1) and except for UN numbers 2910 and 2911 if the activity level exceeds the A2 value. In addition, the provisions of 1.10.1, 1.10.2 and 1.10.3 do not apply when the quantities carried in tanks or in bulk in a wagon or container do not exceed those referred to in 1.1.3.6.3. In addition the provisions of this Chapter do not apply to the carriage of UN No. 2912 RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I) and UN No. 2913 RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I).

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

CHAPTER 1.11
INTERNAL EMERGENCY PLANS FOR MARSHALLING YARDS

Internal emergency plans shall be drawn up for the carriage of dangerous goods in marshalling yards.

The aim of emergency plans shall be that in the event of an accident or incident in marshalling yards, all those involved shall co-operate in a co-ordinated way and the consequences of the accident or incident for human life or for the environment shall be minimised to the greatest possible extent.

PART 2
CLASSIFICATION

CHAPTER 2.1
GENERAL PROVISIONS

2.1.1 INTRODUCTION

2.1.1.1 The classes of dangerous goods according to Annex 2 to SMGS are the following:

Class 1 Explosive substances and articles

Class 2 Gases

Class 3 Flammable liquids

Class 4.1 Flammable solids, self-reactive substances, polymerizing substancesand solid desensitized explosives

Class 4.2 Substances liable to spontaneous combustion

Class 4.3 Substances which, in contact with water, emit flammable gases

Class 5.1 Oxidizing substances

Class 5.2 Organic peroxides

Class 6.1 Toxic[1] (poisonous) substances

Class 6.2 Infectious substances

Class 7 Radioactive material

Class 8 Corrosive[1] (caustic) substances

Class 9 Miscellaneous dangerous substances and articles

2.1.1.2 Each entry in the different classes has been assigned a UN number. The following types of entries are used:

A. Single entries for well defined substances or articles including entries for substances covering several isomers, e.g.:

UN No. 1090 ACETONE

UN No. 1104 AMYL ACETATES

UN No. 1194 ETHYL NITRITE SOLUTION

B. Generic entries for a well defined group of substances or articles, which are not n.o.s. entries, e.g.:

UN No. 1133 ADHESIVES

UN No. 1266 PERFUMERY PRODUCTS

UN No. 2757 CARBAMATE PESTICIDE, SOLID, TOXIC

UN No. 3101 ORGANIC PEROXIDE TYPE B, LIQUID

C. Specific n.o.s. entries covering a group of substances or articles of a particular chemical or technical nature, not otherwise specified, e.g.:

UN No. 1477 NITRATES, INORGANIC, N.O.S.

UN No. 1987 ALCOHOLS, N.O.S.Г.

D. General n.o.s. entries covering a group of substances or articles having one or more dangerous properties, not otherwise specified. e.g.:

[1] In the text of the rules, along with the terms “poisonous” and “caustic”, the terms “toxic” and “corrosive” are used, respectively.

UN No. 1325 FLAMMABLE SOLID, ORGANIC, N.O.S.

UN No. 1993 FLAMMABLE LIQUID, N.O.S.

The entries defined under B., C. and D. are defined as collective entries.

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

– Packing group I: Substances presenting high danger;

– Packing group II: Substances presenting medium danger;

– Packing group III: Substances presenting low danger.

The packing group(s) to which a substance is assigned is (are) indicated in Table A of Chapter 3.2.

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

2.1.2 PRINCIPLES OF CLASSIFICATION

2.1.2.1 The dangerous goods covered by the heading of a class are defined on the basis of their properties according to sub-section 2.2.x.1 of the relevant class. Assignment of dangerous goods to a class and a packing group is made according to the criteria mentioned in the same sub-section 2.2.x.1. Assignment of one or several subsidiary risk(s) to a dangerous substance or article is made according to the criteria of the class or classes corresponding to those risks, as mentioned in the appropriate sub-section(s) 2.2.x.1.

2.1.2.2 All dangerous goods entries are listed in Table A of Chapter 3.2 in the numerical order of their UN Number. This table contains relevant information on the goods listed, such as name, class, packing group(s), label(s) to be affixed, packing and carriage provisions[2]. The substances listed by name in column (2) of Table A of Chapter 3.2 shall be carried according to their classification in Table A or under the conditions specified in 2.1.2.8.

2.1.2.3 A substance may contain technical impurities (for example those deriving from the production process) or additives for stability or other purposes that do not affect their classification. However, a substance mentioned by name, i.e. listed as a single entry in Table A of Chapter 3.2, containing technical impurities or additives for stability or other purposes affecting its classification shall be considered a solution or mixture (see 2.1.3.3).

2.1.2.4 Dangerous goods which are listed or defined in sub-section 2.2.x.2 of each class are not to be accepted for carriage.

2.1.2.5 Goods not mentioned by name, i.e. goods not listed as single entries in Table A of Chapter 3.2 and not listed or defined in one of the above-mentioned sub-sections 2.2.x.2 shall be assigned to the relevant class in accordance with the procedure of section 2.1.3. In addition, the subsidiary risk (if any) and the packing group (if any) shall be determined. Once the class, subsidiary risk (if any) and packing group (if any) have been established the relevant UN number shall be determined. The decision trees in sub-sections 2.2.x.3 (list of collective entries) at the end of each class indicate the relevant parameters for selecting the relevant collective entry (UN number). In all cases the most specific collective entry covering the properties of the substance or article shall be selected, according to the hierarchy indicated in 2.1.1.2 by the letters B, C and D respectively. If the substance or article cannot be classified under entries of type B or C according to 2.1.1.2, then, and only then shall it be classified under an entry of type D.

2.1.2.6 On the basis of the test procedures of Chapter 2.3 and the criteria set out in sub-sections 2.2.x.1 of classes when it is so specified, it may be determined that a substance, solution or mixture of a certain class, mentioned by name in Table A of Chapter 3.2, does not

[2] *An alphabetical list of these entries is given in table B of Chapter 3.2.*

meet the criteria of that class. In such a case, the substance, solution or mixture is deemed not to belong to that class.

2.1.2.7 For the purposes of classification, substances with a melting point or initial melting point of 20 °C or lower at a pressure of 101.3 kPa shall be considered to be liquids. A viscous substance for which a specific melting point cannot be determined shall be subjected to the ASTM D 4359-90 test or to the test for determining fluidity (penetrometer test) prescribed in 2.3.4.

2.1.2.8 A consignor who has identified, on the basis of test data, that a substance listed by name in column (2) of Table A of Chapter 3.2 meets classification criteria for a class that is not identified in column (3a) or (5) of Table A of Chapter 3.2, may, with the approval of the competent authority, consign the substance:

- Under the most appropriate collective entry listed in sub-sections 2.2.x.3 reflecting all hazards; or
- Under the same UN number and name but with additional hazard communication information as appro-priate to reflect the additional subsidiary hazard(s) (documentation, label, placard) provided that the class remains unchanged and that any other carriage conditions (e.g. limited quantity, packaging and tank provisions) that would normally apply to substances possessing such a combination of hazards are the same as those applicable to the substance listed.

Note 1: *The competent authority granting the approval may be the competent authority of any SMGS Contracting State who may also recognize an approval granted by the competent authority of a country which is not an SMGS Contracting State provided that this approval has been granted in accordance with the procedures applicable according to Annex 2 to SMGS, RID, ADR, ADN, the IMDG Code or the ICAO Technical Instructions.*

Note 2: *When a competent authority grants such approvals, it should inform the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods accordingly and submit a relevant proposal of amendment to the Dangerous Goods List of the UN Model Regulations. Should the proposed amendment be rejected, the competent authority should withdraw its approval.*

Note 3: *For carriage in accordance with 2.1.2.8, see also 5.4.1.1.20.*

2.1.3 CLASSIFICATION OF SUBSTANCES, INCLUDING SOLUTIONS AND MIXTURES (SUCH AS PREPARATION AND WASTES), NOT MENTIONED VBY NAME IN TABLE A OF CHAPTER 3.2

2.1.3.1 Substances including solutions and mixtures not mentioned by name in Table A shall be classified according to their degree of danger on the basis of the criteria mentioned in sub-section 2.2.x.1 of the various classes. The danger(s) presented by a substance shall be determined on the basis of its physical and chemical characteristics and physiological properties. Such characteristics and properties shall also be taken into account when such experience leads to a more stringent assignment.

2.1.3.2 A substance not mentioned by name in Table A of Chapter 3.2 presenting a single hazard shall be classified in the relevant class under a collective entry listed in sub-section 2.2.x.3 of that class.

2.1.3.3 A solution or mixture meeting the classification criteria of Annex 2 to SMGS composed of a single predominant substance mentioned by name in Table A of Chapter 3.2 and one or more substances not subject to Annex 2 to SMGS or traces of one or more substances mentioned by name in Table A of Chapter 3.2, shall be assigned the UN number and proper shipping name of the predominant substance mentioned by name in Table A of Chapter 3.2 unless:

a) The solution or mixture is mentioned by name in Table A of Chapter 3.2;

b) The name and description of the substance mentioned by name in Table A of Chapter 3.2 specifically indicate that they apply only to the pure substance;

c) The class, classification code, packing group, or physical state of the solution or mixture is different from that of the substance mentioned by name in Table A of Chapter 3.2; or

d) The hazard characteristics and properties of the solution or mixture necessitate emergency response measures that are different from those required for the substance mentioned by name in Table A of Chapter 3.2.

In those other cases, except the one described in (a), the solution or mixture shall be classified as a sub- stance not mentioned by name in the relevant class under a collective entry listed in sub-section 2.2.x.3 of that class taking account of the subsidiary hazards presented by that solution or mixture, if any, unless the solution or mixture does not meet the criteria of any class, in which case it is not subject to Annex 2 to SMGS

2.1.3.4 Solutions and mixtures containing a substance belonging to one of the entries mentioned in 2.1.3.4.1 or 2.1.3.4.2 shall be classified in accordance with the provisions of these paragraphs.

2.1.3.4.1 Solutions and mixtures containing one of the following substances mentioned by name shall always be classified under the same entry as the substance they contain, provided they do not have the hazard characteristics as indicated in 2.1.3.5.3:

- Class 3

UN 1921 PROPYLENEIMINE, STABILIZED

UN 3064 NITROGLYCERIN SOLUTION IN ALCOHOL with more than 1% but not more than 5% nitroglycerin

- Class 6.1

UN 1051 HYDROGEN CYANIDE, STABILIZED, containing less than 3% water

UN 1185 ETHYLENEIMINE, STABILIZED

UN 1259 NICKEL CARBONYL

UN 1613 HYDROCYANIC ACID, AQUEOUS SOLUTION (HYDROGEN CYANIDE, AQUEOUS SOLUTION), with not more than 20% hydrogen cyanide

UN 1614 HYDROGEN CYANIDE, STABILIZED, containing not more than 3% water and absorbed in a porous inert material

UN 1994 IRON PENTACARBONYL

UN 2480 METHYL ISOCYANATE

UN 2481 ETHYL ISOCYANATE

UN 3294 HYDROGEN CYANIDE, SOLUTION IN ALCOHOL, with not more than 45% hydrogen cyanide

- Class 8

UN 1052 HYDROGEN FLUORIDE, ANHYDROUS

UN 1744 BROMINE or UN 1744 BROMINE SOLUTION

UN 1790 HYDROFLUORIC ACID with more than 85% hydrogen fluoride

UN 2576 PHOSPHORUS OXYBROMIDE, MOLTEN

2.1.3.4.2 Solutions and mixtures containing a substance belonging to one of the following entries of Class 9:

UN 2315 POLYCHLORINATED BIPHENYLS, LIQUID;

UN 3151 POLYHALOGENATED BIPHENYLS, LIQUID or

UN 3151 HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUID or

UN 3151 POLYHALOGENATED TERPHENYLS, LIQUID;

UN 3152 POLYHALOGENATED BIPHENYLS, SOLID or

UN 3152 HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLID or

UN 3152 POLYHALOGENATED TERPHENYLS, SOLID

shall always be classified under the same entry of Class 9, provided that:

– they do not contain any additional dangerous component other than components of packing group III of classes 3, 4.1, 4.2, 4.3, 5.1, 6.1 or 8; and

– they do not have the hazard characteristics as indicated in 2.1.3.5.3.

2.1.3.4.3 Used articles, e.g. transformers and condensers, containing a solution or mixture mentioned in 2.1.3.4.2 shall always be classified under the same entry of Class 9, provided:

a) they do not contain any additional dangerous components, other than polyhalogenated dibenzodioxins and dibenzofurans of Class 6.1 or components of packing group III of Class 3, 4.1, 4.2, 4.3, 5.1, 6.1 or 8; and

b) they do not have the hazard characteristics as indicated in 2.1.3.5.3 (a) to (g) and (i).

2.1.3.5 Substances not mentioned by name in Table A of Chapter 3.2, having more than one hazard characteristic and solutions or mixtures meeting the classification criteria of Annex 2 to SMGS and containing several dangerous substances shall be classified under a collective entry (see 2.1.2.5) and packing group of the appropriate class in accordance with their hazard characteristics. Such classification according to the hazard characteristics shall be carried out as follows (See 2.1.3.5.1 – 2.1.3.5.5):

2.1.3.5.1 The physical and chemical characteristics and physiological properties shall be determined by measurement or calculation and the substance, solution or mixture shall be classified according to the criteria mentioned in sub-section 2.2.x.1 of the various classes.

2.1.3.5.2 If this determination is not possible without disproportionate cost or effort (as for some kinds of wastes), the substance, solution or mixture shall be classified in the class of the component presenting the major hazard

2.1.3.5.3 If the hazard characteristics of the substance, solution or mixture fall within more than one class or group of substances listed below then the substance, solution or mixture shall be classified in the class or group of substances corresponding to the major hazard on the basis of the following order of precedence:

a) Material of Class 7 (apart from radioactive material in excepted packages for which, except for UN 3507 URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, special provision 290 of Chapter 3.3 applies, where the other hazardous properties take precedence);

b) Substances of Class 1;

c) Substances of Class 2;

d) Liquid desensitized explosives of Class 3;

e) Self-reactive substances and solid desensitized explosives of Class 4.1;

f) Pyrophoric substances of Class 4.2;

g) Substances of Class 5.2;

h) Substances of Class 6.1 meeting the inhalation toxicity criteria of packing group I

Note: *Substances meeting the classification criteria of Class 8 and having an inhalation toxicity of dust and mist (LC50) in the range of packing group I and a toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to Class 8*

i) Infectious substances of Class 6.2.

2.1.3.5.4 If the hazard characteristics of the substance fall within more than one class or group of substances not listed in 2.1.3.5.3 above, the substance shall be classified in accordance with the same procedure but the relevant class shall be selected according to the precedence of hazards table in 2.1.3.10.

2.1.3.5.5 If the substance to be carried is a waste, with a composition that is not precisely known, its assignment to a UN number and packing group in accordance with 2.1.3.5.2 may be based on the consignor's knowledge of the waste, including all available technical and safety data as requested by safety and environmental legislation in force[3].

In case of doubt, the highest danger level shall be taken.

If however, on the basis of the knowledge of the composition of the waste and the physical and chemical properties of the identified components, it is possible to demonstrate that the properties of the waste do not correspond to the properties of the packing group I level, the waste may be classified by default in the most appropriate n.o.s. entry of packing group II. However, if it is known that the waste possesses only environmentally hazardous properties, it may be assigned to packing group III under UN Nos. 3077 or 3082.

This procedure may not be used for wastes containing substances mentioned in 2.1.3.5.3, substances of Class 4.3, substances of the case mentioned in 2.1.3.7 or substances which are not accepted for carriage in accordance with 2.2.x.2.

2.1.3.6 The most specific applicable collective entry (see 2.1.2.5) shall always be used, i.e. a general n.o.s. entry shall only be used if a generic entry or a specific n.o.s. entry cannot be used.

2.1.3.7 Solutions and mixtures of oxidizing substances or substances with an oxidizing subsidiary risk may have explosive properties. In such a case they are not to be accepted for carriage unless they meet the requirements for Class 1. For solid ammonium nitrate based fertilizers, see also 2.2.51.2.2, thirteenth and fourteenth indent and Manual of Tests and Criteria, Part III, Section 39.

2.1.3.8 Substances of classes 1 to 6.2, 8 and 9, other than those assigned to UN Nos. 3077 and 3082, meeting the criteria of 2.2.9.1.10 are additionally to their hazards of classes 1 to 6.2, 8 and 9 considered to be environ- mentally hazardous substances. Other substances meeting the criteria of no other class or of no other substance of Class 9, but those of 2.2.9.1.10 are to be assigned to UN Nos. 3077 and 3082 as appropriate.

2.1.3.9 Wastes which do not meet the criteria for classification in classes 1 to 9 but are covered by the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal may be carried under UN Nos. 3077 or 3082.

[3] *Such legislation is for instance the Regulation listed in the documents Nos. 7 and 8 of the List.*

2.1.3.10 Table of precedence of hazards

Class and packing grou	4.1 (II)	4.1 (III)	4.2 (II)	4.2 (III)	4.3 (I)	4.3 (II)	4.3 (III)	5.1 (I)	5.1 (II)	5.1 (III)	6.1 (I) DERMAL	6.1 (I) ORAL	6.1 (II)	6.1 (III)	8 (I)	8 (II)	8 (III)	9
3 (I)	SOL LIQ 4.1 3(I)	SOL LIQ 4.1 3(I)	SOL LIQ 4.2 3(I)	SOL LIQ 4.2 3(I)	4.3 (I)	4.3 (I)	4.3 (I)	SOL LIQ 5.1(I) 3(I)	SOL LIQ 5.1(I) 3(I)	SOL LIQ 5.1(I) 3(I)	3 (I)	3 (I)	3 (I)	3 (I)	3 (I)	3 (I)	3 (I)	3 (I)
3 (II)	SOL LIQ 4.1 3(II)	SOL LIQ 4.1 3(II)	SOL LIQ 4.2 3(II)	SOL LIQ 4.2 3(II)	4.3 (I)	4.3 (II)	4.3 (II)	SOL LIQ 5.1(I) 3(I)	SOL LIQ 5.1(II) 3(II)	SOL LIQ 5.1(II) 3(II)	3 (I)	3 (I)	3 (II)	3 (II)	8 (I)	3 (II)	3 (II)	3 (II)
3 (III)	SOL LIQ 4.1 3(II)	SOL LIQ 4.1 3(III)	SOL LIQ 4.2 3(II)	SOL LIQ 4.2 3(III)	4.3 (I)	4.3 (II)	4.3 (III)	SOL LIQ 5.1(I) 3(I)	SOL LIQ 5.1(II) 3(II)	SOL LIQ 5.1(III) 3(III)	6.1 (I)	6.1 (I)	6.1 (II)	3 (III) */	8 (I)	8 (II)	3 (III)	3 (III)
4.1 (II)			4.2 (II)	4.2 (II)	4.3 (I)	4.3 (II)	4.3 (II)	5.1(I)	4.1 (II)	4.1 (II)	6.1 (I)	6.1 (I)	SOL LIQ 4.1(II) 6.1(II)	SOL LIQ 4.1(II) 6.1(II)	8 (I)	SOL LIQ 4.1(II) 8(II)	SOL LIQ 4.1(II) 8(II)	4.1 (II)
4.1 (III)			4.2 (II)	4.2 (III)	4.3 (I)	4.3 (II)	4.3 (III)	5.1(I)	4.1 (II)	4.1 (III)	6.1 (I)	6.1 (I)	6.1 (II)	SOL LIQ 4.1(III)6.1(III)	8 (I)	8 (II)	SOL LIQ 4.1(III) 8(III)	4.1 (III)
4.2 (II)					4.3 (I)	4.3 (II)	4.3 (II)	5.1(I)	4.2 (II)	4.2 (II)	6.1 (I)	6.1 (I)	4.2 (II)	4.2 (II)	8 (I)	4.2 (II)	4.2 (II)	4.2 (II)
4.2 (III)					4.3 (I)	4.3 (II)	4.3 (III)	5.1(I)	5.1 (II)	4.2 (III)	6.1 (I)	6.1 (I)	6.1 (II)	4.2 (III)	8 (I)	8 (II)	4.2 (III)	4.2 (III)
4.3 (I)								5.1(I)	4.3 (I)	4.3 (I)	6.1 (I)	4.3 (I)	4.3 (I)	4.3 (I)	4.3 (I)	4.3 (I)	4.3 (I)	4.3 (I)
4.3 (II)								5.1(I)	4.3 (II)	4.3 (II)	6.1 (I)	4.3 (I)	4.3 (II)	4.3 (II)	8 (I)	4.3 (II)	4.3 (II)	4.3 (II)
4.3 (III)								5.1(I)	5.1 (II)	4.3 (III)	6.1 (I)	6.1 (I)	6.1 (II)	4.3 (III)	8 (I)	8 (II)	4.3 (III)	4.3 (III)
5.1 (I)											5.1 (I)	5.1 (I)	5.1 (I)	5.1 (I)	5.1 (I)	5.1 (I)	5.1 (I)	5.1 (I)
5.1 (II)											6.1 (I)	5.1 (I)	5.1 (II)	5.1 (II)	8 (I)	5.1 (II)	5.1 (II)	5.1 (II)
5.1 (III)											6.1 (I)	6.1 (I)	6.1 (II)	5.1 (III)	8 (I)	8 (II)	5.1 (III)	5.1 (III)
6.1 (I) DERMAL															SOL LIQ 6.1(I) 8(I)	6.1 (I)	6.1 (I)	6.1 (I)
6.1 (I) ORAL															SOL LIQ 6.1(I) 8(I)	6.1 (I)	6.1 (I)	6.1 (I)
6.1 (II) INHAL															SOL LIQ 6.1(I) 8(I)	6.1 (II)	6.1 (II)	6.1 (II)
6.1 (II) DERMAL															SOL LIQ 6.1(I) 8(I)	SOL LIQ 6.1(II) 8(II)	6.1 (II)	6.1 (II)
6.1 (II) ORAL			SOL - Solid substances and mixtures; LIQ - Liquid substances, mixtures and solutions; DERMAL - Dermal toxicity – toxic effect (by absorption through the undamaged skin); ORAL - Oral toxicity – toxic effect (by ingesting); INHAL - Inhalation toxicity – toxic effect by breathing; */ - Class 6.1 for pesticides												8 (I)	SOL LIQ 6.1(II) 8(II)	6.1 (II)	6.1 (II)
6.1 (III)															8 (I)	8 (II)	8 (III)	6.1 (III)
8 (I)																		8 (I)
8 (II)																		8 (II)
8 (III)																		8 (III)

Note 1: *Examples to explain the use of the table*

Classification of a single substance

Description of the substance to be classified:

An amine not mentioned by name meeting the criteria for Class 3, packing group II as well as those for Class 8, packing group I.

Procedure:

The intersection of line 3 II with column 8 I gives 8 I. This amine has therefore to be classified in Class 8 under UN No. 2734 AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S. or UN No. 2734 POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S., packing group I.

Classification of mixture

Description of the mixture to be classified:

Mixture consisting of a flammable liquid classified in Class 3, packing group III, a toxic substance in Class 6.1, packing group II and a corrosive substance in Class 8, packing group I.

Procedure:

The intersection of line 3 III with column 6.1 II gives 6.1 II.

The intersection of line 6.1 II with column 8 I gives 8 I LIQ.

This mixture not further defined has therefore to be classified in Class 8 under UN No. 2922 CORROSIVE LIQUID, TOXIC, N.O.S., packing group I.

Note 2: *Examples for the classification of mixtures and solutions under a class and a packing group:*

A phenol solution of Class 6.1, (II), in benzene of Class 3, (II) is to be classified in Class 3, (II); this solution is to be classified under UN No. 1992 FLAMMABLE LIQUID, TOXIC, N.O.S., Class 3, (II), by virtue of the toxicity of the phenol.

A solid mixture of sodium arsenate of Class 6.1, (II) and sodium hydroxide of Class 8, (II) is to be classified under UN No. 3290 TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S., in Class 6.1 (II).

A solution of crude or refined naphthalene of Class 4.1, (III) in petrol of Class 3, (II), is to be classified under UN No. 3295 HYDROCARBONS, LIQUID, N.O.S. in Class 3, (II).

A mixture of hydrocarbons of Class 3, (III), and of polychlorinated biphenyls (PCB) of Class 9, (II), is to be classified under UN No. 2315 POLYCHLORINATED BIPHENYLS, LIQUID or UN No. 3432 POLYCHLORINATED BIPHENYLS, SOLID in Class 9, (II).

A mixture of propyleneimine of Class 3, and polychlorinated biphenyls (PCB) of Class 9, (II), is to be classified under UN No. 1921 PROPYLENEIMINE, INHIBITED in Class 3.

2.1.4 CLASSIFICATION OF SAMPLES

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

a) the classification criteria of Chapter 2.2; and

b) the requirements of this Chapter.

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

Where this provision is used the proper shipping name shall be supplemented with the word "SAMPLE" (e.g., "FLAMMABLE LIQUID, N.O.S., SAMPLE"). In certain instances, where a specific proper shipping name is provided for a sample of a substance considered to meet certain classification criteria (e.g., GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, UN No. 3167) that proper shipping name shall be used. When an N.O.S. entry is used to carry the sample, the proper shipping name need not be supplemented with the technical name as required by special provision 274 of Chapter 3.3.

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

a) The substance is not considered to be a substance not accepted for carriage by sub-sections 2.2.x.2 of Chapter 2.2 or by Chapter 3.2;

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

c) The substance is in compliance with 2.2.41.1.15 or 2.2.52.1.9 if it is a self-reactive substance or an organic peroxide, respectively;

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

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

2.1.4.3 ***Samples of energetic materials for testing purposes***

2.1.4.3.1 Samples of organic substances carrying functional groups listed in Tables A6.1 and/or A6.3 in Appendix 6 (Screening Procedures) of the Manual of Tests and Criteria may be carried under UN No. 3224 (self-reactive solid type C) or UN No. 3223 (self-reactive liquid type C), as applicable, of Class 4.1 provided that:

a) The samples do not contain any:

1) Known explosives;

2) Substances showing explosive effects in testing;

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

4) Components consisting of synthetic precursors of intentional explosives;

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

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

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

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

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

e) The sample is packed in accordance with packing instruction P 520 and special packing provisions PP 94 or PP 95 of 4.1.4.1, as applicable.

2.1.5 Classification of articles as articles containing dangerous goods, n.o.s.

Note: *For articles which do not have a proper shipping name and which contain only dangerous goods within the permitted limited quantity amounts specified in Column (7a) of Table A of Chapter 3.2, UN No. 3363 and special provisions 301 and 672 of Chapter 3.3 may be applied.*

2.1.5.1 Articles containing dangerous goods may be classified as otherwise provided by Annex 2 to SMGS under the proper shipping name for the dangerous goods they contain or in accordance with this section.

For the purposes of this section "article" means machinery, apparatus or other devices containing one or more dangerous goods (or residues thereof) that are an integral element of the article, necessary for its functioning and that cannot be removed for the purpose of carriage.

An inner packaging shall not be an article.

2.1.5.2 Such articles may in addition contain batteries. Lithium batteries that are integral to the article shall be of a type proven to meet the testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3, except when otherwise specified by Annex 2 to SMGS (e.g. for pre-production prototype articles containing lithium batteries or for a small production run, consisting of not more than 100 such articles).

2.1.5.3 This section does not apply to articles for which a more specific proper shipping name already exists in Table A of Chapter 3.2.

2.1.5.4 This section does not apply to dangerous goods of Class 1, Class 6.2, Class 7 or radioactive material contained in articles. However, this section applies to articles containing explosives which are excluded from Class 1 in accordance with 2.2.1.1.8.2.

2.1.5.5 Articles containing dangerous goods shall be assigned to the appropriate Class determined by the hazards present using, where applicable, the Table of precedence of hazard in 2.1.3.10 for each of the dangerous goods contained in the article. If dangerous goods classified as Class 9 are contained within the article, all other dangerous goods present in the article shall be considered to present a higher hazard.

2.1.5.6 Subsidiary hazards shall be representative of the primary hazards posed by the other dangerous goods contained within the article. When only one item of dangerous goods is present in the article, the subsidiary hazard(s), if any, shall be the subsidiary hazard(s) identified by the subsidiary hazard label(s) in column (5) of Table A of Chapter 3.2. If the article contains more than one item of dangerous goods and these could react dangerously with one another during carriage, each of the dangerous goods shall be enclosed sepa-rately (see 4.1.1.6).

2.1.6 Classification of packagings, discarded, empty, uncleaned

Empty uncleaned packagings, large packagings or IBCs, or parts thereof, carried for disposal, recycling or recovery of their material, other than reconditioning, repair, routine maintenance, remanufacturing or reuse, may be assigned to UN 3509 if they meet the requirements for this entry.

CHAPTER 2.2

CLASS SPECIAL PROVISIONS

2.2.1 CLASS 1 EXPLOSIVE SUBSTANCES AND ARTICLES

2.2.1.1 Criteria

2.2.1.1.1 The heading of Class 1 covers:

a) Explosive substances: solid or liquid substances (or mixtures of substances) capable by chemical reaction of producing gases at such a temperature and pressure and at such a speed as to cause damage to the surroundings.

Pyrotechnic substances: substances or mixtures of substances designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonating self-sustaining exothermic chemical reactions..

Note 1: *Substances which are not themselves explosive but which may form an explosive mixture of gas, vapour or dust are not substances of Class 1.*

Note 2: *Also excluded from Class 1 are:*

- *water- or alcohol-wetted explosives of which the water or alco- hol content exceeds the limits specified,*
- *those explosive containing plasticizers, assigned to Class 3 or Class 4.1,*
- *as well as those explosives which, on the basis of their predominant hazard, are assigned to Class 5.2.*

b) Explosive articles: articles containing one or more explosive or pyrotechnic substances.

Note: *Devices containing explosive or pyrotechnic substances in such small quantity or of such a character that their inadvertent or accidental ignition or initiation during carriage would not cause any manifestation external to the device by projection, fire, smoke, heat or loud noise are not subject to the requirements of Class 1.*

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

For the purposes of Class 1, the following definition applies:

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

2.2.1.1.2 Any substance or article having or suspected of having explosive properties shall be considered for as- signment to Class 1 in accordance with the tests, procedures and criteria prescribed in Part I, Manual of Tests and Criteria.

A substance or article assigned to Class 1 can only be accepted for carriage when it has been assigned to a name or n.o.s. entry listed in Table A of Chapter 3.2 and meets the criteria of the Manual of Tests and Criteria.

2.2.1.1.3 The substances and articles of Class 1 shall be assigned to a UN Number and a name or n.o.s. entry listed in Table A of Chapter 3.2. Interpretation of the names of substances and articles in Table A of Chapter 3.2 shall be based upon the glossary in 2.2.1.4

Samples of new or existing explosive substances or articles carried for purposes including: testing, classifi- cation, research and development quality control, or as a

commercial sample, other than initiating explo- sive, may be assigned to UN No. 0190 SAMPLES, EXPLOSIVE.

The assignment of explosive substances and articles not mentioned by name as such in Table A of Chap- ter 3.2 to an n.o.s entry of Class 1 or UN No. 0190 SAMPLES, EXPLOSIVE as well as the assignment of certain substances the carriage of which is subject to a specific authorization by the competent authority according to the special provisions referred to in Column (6) of Table A of Chapter 3.2 shall be made by the competent authority of the country of origin. This competent authority shall also approve in writing the conditions of carriage of these substances and articles. If the country of origin is not an SMGS Contracting State, the classification and the conditions of carriage shall be recognized by the competent authority of the first SMGS Contracting State reached by the consignment.

2.2.1.1.4 Substances and articles of Class 1 shall have been assigned to a division in accordance with 2.2.1.1.5 and to a compatibility group in accordance with 2.2.1.1.6. The division shall be based on the results of the tests described in 2.3.0 and 2.3.1 applying the definitions in 2.2.1.1.5. The compatibility group shall be determined in accordance with the definitions in 2.2.1.1.6. The classification code shall consist of the division number and the compatibility group letter.

2.2.1.1.5 ***Definition of divisions***

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

Division 1.2 Substances and articles which have a projection hazard but not a mass explosion hazard.

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

a) combustion of which gives rise to considerable radiant heat; or

b) which burn one after another, producing minor blast or projection effects or both.

Division 1.4 Substances and articles which present only a slight hazard of explosion in the event of ignition or initiation during carriage. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package.

Division 1.5 Very insensitive substances having a mass explosion hazard which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of carriage. As a minimum requirement they must not explode in the external fire test.

Division 1.6 Extremely insensitive articles which do not have a mass explosion hazard. The articles pre-dominantly contain extremely insensitive substances and demonstrate a negligible probability of accidental initiation or propagation

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

2.2.1.1.6 Definition of compatibility groups of substances and articles:

A – Primary explosive substance.

B – Article containing a primary explosive substance and not having two or more effective protective features. Some articles, such as detonators for blasting, detonator assemblies

for blasting and primers, cap-type, are included, even though they do not contain primary explosives.

C – Propellant explosive substance or other deflagrating explosive substance or article containing such ex- plosive substance..

D – Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and having two or more effective protective features.

E – Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids).

F – Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids) or without a propelling charge.

G – Pyrotechnic substance, or article containing a pyrotechnic substance, or article containing both an ex- plosive substance and an illuminating, incendiary, tear- or smoke-producing substance (other than a water-activated article or one which contains white phosphorus, phosphides, a pyrophoric substance, a flammable liquid or gel or hypergolic liquids).

H – Article containing both an explosive substance and white phosphorus.

J – Article containing both an explosive substance and a flammable liquid or gel.

K – Article containing both an explosive substance and a toxic chemical.

L – Explosive substance or article containing an explosive substance and presenting a special hazard (e.g. due to water activation or the presence of hypergolic liquids, phosphides or a pyrophoric substance) necessitating isolation of each type.

N – Articles predominantly containing extremely insensitive substances.

S – Substance or article so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prevent fire-fighting or other emergency response efforts in the immediate vicinity of the package.

Note 1: *Each substance or article, packed in a specified packaging, may be assigned to one compatibility group only. Since the criterion of compatibility group S is empirical, assignment to this group is necessarily linked to the tests for assignment of a classification code.*

Note 2: *Articles of compatibility groups D and E may be fitted or packed together with their own means of initiation, provided that such means have at least two effective protective features designed to prevent an explosion in the event of accidental functioning of the means of initiation. Such articles and packages shall be assigned to compatibility groups D or E.*

Note 3: *Articles of compatibility groups D and E may be packed together with their own means of initiation, which do not have two effective protective features (i.e. means of initiation assigned to compatibility group B), provided that they comply with mixed packing provision MP 21 of Section 4.1.10. Such packages shall be assigned to compatibility groups D or E.*

Note 4: *Articles may be fitted or packed together with their own means of ignition, provided that the means of ignition cannot function during normal conditions of carriage.*

Note 5: *Articles of compatibility groups C, D and E may be packed together. Such packages shall be assigned to compatibility group E.*

2.2.1.1.7 ***Assignment of fireworks to divisions***

2.2.1.1.7.1 Fireworks shall normally be assigned to divisions 1.1, 1.2, 1.3 and 1.4 on the basis of test data derived from Test Series 6 of the Manual of Tests and Criteria. However:

a) waterfalls containing flash composition (see Note 2 of 2.2.1.1.7.5) shall be classified as 1.1G regardless of the results of Test Series 6;

b) since the range of such articles is very extensive and the availability of test facilities may be limited, assignment to divisions may also be made in accordance with the procedure in 2.2.1.1.7.2.

2.2.1.1.7.2 Assignment of fireworks to UN No. 0333, 0334, 0335 or 0336, and assignment of articles to UN No. 0431 for those used for theatrical effects meeting the definition for article type and the 1.4G specification in the default fireworks classification table in 2.2.1.1.7.5, may be made on the basis of analogy, without the need for Test Series 6 testing, in accordance with the default fireworks classification table in 2.2.1.1.7.5. Such assignment shall be made with the agreement of the competent authority. Items not specified in the table shall be classified on the basis of test data derived from Test Series 6.

Note 1: *The addition of other types of fireworks to column 1 of the table in 2.2.1.1.7.5 shall only be made on the basis of full test data submitted to the UN Sub-Committee of Experts on the Trans- port of Dangerous Goods for consideration.*

Note 2: *Test data derived by competent authorities which validates, or contradicts the assignment of fireworks specified in column 4 of the table in 2.2.1.1.7.5 to divisions in column 5 should be submitted to the UN Sub-Committee of Experts on the Transport of Dangerous Goods for information.*

2.2.1.1.7.3 Where fireworks of more than one division are packed in the same package they shall be classified on the basis of the most dangerous division unless test data derived from Test Series 6 indicate otherwise.

2.2.1.1.7.4 The classification shown in the Table in 2.2.1.1.7.5 applies only for articles packed in fibreboard boxes (4G).

2.2.1.1.7.5 Default fireworks classification table (I accordance with principle of equivalence)[4]

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

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

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

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

Note 3: *Dimensions in mm refer to:*

a) for spherical and peanut shells the diameter of the sphere of the shell;
b) for cylinder shells the length of the shell;
c) for a shell in mortar, Roman candle, shot tube firework or mine[5] the inside diameter of the tube comprising or containing the firework;
d) for a bag mine or cylinder mine, the inside diameter of the mortar intended to contain the mine.

[4] *This Table contains a list of firework classifications which may be used in the absence of Test Series 6 data (see 2.2.1.1.7.2).*

[5] *Mine is a thick paper, plastic or metal case, closed from below by a sabot on which there is an ejection charge. On the separating membrane, a filling of pyrotechnic elements, closed with cardboard covers, is laid. After the ejection charge is ignited, the mine filling is ejected.*

Type	Includes: / Synonym:	Definition	Technical specifications	Classification code
Shell, spherical or cylindrical	Spherical display shell: aerial shell, colour shell, dye shell, multi-break shell, multi-effect shell, nautical shell, parachute shell, smoke shell, star shell; report shell: maroon[6], salute, sound shell, thunder- clap, aerial shell kit	Device with or without propellant charge, with delay fuse and bursting charge, pyrotechnic unit(s) or loose pyrotechnic sub- stance and designed to be projected from a mortar	All report shells	1.1G
			Colour shell: ≥ 180 mm	1.1G
			Colour shell: < 180 mm with > 25% flash composition, as loose powder and/ or report effects	1.1G
			Colour shell: < 180 mm with ≤ 25% flash composition, as loose powder and/ or report effects	1.3G
			Colour shell: ≤ 50 mm, or ≤ 60 g pyrotechnic substance, with ≤ 2% flash composition as loose powder and/ or report effects	1.4G
	Peanut shell	Device with two or more spherical aerial shells in a common wrapper propelled by the same propellant charge with separate external delay fuses	The most hazardous spherical aerial shell determines the classification	
	Preloaded mortar, shell in mortar	Assembly comprising a spherical or cylindrical shell inside a mortar from which the shell is designed to be projected	All report shells	1.1G
			Colour shell: ≥ 180 mm	1.1G
			Colour shell: > 25% flash composition as loose powder and/or report effects	1.1G
			Colour shell: > 50 mm and < 180 mm	1.2G
			Colour shell: ≤ 50 mm, or ≤ 60 g pyrotechnic substance, with ≤ 25% flash composition as loose powder and/ or report effects	1.3G
Shell, spherical or cylindrical	Shell of shells (spherical) (Reference to percentages for	Device without propellant charge, with delay fuse and bursting charge, containing report shells and inert materials and	> 120 mm	1.1G

[6] *A pyrotechnic article producing a very loud pop (bang)*

	shell of shells are to the gross mass of the fireworks article)	designed to be projected from a mortar		
		Device without propellant charge, with delay fuse and bursting charge, containing report shells ≤ 25g flash composition per report unit, with ≤ 33% flash composition and ≥ 60% inert materials and designed to be projected from a mortar	≤ 120 mm	1.3G
		Device without propellant charge, with delay fuse and bursting charge, containing colour shells and/or pyrotechnic units and designed to be projected from a mortar	> 300 mm	1.1G
		Device without propellant charge, with delay fuse and bursting charge, containing colour shells ≤ 70mm and/or pyrotechnic units, with ≤ 25% flash composition and ≤ 60% pyrotechnic substance and designed to be projected from a mortar	> 200mm and ≤ 300 mm	1.3G
		Device with propellant charge, with delay fuse and bursting charge, containing colour shells ≤ 70 mm and/or pyrotechnic units, with ≤ 25% flash composition and ≤ 60% pyrotechnic substance and designed to be projected from a mortar	≤ 200 mm	1.3G
Battery/ combina-tion	Barrage, bombardos, cakes, finale box, flowerbed, hybrid, multiple tubes, shell cakes, banger batteries, flash banger batteries	Assembly including several elements either containing the same type or several types each corresponding to one of the types of fire- works listed in this table, with one or two points of ignition	The most hazardous firework type determines the classification	
Roman candle	Exhibition candle, candle, bombettes	Tube containing a series of pyrotechnic units consisting of alternate pyrotechnic substance, propellant charge, and transmitting fuse	≥ 50 mm inner diameter, containing flash composition, or < 50 mm with >25% flash composition	1.1G
			≥ 50 mm inner diameter, containing no flash composition	1.2G
			< 50 mm inner diameter and ≤ 25%	1.3G

			flash com position	
			≤ 30 mm inner diame- ter, each pyrotechnic unit ≤ 25 g and ≤ 5% flash composition	1.4G
Shot tube	Single shot Roman candle, small preloaded mortar	Tube containing a pyrotechnic unit consisting of pyrotechnic substance, propellant charge with or without transmitting fuse	≤ 30 mm inner diameter and pyrotechnic unit > 25 g, or > 5% and ≤ 25% flash composition	1.3G
			≤ 30 mm inner diameter, pyrotechnic unit ≤ 25 g and ≤ 5% flash composition	1.4G
Rocket	Avalanche rocket, signal rocket, whistling rocket, bottle rocket, sky rocket, missile type rocket, table rocket	Tube containing pyrotechnic substance and/or pyro- technic units, equipped with stick(s) or other means for stabilization of flight, and designed to be propelled into the air	Flash composition effects only	1.1G
			Flash composition > 25% of the pyrotechnic substance	1.1G
			> 20 g pyrotechnic substance and flash composition ≤ 25%	1.3G
			≤ 20 g pyrotechnic substance, black pow- der bursting charge and ≤ 0.13 g flash composition per report and ≤ 1 g in total	1.4G
Mine	Pot-a-feu, ground mine, bag mine, cylinder mine	Tube containing propellant charge and pyrotechnic units and designed to be placed on the ground or to be fixed in the ground. The principal effect is ejection of all the pyrotechnic units in a single burst producing a widely dispersed visual and/or aural effect in the air or: Tube containing propellant charge and pyrotechnic units and designed to be placed on the ground or to be fixed in the ground. The principal effect is ejection of all the pyrotechnic units in a single burst producing a widely dispersed visual and/or aural effect in the air or:	> 25% flash composition, as loose powder and/ or report effects	1.1G
			≥ 180 mm and ≤ 25% flash composition, as loose powder and/ or report effects	1.1G
			< 180 mm and ≤ 25% flash composition, as loose powder and/ or report effects	1.3G

		Cloth or paper bag or cloth or paper cylinder contain- ing propellant charge and pyrotechnic units, designed to be placed in a mortar and to function as a mine	≤ 150 g pyrotechnic substance, containing ≤ 5% flash composition as loose powder and/ or report effects. Each pyrotechnic unit ≤ 25 g, each report effect < 2 g, each whistle, if any, ≤ 3 g	1.4G
Fountain	Volcanos, gerbs, showers, lances, Bengal fire, flitter sparkle, cylindrical fountains, cone fountains, illuminating torch	Non-metallic case containing pressed or consolidated pyrotechnic substance producing sparks and flame ***Note:*** Fountains intended to produce a vertical cascade or curtain of sparks are considered to be waterfalls (see row below).	≥ 1 kg pyrotechnic substance	1.3G
			< 1 kg pyrotechnic substance	1.4G
Waterfall	cascades, showers	pyrotechnic fountain in-tended to produce a verti-cal cascade or curtain of sparks	containing flash compo-sition regardless of the results of Test Series 6 (see 2.2.1.1.7.1 (a))	1.1G
			not containing flash composition	1.3G
Sparkler	Handheld sparklers, non-handheld sparklers, wire sparklers	Rigid wire partially coated (along one end) with slow burning pyrotechnic substance with or without an ignition tip	Perchlorate based sparklers: > 5 g per item or > 10 items per pack	1.3G
			Perchlorate based sparklers: ≤ 5 g per item and ≤ 10 items per pack; Nitrate based sparklers: ≤ 30 g per item	1.4G
Bengal stick	Dipped stick	Non-metallic stick partially coated (along one end) with slow-burning pyrotechnic substance and designed to be held in the hand	Perchlorate based items: > 5 g per item or > 10 items per pack	1.3G
			Perchlorate based items: ≤ 5 g per item and ≤ 10 items per pack; Nitrate based items:	1.4G

			≤ 30 g per item	
Low hazard fire-works and novelties	Table bombs, throw- downs, crackling granules, smokes, fog, snakes, glow worm, serpents, snaps, party poppers	Device designed to pro- duce very limited visible and/ or audible effect which contains small amounts of pyrotechnic substance and/or explosive composition.	Throwdowns and snaps may contain up to 1.6 mg of silver fulminate; snaps and party poppers may contain up to 16 mg of potassium chlorate/ red phosphorous mixture; other articles may contain up to 5 g of pyrotechnic substance, but no flash composition	1.4G
Spinner	Aerial spinner, helicopter, chaser, ground spinner	Non-metallic tube or tubes containing gas- or spark- producing pyrotechnic substance, with or without noise producing composition, with or without aerofoils attached	Pyrotechnic substance per item > 20 g, containing ≤ 3% flash com-position as report effects, or whistle composition ≤ 5 g	1.3G
			Pyrotechnic substance per item ≤ 20 g, containing ≤ 3% flash com-position as report effects, or whistle composition ≤ 5 g	1.4G
Wheels	Catherine wheels, Saxon	Assembly including drivers containing pyrotechnic substance and provided with a means of attaching it to a support so that it can rotate	≥ 1 kg total pyrotechnic substance, no report effect, each whistle (if any) ≤ 25 g and ≤ 50 g whistle composition per wheel	1.3G
			< 1 kg total pyrotechnic substance, no report effect, each whistle (if any) ≤ 5 g and ≤ 10 g whistle composition per wheel	1.4G
Aerial wheel	Flying Saxon, UFO's, rising crown	Tubes containing propellant charges and sparks- flame- and/ or noise producing pyrotechnic substances, the tubes being fixed to a supporting ring	> 200 g total pyrotechnic substance or > 60 g pyrotechnic substance per driver, ≤ 3% flash composition as report effects, each whistle (if any) ≤ 25 g and ≤ 50 g whistle composition per wheel	1.3G

			≤ 200 g total pyrotechnic substance and ≤ 60 g pyrotechnic substance per driver, ≤ 3% flash composition as report effects, each whistle (if any) ≤ 5 g and ≤ 10 g whistle composition per wheel	1.4G
Selection pack	Display selection box, display selection pack, garden selection box, indoor selection box; assortment	A pack of more than one type each corresponding to one of the types of fire-works listed in this table	The most hazardous firework type determines the classification	
Firecracker	Celebration cracker, celebration roll, string cracker	Assembly of tubes (paper or cardboard) linked by a pyrotechnic fuse, each tube intended to produce an aural effect	Each tube ≤ 140 mg of flash composition or ≤ 1 g black powder	1.4G
Banger	Salute, flash banger, lady cracker	Non-metallic tube containing report composition intended to produce an aural effect	> 2 g flash composition per item	1.1G
			≤ 2 g flash composition per item and ≤ 10 g per inner packaging	1.3G
			≤ 1 g flash composition per item and ≤ 10 g per inner packaging or ≤ 10 g black powder per item	1.4G

2.2.1.1.8 Exclusion from Class 1

2.2.1.1.8.1 An article or a substance may be excluded from Class 1 by virtue of test results and the Class 1 definition with the approval of the competent authority of any SMGS Contracting State who may also recognize an approval granted by the competent authority of a country which is not an SMGS Contracting State provided that this approval has been granted in accordance with the procedures applicable according to RID, ADR, ADN, the IMDG Code or the ICAO Technical Instructions.

2.2.1.1.8.2 With the approval of the competent authority in accordance with 2.2.1.1.8.1, an article may be excluded from Class 1 when three unpackaged articles, each individually activated by its own means of initiation or ignition or external means to function in the designed mode, meet the following test criteria:

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

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

Note: *Where the integrity of the article may be affected in the event of an external fire these criteria shall be examined by a fire test. One such method is described in ISO 14451-2 using a heating rate of 80 K/min. (c) No audible report exceeding 135 dB(C) peak at a distance of one metre;*

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

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

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

Note 2: *The competent authority referred to in 2.2.1.1.8.1 may require testing in packaged form if it is determined that, as packaged for carriage, thearticle may pose a greater risk.*

2.2.1.1.9 *Classification documentation*

2.2.1.1.9.1 A competent authority assigning an article or substance to Class 1 shall confirm that classification with the applicant in writing.

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

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

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

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

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

c) Confirmation that the classification has been approved, made or agreed in accordance with the UN Model Regulations or the relevant modal regulations;

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

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

f) The proper shipping name, UN number, class, division and corresponding compatibility group of the explosives;

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

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

i) Where safety in carriage or the division is assessed as being dependent upon the packaging, the packaging mark or a description of the permitted inner packagings, intermediate packagings, outer packagings;

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

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

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

m) The basis for assigning the classification, i.e. whether on the basis of test results, default for fireworks, analogy with classified explosive, by definition from Table A of Chapter 3.2 etc.;

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

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

2.2.1.2 Substances and articles not accepted for carriage

2.2.1.2.1 Explosive substances which are unduly sensitive according to the criteria of the Manual of Tests and Criteria, Part I, or are liable to spontaneous reaction, as well as explosive substances and articles which cannot be assigned to a name or n.o.s. entry listed in Table A of Chapter 3.2, shall not be accepted for carriage.

2.2.1.2.2 Substances of compatibility group A shall not be accepted for carriage by rail (1.1 A, UN Nos. 0074, 0113, 0114, 0129, 0130, 0135, 0224 and 0473).

Articles of compatibility group K shall not be accepted for carriage (1.2 K, UN No. 0020 and 1.3 K, UN No. 0021).

2.2.1.3 List of collective entries

Classification code (see 2.2.1.1.4)	UN NO	Name of the substance or article
1.1A	0473	SUBSTANCES, EXPLOSIVE, N.O.S. (not accepted for carriage by rail, see 2.2.1.2.2)
1.1B	0461	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.1C	0474	SUBSTANCES, EXPLOSIVE, N.O.S

Classification code (see 2.2.1.1.4)	UN NO	Name of the substance or article
	0497	PROPELLANT, LIQUID
	0498	PROPELLANT, SOLID
	0462	ARTICLES, EXPLOSIVE, N.O.S
1.1D	0475	SUBSTANCES, EXPLOSIVE, N.O.S.
	0463	ARTICLES, EXPLOSIVE, N.O.S
1.1E	0464	ARTICLES, EXPLOSIVE, N.O.S.
1.1F	0465	ARTICLES, EXPLOSIVE, N.O.S.
1.1G	0476	SUBSTANCES, EXPLOSIVE, N.O.S.
1.1L	0357	SUBSTANCES, EXPLOSIVE, N.O.S.
	0354	ARTICLES, EXPLOSIVE, N.O.S.
1.2B	0382	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.2C	0466	ARTICLES, EXPLOSIVE, N.O.S.
1.2D	0467	ARTICLES, EXPLOSIVE, N.O.S
1.2E	0468	ARTICLES, EXPLOSIVE, N.O.S
1.2F	0469	ARTICLES, EXPLOSIVE, N.O.S
1.2L	0358	SUBSTANCES, EXPLOSIVE, N.O.S.
	0248	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge
	0355	ARTICLES, EXPLOSIVE, N.O.S.
1.3C	0132	DEFLAGRATING METAL SALTS OF AROMATIC NITRO-DERIVATIVES, N.O.S.
	0447	SUBSTANCES, EXPLOSIVE, N.O.S.
	0495	PROPELLANT, LIQUID
	0499	PROPELLANT, SOLID
	0470	ARTICLES, EXPLOSIVE, N.O.S.
1.3G	0478	SUBSTANCES, EXPLOSIVE, N.O.S.
1.3L	0359	SUBSTANCES, EXPLOSIVE, N.O.S.
	0249	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge
	0356	ARTICLES, EXPLOSIVE, N.O.S.
1.4B	0350	ARTICLES, EXPLOSIVE, N.O.S.
	0383	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.4C	0479	SUBSTANCES, EXPLOSIVE, N.O.S
	0501	PROPELLANT, SOLID
	0351	ARTICLES, EXPLOSIVE, N.O.S
1.4D	0480	SUBSTANCES, EXPLOSIVE, N.O.S.
	0352	ARTICLES, EXPLOSIVE, N.O.S
1.4E	0471	ARTICLES, EXPLOSIVE, N.O.S..
1.4F	0472	ARTICLES, EXPLOSIVE, N.O.S.
1.4G	0485	SUBSTANCES, EXPLOSIVE, N.O.S.
	0353	ARTICLES, EXPLOSIVE, N.O.S.
1.4S	0481	SUBSTANCES, EXPLOSIVE, N.O.S.
	0349	ARTICLES, EXPLOSIVE, N.O.S.
	0384	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.5D	0482	SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE (SUBSTANCES, EVI) N.O.S.

Classification code (see 2.2.1.1.4)	UN NO	Name of the substance or article
1.6N	0486	ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES, EEI)
	0190	SAMPLES, EXPLOSIVE other than initiating explosive ***Note:*** *Division and compatibility group shall be defined as directed by the competent authority and according to the principles in 2.2.1.1.4.*

2.2.1.4 Glossary of names

Note 1: *The descriptions in the glossary are not intended to replace the test procedures, nor to deter mine the hazard classification of a substance or article of Class 1. Assignment to the correct di vision and a decision on whether compatibility group S is appropriate shall be based on testing of the product in accordance with the Manual of Tests and Criteria, Part I or by analogy with similar products which have already been tested and assigned in accordance with the procedures of the Manual of Tests and Criteria.*

Note 2: *The figures given after the names refer to the relevant UN numbers (Column 1 of Table A of Chapter 3.2). For the classification code, see 2.2.1.1.4.*

AMMUNITION, ILLUMINATING, with or without burster, expelling charge or propelling charge: UN Nos. 0171, 0254, 0297

Ammunition designed to produce a single source of intense light for lighting up an area. The term includes illuminating cartridges, grenades and projectiles; and illuminating and target identification bombs.

Note: *The following articles: CARTRIDGES, SIGNAL; SIGNAL DEVICES HAND; SIGNALS, DISTRESS;*

FLARES, AERIAL; FLARES, SURFACE are not included in this definition. They are listed separately.

AMMUNITION, INCENDIARY, liquid or gel, with burster, expelling charge or propelling charge: UN No. 0247

Ammunition containing liquid or gelatinous incendiary substance. Except when the incendiary substance is an explosive per se, it also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

AMMUNITION, INCENDIARY, WHITE PHOSPHORUS with burster, expelling charge or propelling charge: UN Nos. 0243, 0244

Ammunition containing white phosphorus as incendiary substance. It also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

AMMUNITION, INCENDIARY with or without burster, expelling charge or propelling charge: UN Nos. 0009, 0010, 0300

Ammunition containing incendiary composition. Except when the composition is an explosive per se, it also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

AMMUNITION, PRACTICE: UN Nos. 0362, 0488

Ammunition without a main bursting charge, containing a burster or expelling charge. Normally it also contains a fuze and a propelling charge.

Note: *GRENADES, PRACTICE are not included in this definition. They are listed separately.*

AMMUNITION, PROOF: UN No. 0363

Ammunition containing pyrotechnic substances, used to test the performance or strength of new ammunition, weapon components or assemblies

AMMUNITION, SMOKE, WHITE PHOSPHORUS, with burster, expelling charge or propelling charge: UN Nos. 0245, 0246

Ammunition containing white phosphorus as a smoke-producing substance. It also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes grenades, smoke.

AMMUNITION, SMOKE with or without burster, expelling charge or propelling charge: UN Nos. 0015, 0016, 0303

Ammunition containing a smoke-producing substance such as chlorosulphonic acid mixture or titanium tetrachloride; or a smoke-producing pyrotechnic composition based on hexachloroethane or red phosphorus. Except when the substance is an explosive per se, the ammunition also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes grenades, smoke.

Note: *SIGNALS, SMOKE are not included in this definition. They are listed separately.*

AMMUNITION, TEAR-PRODUCING, with burster, expelling charge or propelling charge: UN Nos. 0018, 0019, 0301

Ammunition containing a tear-producing substance. It also contains one or more of the following: a pyro- technic substance; a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES EEI): UN No. 0486

Articles that predominantly contain extremely insensitive substances which demonstrate a negligible probability of accidental initiation or propagation under normal conditions of transport, and which have passed Test Series 7.

ARTICLES, PYROPHORIC: UN No. 0380

Articles which contain a pyrophoric substance (capable of spontaneous ignition when exposed to air) and an explosive substance or component. The term excludes articles containing white phosphorus.

ARTICLES, PYROTECHNIC, for technical purposes: UN Nos. 0428, 0429, 0430, 0431, 0432

Articles which contain pyrotechnic substances and are used for technical purposes such as heat generation, gas generation, theatrical effects, etc.

Note: *The following articles: all ammunition; CARTRIDGES, SIGNAL; CUTTERS, CABLE, EXPLOSIVE; FIREWORKS; FLARES, AERIAL; FLARES, SURFACE; RELEASE DEVICES, EXPLOSIVE; RIVETS, EXPLOSIVE; SIGNAL DEVICES, HAND; SIGNALS, DISTRESS; SIGNALS, RAILWAY*

TRACK, EXPLOSIVES; SIGNALS, SMOKE are not included in this definition. They are listed separately.

BLACK POWDER (GUNPOWDER), COMPRESSED or **BLACK POWDER (GUNPOWDER), IN PELLETS:** UN No. 0028

Substance consisting of a pelletized form of black powder.

BLACK POWDER (GUNPOWDER), GRANULAR OR AS MEAL: UN NO. 0027

SUBSTANCE CONSISTING OF AN INTIMATE MIXTURE OF CHARCOAL OR OTHER CARBON AND EITHER POTASSIUM NITRATE OR SO- DIUM NITRATE, WITH OR WITHOUT SULPHUR.

BOMBS, WITH FLAMMABLE LIQUID, with bursting charge: UN Nos. 0399, 0400

Articles which are dropped from aircraft, consisting of a tank filled with inflammable liquid and bursting charge.

BOMBS, PHOTO-FLASH: UN NO. 0038

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a charge of detonating explosive without means of initiation or with means of initiation containing two or more effective protective features.

BOMBS, PHOTO-FLASH: UN NO. 0037

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a charge of detonating explosive with means of initiation not containing two or more effective protective features.

BOMBS, PHOTO-FLASH: UN NOS. 0039, 0299

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a photo-flash composition.

BOMBS WITH BURSTING CHARGE: UN NOS. 0034; 0035

Explosive articles which are dropped from aircraft, without means of initiation or with means of initiation containing two or more effective protective features.

BOMBS WITH BURSTING CHARGE: UN NOS. 0033, 0291

Explosive articles which are dropped from aircraft, with means of initiation not containing two or more effective protective features.

BOOSTERS WITH DETONATOR: UN NOS. 0225, 0268

Articles consisting of a charge of detonating explosive with means of initiation. They are used to increase the initiating power of detonators or detonating cord.

BOOSTERS WITHOUT DETONATOR: UN NOS. 0042, 0283

Articles consisting of a charge of detonating explosive without means of initiation. They are used to increase the initiating power of detonators or detonating cord.

BURSTERS, EXPLOSIVE: UN NO. 0043

Articles consisting of a small charge of explosive used to open projectiles or other ammunition in order to disperse their contents.

CARTRIDGES, FLASH: UN Nos. 0049, 0050

Articles consisting of a casing, a primer and flash powder, all assembled in one piece ready for firing.

CARTRIDGES FOR TOOLS, BLANK: UN No. 0014

Article, used in tools, consisting of a closed cartridge case with a centre or rim fire primer with or without a charge of smokeless or black powder but with no projectile.

CARTRIDGES FOR WEAPONS, BLANK: UN Nos. 0326, 0413, 0327, 0338, 0014

Ammunition consisting of a closed cartridge case with a centre or rim fire primer and a charge of smokeless or black powder but no projectile. It produces a loud noise and is used for training, saluting, propelling charge, starter pistols, etc. The term includes ammunition, blank.

CARTRIDGES FOR WEAPONS, INERT PROJECTILE: UN Nos. 0328, 0417, 0339, 0012

Ammunition consisting of a projectile without bursting charge but with a propelling charge with or without a primer. The articles may include a tracer, provided that the predominant hazard is that of the propelling charge.

CARTRIDGES FOR WEAPONS with bursting charge: UN Nos. 0006, 0321, 0412

Ammunition consisting of a projectile with a bursting charge without means of initiation or with means of ini- tiation containing two or more effective protective features; and a propelling charge with or without a primer. The term includes fixed (assembled) ammunition, semi-fixed (partially assembled) ammunition and separate loading ammunition when the components are packed together.

CARTRIDGES FOR WEAPONS with bursting charge**:** UN Nos. 0005, 0007, 0348

Ammunition consisting of a projectile with a bursting charge with means of initiation not containing two or more effective protective features; and a propelling charge with or without a primer. The term includes fixed (assembled) ammunition, semi-fixed (partially assembled) ammunition and separate loading ammunition when the components are packed together.

CARTRIDGES, OIL WELL: UN Nos. 0277, 0278

Articles consisting of a thin casing of fibreboard, metal or other material containing only propellant powder which projects a hardened projectile to perforate an oil well casing.

Note:: CHARGES, SHAPED are not included in this definition. They are listed separately.

CARTRIDGES, POWER DEVICE: UN Nos. 0275, 0276, 0323, 0381

Articles designed to accomplish mechanical actions. They consist of a casing with a charge of deflagrating explosive and a means of ignition. The gaseous products of the deflagration produce inflation, linear or rotary motion or activate diaphragms, valves or switches or project fastening devices or extinguishing agents.

CARTRIDGES, SIGNAL: UN Nos. 0054, 0312, 0405

Articles designed to fire coloured flares or other signals from signal pistols, etc.

CARTRIDGES, SMALL ARMS: UN Nos. 0417, 0339, 0012

Ammunition consisting of a cartridge case fitted with a centre or rim fire primer and containing both a propelling charge and solid projectile. They are designed to be fired in weapons of calibre not larger than 19.1 mm. Shot-gun cartridges of any calibre are included in this description.

Note:: CARTRIDGES, SMALL ARMS, BLANK, are not included in this definition. They are listed separately. Some military small arms cartridges are not included in this definition. They are listed under CARTRIDGES FOR WEAPONS, INERT PROJECTILE.

CARTRIDGES, SMALL ARMS, BLANK: UN Nos. 0014, 0327, 0338

Ammunition consisting of a closed cartridge case with a centre or rim fire primer and a charge of smokeless or black powder. The cartridge cases contain no projectiles. The cartridges are designed to be fired from weapons with a calibre of at most 19.1 mm and serve to produce a loud noise and are used for training, saluting, propelling charge, starter pistols, etc.

CASES, CARTRIDGE, EMPTY, WITH PRIMER: UN Nos. 0379; 0055

Articles consisting of a cartridge case made from metal, plastics or other non-inflammable material, in which the only explosive component is the primer

CASES, COMBUSTIBLE, EMPTY, WITHOUT PRIMER: UN Nos. 0447, 0446

Articles consisting of a cartridge case made partly or entirely from nitrocellulose.

CHARGES, BURSTING, PLASTICS BONDED: UN Nos. 0457, 0458, 0459, 0460

Articles consisting of a charge of detonating explosive, plastics bonded, manufactured in a specific form without a casing and without means of initiation. They are designed as components of ammunition such as warheads.

CHARGES, DEMOLITION: UN No. 0048

Articles containing a charge of a detonating explosive in a casing of fibreboard, plastics, metal or other material. The articles are without means of initiation or with means of initiation containing two or more effective protective features.

***Note:**: The following articles: BOMBS; MINES; PROJECTILES are not included in this definition. They are listed separately.*

CHARGES, DEPTH: UN No. 0056

Articles consisting of a charge of detonating explosive contained in a drum or projectile without means of initiation or with means of initiation containing two or more effective protective features. They are designed to detonate under water.

CHARGES, EXPLOSIVE, COMMERCIAL without detonator: UN Nos. 0442, 0443, 0444, 0445

Articles consisting of a charge of detonating explosive without means of initiation, used for explosive welding, jointing, forming and other metallurgical processes.

CHARGES, PROPELLING, FOR CANNON: UN NOS. 0242, 0279, 0414

Charges of propellant in any physical form for separate-loading ammunition for cannon.

CHARGES, PROPELLING: UN Nos. 0271, 0272, 0415, 0491

Articles consisting of a charge of a propellant charge in any physical form, with or without a casing, as a component of rocket motors or for reducing the drag of projectiles.

CHARGES, SHAPED, without detonator: UN Nos. 0059, 0439, 0440, 0441

Articles consisting of a casing containing a charge of detonating explosive with a cavity lined with rigid material, without means of initiation. They are designed to produce a powerful, penetrating jet effect.

CHARGES, SHAPED, FLEXIBLE, LINEAR: UN Nos. 0237, 0288

Articles consisting of a V-shaped core of a detonating explosive clad by a flexible sheath.

CHARGES, SUPPLEMENTARY, EXPLOSIVE: UN No. 0060

Articles consisting of a small removable booster placed in the cavity of a projectile between the fuze and the bursting charge.

COMPONENTS, EXPLOSIVE TRAIN, N.O.S.: UN Nos. 0382, 0383, 0384, 0461

Articles containing an explosive designed to transmit detonation or deflagration within an explosive train.

CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge: UN Nos. 0248, 0249

Articles whose functioning depends upon physico-chemical reaction of their contents with water.

CORD, DETONATING, flexible: UN Nos. 0065, 0289

Article consisting of a core of detonating explosive enclosed in spun fabric and a plastics or other covering. The covering is not necessary if the spun fabric is sift-proof.

CORD (FUSE) DETONATING, metal clad: UN Nos. 0102, 0290

Article consisting of a core of detonating explosive clad by a soft metal tube with or without protective covering.

CORD (FUSE) DETONATING, MILD EFFECT, metal clad: UN No. 0104

Article consisting of a core of detonating explosive clad by a soft metal tube with or without a protective covering. The quantity of explosive substance is so small that only a mild effect is manifested outside the cord.

CORD, IGNITER: UN No. 0066

Article consisting of textile yarns covered with black powder or another fast burning pyrotechnic composition and of a flexible protective covering; or it consists of a core of black powder surrounded by a flexible woven fabric. It burns progressively along its length with an external flame and is used to transmit ignition from a device to a charge or primer.

CUTTERS, CABLE, EXPLOSIVE: UN No. 0070

Articles consisting of a knife-edged device which is driven by a small charge of deflagrating explosive into an anvil.

DETONATOR ASSEMBLIES, NON-ELECTRIC for blasting: UN Nos. 0360, 0361, 0500

Non-electric detonators assembled with and activated by such means as safety fuse, shock tube, flash tube or detonating cord. They may be of instantaneous design or incorporate delay elements. Detonating relays incorporating detonating cord are included.

DETONATORS, ELECTRIC for blasting: UN Nos. 0030, 0255, 0456

Articles specially designed for the initiation of blasting explosives. These detonators may be constructed to detonate instantaneously or may contain a delay element. Electric detonators are activated by an electric current.

DETONATORS, ELECTRONIC programmable for blasting: UN Nos. 0511, 0512, 0513 Detonators with enhanced safety and security features, utilizing electronic components to transmit a firing signal with validated commands and secure communications. Detonators of this type cannot be initiated by other means.

DETONATORS FOR AMMUNITION: UN Nos. 0073, 0364, 0365, 0366

Articles consisting of a small metal or plastics tube containing explosives such as lead azide, PETN or combinations of explosives. They are designed to start a detonation train.

DETONATORS, NON-ELECTRIC for blasting: UN Nos. 0029, 0267, 0455

Articles specially designed for the initiation of blasting explosives. These detonators may be constructed to detonate instantaneously or may contain a delay element. Non-electric detonators are activated by such means as shock tube, flash tube, safety fuse, other igniferous device or flexible detonating cord. Detonating relays without detonating cord are included.

EXPLOSIVE, BLASTING, TYPE A: UN No. 0081

Substances consisting of liquid organic nitrates such as nitroglycerine or a mixture of such ingredients with one or more of the following: nitrocellulose; ammonium nitrate or other inorganic nitrates; aromatic nitro-derivatives, or combustible materials, such as wood-meal and aluminium powder. They may contain inert components such as kieselguhr, and additives such as colouring agents and stabilizers. Such explosives shall be in powdery, gelatinous or elastic form. The term includes dynamite; gelatine, blasting and gelatine dynamites.

EXPLOSIVE, BLASTING, TYPE B: UN Nos. 0082, 0331

Substances consisting of

(a) a mixture of ammonium nitrate or other inorganic nitrates with an explosive such as trinitrotoluene, with or without other substances such as wood-meal and aluminium powder; or

(b) a mixture of ammonium nitrate or other inorganic nitrates with other combustible substances which are not explosive ingredients. In both cases they may contain inert components such as kieselguhr, and additives such as colouring agents and stabilizers.

Such explosives must not contain nitroglycerine, similar liquid organic nitrates or chlorates.

EXPLOSIVE, BLASTING, TYPE C: UN No. 0083

Substances consisting of a mixture of either potassium or sodium chlorate or potassium, sodium or ammo- nium perchlorate with organic nitro-derivatives or combustible materials such as wood-meal or aluminium powder or a hydrocarbon. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine or similar liquid organic nitrates.

EXPLOSIVE, BLASTING, TYPE D: UN No. 0084

Substances consisting of a mixture of organic nitrated compounds and combustible materials such as hy- drocarbons and aluminium powder. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine, similar liquid organic nitrates, chlorates and ammonium nitrate. The term generally includes plastic explosives.

EXPLOSIVES, BLASTING, TYPE E: UN Nos. 0241, 0332

Substances consisting of water as an essential ingredient and high proportions of ammonium nitrate or other oxidizers, some or all of which are in solution. The other constituents may include nitro-derivatives such as trinitrotoluene, hydrocarbons or aluminium powder. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. The term includes explosives, emulsion, explosives, slurry and explosives, watergel.

FIREWORKS: UN Nos. 0333, 0334, 0335, 0336, 0337

Pyrotechnic articles designed for entertainment.

FLARES, AERIAL: UN Nos. 0093, 0403, 0404, 0420, 0421;

Articles containing pyrotechnic substances which are designed to be dropped from an aircraft to illuminate, identify, signal or warn.

FLARES, SURFACE: UN Nos. 0092, 0418, 0419

Articles containing pyrotechnic substances which are designed for use on the surface to illuminate, identify, signal or warn.

FLASH POWDER: UN Nos. 0094, 0305

Pyrotechnic substance which, when ignited, produces an intense light.

FRACTURING DEVICES, EXPLOSIVE without detonator, for oil wells: UN No. 0099

Articles consisting of a charge of detonating explosive contained in a casing without means of initiation. They are used to fracture the rock around a drill shaft to assist the flow of crude oil from the rock.

FUSE, IGNITER, tubular, metal clad: UN No. 0103

Article consisting of a metal tube with a core of deflagrating explosive.

FUSE, NON-DETONATING: UN No. 0101

Article consisting of cotton yarns impregnated with fine black powder (quickmatch). It burns with an external flame and is used in ignition trains for fireworks, etc.

FUSE, SAFETY: UN No. 0105

Article consisting of a core of fine grained black powder surrounded by a flexible woven fabric with one or more protective outer coverings. When ignited, it burns at a predetermined rate without any external explosive effect.

FUZES, DETONATING: UN Nos. 0106, 0107, 0257, 0367

Articles with explosive components designed to produce a detonation in ammunition. They incorporate me- chanical, electrical, chemical or hydrostatic components to initiate the detonation. They generally incorporate protective features**.**

FUZES, DETONATING with protective features: UN Nos. 0408, 0409, 0410

Articles with explosive components designed to produce a detonation in ammunition. They incorporate me- chanical, electrical, chemical or hydrostatic components to initiate the detonation. The detonating fuze must incorporate two or more effective protective features.

FUZES, IGNITING: UN Nos. 0316, 0317, 0368

Articles with primary explosive components designed to produce a deflagration in ammunition. They incor- porate mechanical, electrical, chemical or hydrostatic components to start the deflagration. They generally incorporate protective features.

GRENADES, hand or rifle, with bursting charge: UN Nos. 0284, 0285

Articles which are designed to be thrown by hand or to be projected by a rifle. They are without means of initiation or with means of initiation containing two or more effective protective features.

GRENADES, hand or rifle, with bursting charge: UN Nos. 0292, 0293

Articles which are designed to be thrown by hand or to be projected by a rifle. They are with means of initiation not containing two or more effective protective features.

GRENADES, PRACTICE, hand or rifle: UN Nos. 0110, 0372, 0318, 0452

Articles without a main bursting charge which are designed to be thrown by hand or to be projected by a rifle. They contain the priming device and may contain a spotting charge.

HEXOTONAL: UN No. 0393

Substance consisting of an intimate mixture of cyclotrimethylene-trinitramine (RDX), trinitrotoluene (TNT) and aluminium.

HEXOLITE (HEXOTOL), dry or wetted with less than 15% water, by mass: UN No. 0118

Substance consisting of an intimate mixture of cyclotrimethylene-trinitramine (RDX) and trinitrotoluene (TNT). The term includes "Composition B".

IGNITERS: UN Nos. 0121, 0314, 0315, 0325, 0454

Articles containing one or more explosive substances designed to produce a deflagration in an explosive train. They may be actuated chemically, electrically or mechanically.

Note: *The following articles: CORD, IGNITER; FUSE, IGNITER; FUSE, NON-DETONATING; FUZES, IGNITING; LIGHTERS, FUSE; PRIMERS, CAP TYPE; PRIMERS, TUBULAR are not included in this definition. They are listed separately.*

JET PERFORATING GUNS, CHARGED, oil well, without detonator: UN Nos. 0124, 0494

Articles consisting of a steel tube or metallic strip, into which are inserted shaped charges connected by detonating cord, without means of initiation.

LIGHTERS, FUSE: UN No. 0131

Articles of various design actuated by friction, percussion or electricity and used to ignite safety fuse.

MINES with bursting charge: UN Nos. 0137, 0138

Articles consisting normally of metal or composition receptacles filled with a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be operated by the passage of ships, vehicles or personnel. The term includes "Bangalore torpedoes".MINES with bursting charge: UN Nos. 0136, 0294

Articles consisting normally of metal or composition receptacles filled with a detonating explosive, with means of initiation not containing two or more effective protective

features. They are designed to be operated by the passage of ships, vehicles or personnel. The term includes "Bangalore torpedoes".

OCTOLITE (OCTOL), dry or wetted with less than 15% water, by mass: UN No. 0266

Substance consisting of an intimate mixture of cyclotetramethylene-tetranitramine (HMX) and trinitrotoluene (TNT).

OCTONAL: UN No. 0496

Substance consisting of an intimate mixture of cyclotetramethylenetetranitramine (HMX), trinitrotoluene (TNT) and aluminium.

PENTOLITE, dry or wetted with less than 15% water, by mass: UN No. 0151

Substance consisting of an intimate mixture of pentaerythrite tetranitrate (PETN) and trinitrotoluene (TNT).

POWDER CAKE (POWDER PASTE), WETTED with not less than 17% alcohol, by mass; POWDER CAKE (POWDER PASTE), WETTED with not less than 25% water, by mass: UN Nos. 0433, 0159

Substance consisting of nitrocellulose impregnated with not more than 60% of nitroglycerine or other liquid organic nitrates or a mixture of these.

POWDER, SMOKELESS: UN Nos. 0160, 0161, 0509

Substance based on nitrocellulose used as propellant. The term includes propellants with a single base (nitrocellulose (NC) alone), those with a double base (such as NC and nitroglycerine/(NG)) and those with a triple base (such as NC/NG/nitroguanidine).

Note: *Cast, pressed or bag-charges of smokeless powder are listed under CHARGES, PROPELLING or CHARGES, PROPELLING, FOR CANON.*

PRIMERS, CAP TYPE: UN Nos. 0044, 0377, 0378

Articles consisting of a metal or plastics cap containing a small amount of primary explosive mixture that is readily ignited by impact. They serve as igniting elements in small arms cartridges and in percussion primers for propelling charges.

PRIMERS, TUBULAR: UN Nos. 0319, 0320, 0376

Articles consisting of a primer for ignition and an auxiliary charge of deflagrating explosive such as black powder used to ignite the propelling charge in a cartridge case for cannon, etc.

PROJECTILES, inert with tracer: UN Nos. 0345, 0424, 0425

Articles such as a shell or bullet, which are projected from a cannon or other gun, rifle or other small arm.

PROJECTILES with burster or expelling charge: UN Nos. 0346, 0347

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are without means of initiation or with means of initiation containing two or more effective protective features. They are used to scatter dyes for spotting or other inert materials.

PROJECTILES with burster or expelling charge: UN Nos. 0426, 0427

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are with means of initiation not containing two or more effective protective features. They are used to scatter dyes for spotting or other inert materials.

PROJECTILES with burster or expelling charge: UN Nos. 0434, 0435

Articles such as a shell or bullet, which are projected from a cannon or other gun, rifle or other small arm. They are used to scatter dyes for spotting or other inert materials.

PROJECTILES with bursting charge: UN Nos. 0168, 0169, 0344

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are without means of initiation or with means of initiation containing two or more effective protective features.

PROJECTILES with bursting charge: UN Nos. 0167, 0324

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are with means of initiation not containing two or more effective protective features.

PROPELLANT, LIQUID: UN Nos. 0495, 0497

Substance consisting of a deflagrating liquid explosive, used for propulsion.

PROPELLANT, SOLID: UN Nos. 0498, 0499, 0501

Substance consisting of a deflagrating solid explosive, used for propulsion.

RELEASE DEVICES, EXPLOSIVE: UN No. 0173

Articles consisting of a small charge of explosive with means of initiation and rods or links. They sever the rods or links to release equipment quickly.

RIVETS, EXPLOSIVE: UN No. 0174

Articles consisting of a small charge of explosive inside a metallic rivet.

ROCKET MOTORS: UN Nos. 0186, 0280, 0281, 0510

Articles consisting of a charge of explosive, generally a solid propellant, contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

ROCKET MOTORS, LIQUID FUELLED: UN Nos. 0395, 0396

Articles consisting of a liquid fuel within a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without expelling charge: UN Nos. 0322, 0250

Articles consisting of a hypergolic fuel contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

ROCKETS, LINE THROWING: UN Nos. 0238, 0240, 0453

Articles consisting of a rocket motor which is designed to extend a line.

ROCKETS, LIQUID FUELLED with bursting charge: UN Nos. 0397, 0398

Articles consisting of a liquid fuel within a cylinder fitted with one or more nozzles and fitted with a warhead. The term includes guided missiles.

ROCKETS with bursting charge: UN Nos. 0181, 0182

Articles consisting of a rocket motor and a warhead without means of initiation or with means of initiation containing two or more effective protective features. The term includes guided missiles.

ROCKETS with bursting charge: UN Nos. 0180, 0295

Articles consisting of a rocket motor and a warhead with means of initiation not containing two or more effective protective features. The term includes guided missiles.

ROCKETS with expelling charge: UN Nos. 0436, 0437, 0438

Articles consisting of a rocket motor and a charge to expel the payload from a rocket head. The term includes guided missiles.

ROCKETS with inert head: UN Nos. 0183, 0502

Articles consisting of a rocket motor and an inert head. The term includes guided missiles.

SAFETY DEVICES, PYROTECHNIC: UN No. 0503

Articles which contain pyrotechnic substances or dangerous goods of other classes and are used in vehicles, vessels or aircraft to enhance safety to persons. Examples are: air bag inflators, air bag modules, seat-belt pretensioners and pyromechanical devices. These pyromechanical devices are assembled components for tasks such as but not limited to separation, locking, or occupant restraint.

SAMPLES, EXPLOSIVE, other than initiating explosive UN No. 0190

New or existing explosive substances or articles, not yet assigned to a name in Table A of Chapter 3.2 and carried in conformity with the instructions of the competent authority and generally in small quantities, inter alia, for the purposes of testing, classification, research and development, or quality control, or as commercial samples.

Note: *Explosive substances or articles already assigned to another name in Table A of Chapter 3.2 are not included in this definition.*

SIGNAL DEVICES, HAND: UN Nos. 0191, 0373

Portable articles containing pyrotechnic substances which produce visual signals or warnings. The term includes small surface flares such as highway or railway flares and small distress flares.

SIGNALS, DISTRESS, ship: UN Nos. 0194, 0195, 0505, 0506

Articles containing pyrotechnic substances designed to produce signals by means of sound, flame or smoke or any combination thereof.

SIGNALS, RAILWAY TRACK, EXPLOSIVE: UN Nos. 0192, 0193, 0492, 0493

Articles containing a pyrotechnic substance which explodes with a loud report when the article is crushed. They are designed to be placed on a rail.

SIGNALS, SMOKE: UN Nos. 0196, 0197, 0313, 0487, 0507

Articles containing pyrotechnic substances which emit smoke. In addition they may contain devices for emitting audible signals.

SOUNDING DEVICES, EXPLOSIVE: UN Nos. 0374, 0375

Articles consisting of a charge of detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are dropped from ships and function when they reach a predetermined depth or the sea bed.

SOUNDING DEVICES, EXPLOSIVE: UN Nos. 0204, 0296

Articles consisting of a charge of detonating explosive with means of initiation not containing two or more effective protective features. They are dropped from ships and function when they reach a predetermined depth or the sea bed.

SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE (SUBSTANCES, EVI), N.O.S.: UN No. 0482

Substances presenting a mass explosion hazard but which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport, and which have passed Test Series 5.

TORPEDOES, LIQUID FUELLED with inert head: UN No. 0450

Articles consisting of a liquid explosive system to propel the torpedo through the water, with an inert head.

TORPEDOES, LIQUID FUELLED with or without bursting charge: UN No. 0449

Articles consisting of either a liquid explosive system to propel the torpedo through the water, with or with- out a warhead; or a liquid non-explosive system to propel the torpedo through the water, with a warhead.

TORPEDOES with bursting charge: UN No. 0451

Articles consisting of a non-explosive system to propel the torpedo through the water, and a warhead with- out means of initiation or with means of initiation containing two or more effective protective features.

TORPEDOES with bursting charge: UN No. 0329

Articles consisting of an explosive system to propel the torpedo through the water, and a warhead without means of initiation or with means of initiation containing two or more effective protective features.

TORPEDOES with bursting charge: UN No. 0330

Articles consisting of an explosive or non-explosive system to propel the torpedo through the water, and a warhead with means of initiation not containing two or more effective protective features.

TRACERS FOR AMMUNITION: UN Nos. 0212, 0306

Sealed articles containing pyrotechnic substances, designed to reveal the trajectory of a projectile.

TRITONAL: UN No. 0390

Substance consisting of trinitrotoluene (TNT) mixed with aluminium.

WARHEADS, ROCKET with burster or expelling charge: UN No. 0370

Articles consisting of an inert payload and a small charge of detonating or deflagrating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a rocket motor to scatter inert material. The term includes warheads for guided missiles.

WARHEADS, ROCKET with burster or expelling charge: UN No. 0371

Articles consisting of an inert payload and a small charge of detonating or deflagrating explosive, with means of initiation not containing two or more effective protective features. They are designed to be fitted to a rocket motor to scatter inert material. The term includes warheads for guided missiles.

WARHEADS, ROCKET with bursting charge: UN Nos. 0286, 0287

Articles consisting of a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a rocket. The term includes warheads for guided missiles.

WARHEADS, ROCKET with bursting charge: UN No. 0369

Articles consisting of a detonating explosive, with means of initiation not containing two or more effective protective features. They are designed to be fitted to a rocket. The term includes warheads for guided missiles.

WARHEADS, TORPEDO with bursting charge: UN No. 0221

Articles consisting of a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a torpedo.

2.2.2 CLASS 2 Gases

2.2.2.1 Criteria

2.2.2.1.1 The heading of Class 2 covers pure gases, mixtures of gases, mixtures of one or more gases with one or more other substances and articles containing such substances.

A gas is a substance which:

a) at 50 °C has a vapour pressure greater than 300 kPa (3 bar); or

b) is completely gaseous at 20 °C at the standard pressure of 101.3 kPa.

Note 1. *UN No. 1052 HYDROGEN FLUORIDE is nevertheless classified in Class 8.*

Note 2. *A pure gas may contain other components deriving from its production process or added to preserve the stability of the product, provided that the level of these components does not change its classification or its conditions of carriage, such as filling ratio, filling pressure, test pressure.*

Note 3. *N.O.S. entries in 2.2.2.3 may cover pure gases as well as mixtures.*

2.2.2.1.2 The substances and articles of Class 2 are subdivided as follows:

1. Compressed gas – this category includes all gases with a critical temperature less than or equal to -50 °C.
2. Liquefied gas - this category includes all gases with a critical temperature above -50 °C. A distinction is made between:

   - High pressure liquefied gas: a gas with a critical temperature above -50 °C and equal to or below +65 °C; and;

   - Low pressure liquefied gas: *a gas with a critical temperature above +65 °C;*.
3. Refrigerated liquefied gas – a gas which is liquid because of its low temperature.
4. Dissolved gas – a gas which is dissolved in a liquid phase solvent.
5. Aerosol dispensers and receptacles, small, containing gas (gas cartridges).
6. Other articles containing gas under pressure.
7. Non-pressurized gases subject to special requirements.
8. Chemicals under pressure: liquids, pastes or powders, pressurized with a propellant that meets the definition of a compressed or liquefied gas and mixtures thereof.
9. Adsorbed gas: a gas which when packaged for carriage is adsorbed onto a solid porous material resulting in an internal receptacle pressure of less than 101.3 kPa at 20 °C and less than 300 kPa at 50 °C

2.2.2.1.3 Substances and articles (except aerosols and chemicals under pressure) of Class 2 are assigned to one of the following groups according to their hazardous properties, as follows:

A – asphyxiant

O – oxidizing

F – flammable

T - toxic

TF – toxic, flammable

TC – toxic, corrosive

TO – toxic, oxidizing

TFC – toxic, flammable, corrosive

TOC – toxic, oxidizing, corrosive

For gases and gas mixtures presenting hazardous properties associated with more than one group according to the criteria, the groups designated by letter T take precedence over all other groups. The groups designated by letter F take precedence over the groups designated by letters A or O.

Note 1. *In the UN Model Regulations, the IMDG Code and the ICAO Technical Instructions, gases are assigned to one of the following three divisions, based on the primary hazard:*

Division 2.1: flammable gases (corresponding to the groups designated by the capital letter F);

Division 2.2: non-flammable, non-toxic gases (corresponding to the groups designated by the capital letters A or O);

Division 2.3: toxic gases (corresponding to the groups designated by the capital letter T (i.e. T, TF, TC, TO, TFC and TOC).

Note 2. *Receptacles, small containing gas (UN No. 2037) shall be assigned to the groups A to TOC according to the hazard of the contents. For aerosols (UN No. 1950), see 2.2.2.1.6. For chemicals under pressure (UN Nos. 3500 to 3505), see 2.2.2.1.7.*

Note 3. *Corrosive gases are considered to be toxic, and are therefore assigned to the group TC, TFC or TOC.*

2.2.2.1.4 If a mixture of Class 2 mentioned by name in Table A of Chapter 3.2 meets different criteria as mentioned in 2.2.2.1.2 and 2.2.2.1.5, this mixture shall be classified according to the criteria and assigned to an appropriate N.O.S. entry.

2.2.2.1.5 Substances and articles (except aerosols and chemicals under pressure) of Class 2 which are not mentioned by name in Table A of Chapter 3.2 shall be classified under a collective entry listed in 2.2.2.3 in accordance with 2.2.2.1.2 and 2.2.2.1.3. The following criteria shall apply:

Asphyxiant gases

Gases which are non-oxidizing, non-flammable and non-toxic and which dilute or replace oxygen normally in the atmosphere.

Flammable gases

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

a) are ignitable when in a mixture of 13% or less by volume with air; or

b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit. Flammability shall be determined by tests or by calculation, in accordance with methods adopted by ISO (see ISO 10156:2017).

Where insufficient data are available to use these methods, tests by a comparable method recognized by the competent authority of the country of origin may be used. If the country of origin is not an SMGS Contracting State these methods shall be recognized by the competent authority of the first SMGS Contracting State reached by the consignment.

Oxidizing gases

Gases, which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. These are pure gases or gas mixtures with an oxidizing power greater than 23.5% as determined by a method specified in ISO 10156:2017.

Toxic gases

Note: *Gases meeting the criteria for toxicity in part or completely owing to their corrosivity are to be classified as toxic. See also the criteria under the heading "Corrosive gases" for a possible subsidiary corrosivity hazard.*

Gases which:

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

b) are presumed to be toxic or corrosive to humans because they have a LC50 value for acute toxicity equal to or less than 5 000 ml/m³ (ppm) when tested in accordance with 2.2.61.1.

In the case of gas mixtures (including vapours of substances from other classes) the following formula may be used:

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

where

f_i – mole fraction of the ith component substance of the mixture;

T_i – = toxicity index of the ith component substance of the mixture. The Ti equals the LC50 value as found in packing instruction P200 of 4.1.4.1. When no LC50 value is listed in packing instruction P200 of 4.1.4.1, a LC50 value available in scientific literature shall be used. When the LC50 value is un known, the toxicity index is determined by using the lowest LC50 value of substances of similar physiological and chemical effects, or through testing if this is the only practical possibility.

Corrosive gases

Gases or gas mixtures meeting the criteria for toxicity completely owing to their corrosivity are to be classified as toxic with a subsidiary corrosivity hazard.

A gas mixture that is considered to be toxic due to the combined effects of corrosivity and toxicity has a subsidiary hazard of corrosivity when the mixture is known by human experience to be destructive to the skin, eyes or mucous membranes or when the LC50 value of the corrosive components of the mixture is equal to or less than 5 000 ml/m3 (ppm) when the LC50 is calculated by the formula:

$$LC_{50}\ \text{Corrosive (mixture)} = \frac{1}{\sum_{i=1}^{n} \frac{fc_i}{Tc_i}}$$

where

fc_i – mole fraction of the ith corrosive component substance of the mixture;

Tc_i – oxicity index of the ith corrosive component substance of the mixture. The Tci equals the LC50 value as found in packing instruction P200 of 4.1.4.1. When no LC50 value is listed in packing instruction P200 of 4.1.4.1, a LC50 value available in scientific literature shall be used. When the LC50 value is unknown the toxicity index is determined by using the lowest LC50 value of substances of similar physiological and chemical effects, or through testing if this is the only practical possibility.

2.2.2.1.6 **Aerosols** (aerosol dispensers)

Aerosols (UN No. 1950) are assigned to one of the following groups according to their hazardous properties, as follows:

A: - asphyxiant;
O: - oxidizing;
F: - flammable;
T: - toxic;
C: - corrosive;
CO: - corrosive, oxidizing;
FC: -легковоспламеняющиеся, коррозионные;

TF: - flammable, corrosive;
TC: - toxic, corrosive;
TO: - toxic, oxidizing;
TFC: - toxic, flammable, corrosive;
TOC: - toxic, oxidizing, corrosive.

Note: *Gases, which meet the definition of toxic gases according to 2.2.2.1.5 and gases identified as "Considered as pyrophoric" by table note c of Table 2 of packing instruction P 200 in 4.1.4.1, shall not be used as a propellant in an aerosol dispenser. Aerosols with contents meeting the criteria for packing group I for toxicity or corrosivity shall not be accepted for carriage (see also 2.2.2.2.2).*

The following criteria shall apply:

a) Assignment to group A shall apply when the contents do not meet the criteria for any other group according to sub-paragraphs (b) to (f) below;

b) Assignment to group O shall apply when the aerosol contains an oxidizing gas according to 2.2.2.1.5;

c) Assignment to group F shall apply if the contents include 85% by mass or more flammable components and the chemical heat of combustion is 30 kJ/g or more.

It shall not apply if the contents contain 1% by mass or less flammable components and the heat of combustion is less than 20 kJ/g.

Otherwise the aerosol shall be tested for flammability in accordance with the tests described in the Manual of Tests and Criteria, Part III, section 31. Extremely flammable and flammable aerosols shall be assigned to group F.

Note: *Flammable components are flammable liquids, flammable solids or flammable gases and gas mixtures as defined in Notes 1 to 3 of sub-section 31.1.3 of Part III of the Manual of Tests and Criteria. This designation does not cover pyrophoric, self-heating or water-reactive substances. The chemical heat of combustion shall be determined by one of the following methods: ASTM D 240, ISO/FDIS 13943:1999 (E/F) 86.1 to 86.3 or NFPA 30B.,*

d) Assignment to group T shall apply when the contents, other than the propellant of aerosol dispensers to be ejected, are classified as Class 6.1, packing groups II or III;

e) Assignment to group C shall apply when the contents, other than the propellant of aerosol dispensers to be ejected, meet the criteria for Class 8, packing groups II or III;

f) When the criteria for more than one group amongst groups O, F, T, and C are met, assignment to groups CO, FC, TF, TC TO, TFC or TOC shall apply, as relevant.

2.2.2.1.7 Chemicals under pressure

Chemicals under pressure (UN Nos. 3500 to 3505) are assigned to one of the following groups according to their hazardous properties, as follows:

A - asphyxiant;

F - flammable;

T - toxic;

C - corrosive;

FC - flammable, corrosive;

TF - toxic, flammable.

The classification depends on the hazard characteristics of the components in the different states:

The propellant;

The liquid; or

The solid.

Note 1: *Gases, which meet the definition of toxic gases or of oxidizing gases according to 2.2.2.1.5 or gases identified as "Considered as pyrophoric" by table note c of Table 2 of packing instruction P 200 in 4.1.4.1, shall not be used as a propellant in chemicals under pressure.*

Note 2: *Chemicals under pressure with contents meeting the criteria for packing group I for toxicity or corrosivity or with contents meeting both the criteria for packing group II or III for toxicity and for packing group II or III for corrosivity shall not be accepted for carriage under these UN numbers.*

Note 3: *Chemicals under pressure with components meeting the properties of Class 1; liquid desensitized explosives of Class 3; self-reactive substances and solid desensitized explosives of Class 4.1; Class 4.2; Class 4.3; Class 5.1; Class 5.2; Class 6.2; or Class 7, shall not be used for carriage under these UN numbers.*

Note 4: *A chemical under pressure in an aerosol dispenser shall be carried under UN No. 1950.*

The following criteria shall apply:

a) Assignment to group A shall apply when the contents do not meet the criteria for any other group according to sub-paragraphs (b) to (e) below

(b) Assignment to group F shall apply if one of the components, which can be a pure substance or a mixture, needs to be classified as flammable. Flammable components are flammable liquids and liquid mixtures, flammable solids and solid mixtures or flammable gases and gas mixtures meeting the following criteria:

I) A flammable liquid is a liquid having a flashpoint of not more than 93 °C;

II) A flammable solid is a solid which meets the criteria in 2.2.41.1;

III) A flammable gas is a gas which meets the criteria in 2.2.2.1.;

c) Assignment to group T shall apply when the contents, other than the propellant, are classified as dangerous goods of Class 6.1, packing groups II or III;

d) Assignment to group C shall apply when the contents, other than the propellant, are classified as dangerous goods of Class 8, packing groups II or III;

e) When the criteria for two groups amongst groups F, T, and C are met, assignment to groups FC or TF shall apply, as relevant.

2.2.2.2 Gases not accepted for carriage

2.2.2.2.1 Chemically unstable gases of Class 2 shall not be accepted for carriage

- unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of carriage or
- unless carried in accordance with special packing provision (r) of packing instruction P 200 (10) of 4.1.4.1, as applicable.

For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions. If temperature control is required to prevent polymerization of a substance the substance shall not be accepted for carriage:

- in a packaging or IBC with an SAPT of 50 °C or less,

- or in a tank with an SAPT of 45 °C or less.

2.2.2.2.2 The following substances and mixtures shall not be accepted for carriage:

- UN No. 2186 HYDROGEN CHLORIDE, REFRIGERATED LIQUID;

- UN No. 2421 NITROGEN TRIOXIDE;

- UN No. 2455 METHYL NITRITE;

- Refrigerated liquefied gases which cannot be assigned to classification codes 3A, 3O or 3F;

- Dissolved gases which cannot be classified under UN Nos. 1001, 1043, 2073 or 3318. For UN No. 1043, see special provision 642;

- Aerosols where gases which are toxic according to 2.2.2.1.5 or pyrophoric according to packing instruction P200 in 4.1.4.1 are used as propellants;

- Aerosols with contents meeting the criteria for packing group I for toxicity or corrosivity (see 2.2.61 and 2.2.8);

- Receptacles, small, containing gases which are very toxic (LC50 lower than 200 ppm) or pyrophoric according to packing instruction P200 in 4.1.4.1.

2.2.2.3 List of collective entries

Classification code	UN No.	Name of the substance or article
Compressed gases		
1A 1O	1956 3156	COMPRESSED GAS, N.O.S. COMPRESSED GAS, OXIDIZING, N.O.S.
1F	1964 1954	HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S. COMPRESSED GAS, FLAMMABLE, N.O.S..
1T	1955	COMPRESSED GAS, TOXIC, N.O.S
1TF	1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S
1TC	3304	COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S
1TO	3303	COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S..
1TFC	3305	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.
1TOC	3306	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.
Liquefied gases		
2A	1058 1078 1968 3163	LIQUEFIED GASES, non-flammable, charged with nitrogen, carbon dioxide or air REFRIGERANT GAS, N.O.S. such as mixtures of gases, Indicated by the letter R..., which as: Mixture F1, have a vapour pressure at 70 °C not exceeding 1.3 MPa (13 bar) and a density at 50 °C not lower than that of dichlorofluoromethane (1.30 kg/l); Mixture F2, have a vapour pressure at 70 °C not exceeding 1.9 MPa (19 bar) and a density at 50 °C not lower than that of dichlorodifluoromethane (1.21 kg/l); Mixture F3, have a vapour pressure at 70 °C not exceeding 3 MPa (30 bar) and a density at 50 °C not lower than that of chlorodifluoromethane (1.09 kg/l). Note: Trichlorofluoromethane (Refrigerant R 11), 1,1,2-trichloro-1,2,2- trifluoroethane (Refrigerant R 113), 1,1,1-trichloro-2,2,2-trifluoroethane (Refrigerant R 113a), 1-chloro-1,2,2-trifluoroethane (Refrigerant R 133) and 1-chloro-1,1,2-trifluoroethane (Refrigerant R 133b) are not substances of Class 2. They may, however, enter into the composition of mixtures F1 to F3. INSECTICIDE GAS, N.O.S. LIQUEFIED GAS, N.O.S. INSECTICIDE GAS, N.O.S. LIQUEFIED GAS, N.O.S.
2O	3157	LIQUEFIED GAS, OXIDIZING, N.O.S.
2F	1010 1060	BUTADIENES, STABILIZED or BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, containing more than 40% butadienes. METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED such as mixtures of methylacetylene and propadiene with hydrocarbons, which as:

		Mixture P1, contain not more than 63% methylacetylene and propadiene by volume and not more than 24% propane and propylene by volume, the per-centage of C4- saturated hydrocarbons being not less than 14% by volume; and as Mixture P2, contain not more than 48% methylacetylene and propadiene by volume and not more than 50% propane and propylene by volume, the per-centage of C4- saturated hydrocarbons being not less than 5% by volume, as well as mixtures of propadiene with 1 to 4% methylacetylene.
	1965	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S such as mixtures, which as: Mixture A, have a vapour pressure at 70 °C not exceeding 1.1 MPa (11 bar) and a density at 50 °C not lower than 0.525 kg/l; Mixture A01, have a vapour pressure at 70 °C not exceeding 1.6 MPa (16 bar) and a relative density at 50 °C not lower than 0.516 kg/l; Mixture A02, have a vapour pressure at 70 °C not exceeding 1.6 MPa (16 bar) and a relative density at 50 °C not lower than 0.505 kg/l; Mixture A0, have a vapour pressure at 70 °C not exceeding 1.6 MPa (16 bar) and a density at 50 °C not lower than 0.495 kg/l; Mixture A1, have a vapour pressure at 70 °C not exceeding 2.1 MPa (21 bar) and a density at 50 °C not lower than 0.485 kg/l; Mixture B1 have a vapour pressure at 70 °C not exceeding 2.6 MPa (26 bar) and a relative density at 50 °C not lower than 0.474 kg/l; Mixture B2 have a vapour pressure at 70 °C not exceeding 2.6 MPa (26 bar) and a relative density at 50 °C not lower than 0.463 kg/l; Mixture B, have a vapour pressure at 70 °C not exceeding 2.6 MPa (26 bar) and a density at 50 °C not lower than 0.450 kg/l; Mixture C, have a vapour pressure at 70 °C not exceeding 3.1 MPa (31 bar) and a relative density at 50 °C not lower than 0.440 kg/l; Note 1: In the case of the foregoing mixtures, the use of the following names customary in the trade is permitted for describing these sub- stances: for mixtures A, A01, A02 and A0: BUTANE; for mixture C: PROPANE. 2: UN No. 1075 PETROLEUM GASES, LIQUEFIED may be used as an alternative entry for UN No. 1965 HYDROCARBON GAS MIX- TURE LIQUEFIED, N.O.S. for carriage prior to or following maritime or air carriage.
	3354	INSECTICIDE GAS, FLAMMABLE, N.O.S.
	3161	LIQUEFIED GAS, FLAMMABLE, N.O.S.
2T	1967	INSECTICIDE GAS, TOXIC, N.O.S
	3162	LIQUEFIED GAS, TOXIC, N.O.S.
2TF	3355	INSECTICIDE GAS, TOXIC, FLAMMABLE, N.O.S.
	3160	LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S.
2TC	3308	LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S..
2TO	3307	LIQUEFIED GAS, TOXIC, OXIDIZING, N.O.S.
2TFC	3309	LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.
2TOC	3310	LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S
Refrigerated liquefied gases		
3A	3158	GAS, REFRIGERATED LIQUID, N.O.S..
3O	3311	GAS, REFRIGERATED LIQUID, OXIDIZING, N.O.S.
3F	3312	GAS, REFRIGERATED LIQUID, FLAMMABLE, N.O.S.
Dissolved gases		
4		Only substances listed in Table A of Chapter 3.2 are to be accepted for carriage.

Aerosols and receptacles, small, containing gas		
5	1950 2037	AEROSOLS (aerosol dispensers) RECEPTACLES, SMALL CONTAINING GAS (GAS CARTRIDGES) without arelease device, non-refillable
Other articles containing gas under pressure		
6A	2857 3164 3164 3558	REFRIGERATING MACHINES containing non-flammable, non-toxic gases or ammonia solutions (UN 2672) ARTICLES, PRESSURIZED, PNEUMATIC (containing non-flammable gas) or ARTICLES, PRESSURIZED, HYDRAULIC (containing non-flammable gas) ARTICLES CONTAINING NON-FLAMMABLE, NON TOXIC GAS, N.O.S.
6F	3150 3150 3358 3478 3478 3478 3479 3479 3479 3529 3529 3529 3529	DEVICES, SMALL, HYDROCARBON GAS POWERED or HYDROCARBON GAS REFILLS FOR SMALL DEVICES, with release device REFRIGERATING MACHINES containing flammable, non-toxic, liquefied gas FUEL CELL CARTRIDGES, containing liquefied flammable gas or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT, containing liquefied flammable gas or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing liquefied flammable gas FUEL CELL CARTRIDGES, containing hydrogen in metal hydride or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT, containing hydrogen in metal hydride or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing hydrogen in metal hydride ENGINE, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or ENGINE, FUEL CELL, FLAMMABLE GAS POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE GAS POWERED or MACHINERY, FUEL CELL, FLAMMABLE GAS POWERED
6T	3539	ARTICLES CONTAINING TOXIC GAS, N.O.S.
Gas samples		
7F	3167	GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, N.O.S., not refrigerated liquid
7T	3169	GAS SAMPLE, NON-PRESSURIZED, TOXIC, N.O.S., not refrigerated liquid
7TF	3168	GAS SAMPLE, NON-PRESSURIZED, TOXIC, FLAMMABLE, N.O.S., not refrigerated liquid
Chemicals under pressure		
8A	3500	CHEMICAL UNDER PRESSURE, N.O.S.
8F	3501	CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S.
8T	3502	CHEMICAL UNDER PRESSURE, TOXIC, N.O.S
8C	3503	CHEMICAL UNDER PRESSURE, CORROSIVE, N.O.S.
8TF	3504	CHEMICAL UNDER PRESSURE, FLAMMABLE, TOXIC, N.O.S.
8FC	3505	CHEMICAL UNDER PRESSURE, FLAMMABLE, CORROSIVE, N.O.S.
Adsorbed gases		
9A	3511	ADSORBED GAS, N.O.S.
9O	3513	ADSORBED GAS, OXIDIZING, N.O.S
9F	3510	ADSORBED GAS, FLAMMABLE, N.O.S.

9T	3512	ADSORBED GAS, TOXIC, N.O.S
9TF	3514	ADSORBED GAS, TOXIC, FLAMMABLE, N.O.S.
9TC	3516	ADSORBED GAS, TOXIC, CORROSIVE, N.O.S.
9TO	3515	ADSORBED GAS, TOXIC, OXIDIZING, N.O.S.
9TFC	3517	ADSORBED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S
9TOC	3518	ADSORBED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S

2.2.3 CLASS 3 FLAMMABLE LIQUIDS

2.2.3.1 Criteria

2.2.3.1.1 The heading of Class 3 covers substances and articles containing substances of this Class which:

– are liquids according to subparagraph (a) of the definition for "liquid" in 1.2.1;

– have at 50 °C a vapour pressure of not more than 300 kPa (3 bar) and are not completely gaseous at 20 °C and at standard pressure of 101.3 kPa; and;

– have a flash-point of not more than 60 °C (see 2.3.3.1 for the relevant test).

The heading of Class 3 also covers liquid substances and molten solid substances with a flash-point of more than 60 °C and which are carried or handed over for carriage whilst heated at temperatures equal to or higher than their flash-point. These substances are assigned to UN No. 3256

The heading of Class 3 also covers liquid desensitized explosives. Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form an homogeneous liquid mixture to suppress their explosive properties. Such entries in Table A of Chapter 3.2 are UN Nos. 1204, 2059, 3064, 3343, 3357 and 3379.

Note 1: *Substances having a flash-point above 35 °C which do not sustain combustion according to the criteria of sub-section 32.2.5 of Part III of the Manual of Tests and Criteria, are not substances of Class 3; if, however, these substances are handed over for carriage and carried whilst heated at temperatures equal to or higher than their flash-point, they are substances of Class 3.*

Note 2: *By derogation from paragraph 2.2.3.1.1 above, diesel fuel, gasoil, heating oil (light) including synthetically manufactured products having a flash-point above 60 °C and not more than 100 °C shall be deemed substances of Class 3, UN No. 1202.*

Note 3: *Flammable liquids which are highly toxic by inhalation, as defined in 2.2.61.1.4 to 2.2.61.1.9, and toxic substances having a flash-point of 23 °C or above are substances of Class 6.1 (see 2.2.61.1). Liquids which are highly toxic by inhalation are indicated as "toxic by inhalation" in their proper shipping name in Column (2) or by special provision 354 in Column (6) of Table A of Chapter 3.2.*

Note 4: *Flammable liquid substances and preparations used as pesticides, which are highly toxic, toxic or slightly toxic and have a flash-point of 23 °C or above are substances of Class 6.1 (see 2.2.61.1).*

2.2.3.1.2 The substances and articles of Class 3 are subdivided as follows:

F Flammable liquids, without subsidiary risk and articles containing such substances:

- **F1** Flammable liquids having a flash-point of or below 60 °C;
- **F2** Flammable liquids having a flash-point above 60 °C which are carried or handed over for carriage at or above their flash-point (elevated temperature substances);
- **F3** Articles containing flammable liquids

FT Flammable liquids, toxic:

- **FT1** Flammable liquids, toxic;
- **FT2** Pesticides**;**

FC Flammable liquids, corrosive

FTC Flammable liquids, toxic, corrosive;

D Liquid desensitized explosives.

2.2.3.1.3 Substances and articles classified in Class 3 are listed in Table A of Chapter 3.2. Substances not mentioned by name in Table A of Chapter 3.2 shall be assigned to the

relevant entry of 2.2.3.3 and the relevant packing group in accordance with the provisions of this section. Flammable liquids shall be assigned to one of the following packing groups according to the degree of danger they present for carriage:

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

[a] See also 2.2.3.1.4.

For a liquid with (a) subsidiary risk(s), the packing group determined in accordance with the table above and the packing group based on the severity of the subsidiary risk(s) shall be considered; the classification and packing group shall then be determined in accordance with the table of precedence of hazards in 2.1.3.10.

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

a) The viscosity[7] and flash-point are in accordance with the following Table:

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

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

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

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

Note: *These provisions also apply to mixtures containing no more than 20% nitrocellulose with a nitrogen content not exceeding 12.6% by dry mass. Mixtures containing more than 20% but not more than 55% nitrocellulose with a nitrogen content not exceeding 12.6% by dry mass are substances assigned to UN No. 2059.*

Mixtures having a flash-point below 23 °C and containing:

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

– more than 55% nitrocellulose, whatever their nitrogen content; or

– not more than 55% nitrocellulose with a nitrogen content above 12.6% by dry mass) are substances of Class 1 (UN Nos. 0340 or 0342) or of Class 4.1 (UN Nos. 2555, 2556 or 2557).

2.2.3.1.5 *Viscous liquids*

2.2.3.1.5.1 Except as provided for in 2.2.3.1.5.2, viscous liquids which:
- have a flash-point of 23 °C or above and less than or equal to 60 °C;
- are not toxic, corrosive or environmentally hazardous;
- contain not more than 20% nitrocellulose provided the nitrocellulose contains not more than 12.6% nitrogen by dry mass; and
- are packed in receptacles of not more than 450 litre capacity

are not subject to Annex 2 to SMGS, if:

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

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

- 60 seconds, or

- 40 seconds, if the viscous liquid contains not more than 60% of Class 3 substances.

2.2.3.1.5.2 Viscous liquids which are also environmentally hazardous, but meet all other criteria in 2.2.3.1.5.1, are not subject to any other provisions of Annex 2 to SMGS when they are carried in single or combination packagings containing a net quantity per single or inner packaging of 5 litres or less, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

2.2.3.1.6 If substances of Class 3, as a result of admixtures, come into categories of risk different from those to which the substances mentioned by name in Table A of Chapter 3.2 belong, these mixtures or solutions shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

Note: *For the classification of solutions and mixtures (such as preparations and wastes) see also 2.1.3.*

2.2.3.1.7 On the basis of the test procedures in accordance with 2.3.3.1 and 2.3.4, and the criteria set out in 2.2.3.1.1, it may also be determined whether the nature of a solution or a mixture mentioned by name or containing a substance mentioned by name is such that the solution or mixture is not subject to the provisions for this Class (see also 2.1.3).

2.2.3.2 Substances not accepted for carriage

2.2.3.2.1 Substances of Class 3 which are liable to form peroxides easily (as happens with ethers or with certain heterocyclic oxygenated substances) shall not be accepted for carriage if their peroxide content, calculated as hydrogen peroxide (H2O2), exceeds 0.3%. The peroxide content shall be determined as indicated in 2.3.3.3.

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

If temperature control is required to prevent polymerization of a substance the substance shall not be accepted for carriage:

- in a packaging or IBC with an SAPT of 50 °C or less,

- or in a tank with an SAPT of 45 °C or less.

2.2.3.2.3 Liquid desensitized explosives other than those listed in Table A of Chapter 3.2 shall not be accepted for carriage as substances of Class 3.

2.2.3.3 List of collective entries

Subsidiary risk	Classification code	UN No.	Name of the substance or article
Flammable liquids and articles containing such substances			
without subsidiary risk F	**F1**	1133	ADHESIVES containing flammable liquid
		1136	COAL TAR DISTILLATES, FLAMMABLE
		1139	COATING SOLUTION (includes surface treatments or coatings used for industrial or other purposes such as vehicle undercoating, drum or barrel lining)
		1197	EXTRACTS, LIQUID, for flavour or aroma
		1210	PRINTING INK, flammable or
		1210	PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable
		1263	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or
		1263	PAINT RELATED MATERIAL (including paint thinning or reducing compound)
		1266	PERFUMERY PRODUCTS with flammable solvents
		1293	TINCTURES, MEDICINAL
		1306	WOOD PRESERVATIVES, LIQUID
		1866	RESIN SOLUTION, flammable
		1999	TARS, LIQUID, including road oils, and cutback bitumens
		3065	ALCOHOLIC BEVERAGES
		1224	KETONES, LIQUID, N.O.S.
		1268	PETROLEUM DISTILLATES, N.O.S. or
		1268	PETROLEUM PRODUCTS, N.O.S.
		1987	ALCOHOLS, N.O.S..
		1989	ALDEHYDES, N.O.S.
		2319	TERPENE HYDROCARBONS, N.O.S
		3271	ETHERS, N.O.S.
		3272	ESTERS, N.O.S.
		3295	HYDROCARBONS, LIQUID, N.O.S..
		3336	MERCAPTANS, LIQUID, FLAMMABLE, N.O.S. or
		3336	MERCAPTANS MIXTURE, LIQUID, FLAMMABLE, N.O.S.
		1993	FLAMMABLE LIQUID, N.O.S.
	F2 Elevated temperature	3256	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S., with flash-point above 60 °C, at or above its flash-point
	Articles F3	3269	POLYESTER RESIN KIT
		3473	FUEL CELL CARTRIDGES or
		3473	FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or
		3473	FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT
		3528	ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or
		3528	ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or
		3528	MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or
		3528	MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED
		3540	ARTICLES CONTAINING FLAMMABLE LIQUID, N.O.S.

		1228 MERCAPTANS, LIQUID, FLAMMABLE, TOXIC, N.O.S. or 1228 MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, TOXIC, N.O.S. 1986 ALCOHOLS, FLAMMABLE, TOXIC, N.O.S. 1988 ALDEHYDES, FLAMMABLE, TOXIC, N.O.S 2478 ISOCYANATES, FLAMMABLE, TOXIC, N.O.S. or 2478 ISOCYANATE SOLUTION, FLAMMABLE, TOXIC, N.O.S. 3248 MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S. 3273 NITRILES, FLAMMABLE, TOXIC, N.O.S. 1992 FLAMMABLE LIQUID, TOXIC, N.O.S.
	FT1	
Toxic FT	**pesticide (flash point below 23 °C) FT2**	2758 CARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2760 ARSENICAL PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2762 ORGANOCHLORINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2764 TRIAZINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2772 THIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2776 COPPER BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2778 MERCURY BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2780 SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2782 BIPYRIDILIUM PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2784 ORGANOPHOSPHORUS PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2787 ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC 3024 COUMARIN DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 3346 PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 3350 PYRETHROID PESTICIDE, LIQUID, FLAMMABLE TOXIC 3021 PESTICIDE, LIQUID, FLAMMABLE, TOXIC, N.O.S ***Note:*** *The classification of a pesticide under an entry shall be effected on the basis of the active ingredient, of the physical state of the pesticide and any subsidiary risks it may exhibit.*
		3469 PAINT, FLAMMABLE, CORROSIVE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or 3469 PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint thinning and reducing compound)
Corrosive	**FC**	2733 AMINES, FLAMMABLE, CORROSIVE, N.O.S. or 2733 POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S. 2985 CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S. 3274 ALCOHOLATES SOLUTION, N.O.S., in alcohol 2924 FLAMMABLE LIQUID, CORROSIVE, N.O.S.
Toxic, corrosive	**FTC**	3286 FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S.
Liquid desensitized explosive	**D**	3343 NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, FLAMMA BLE, N.O.S. with not more than 30% nitroglycerin by mass 3357 NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30% nitroglycerin by mass 3379 DESENSITIZED EXPLOSIVE, LIQUID, N.O.S.

2.2.41 CLASS 4.1 FLAMMABLE SOLIDS, SELF-REACTIVE SUBSTANCES, POLYMERIZING SUBSTANCES AND SOLID DESENSITIZED EXPLOSIVES

2.2.41.1 Criteria

2.2.41.1.1 The heading of Class 4.1 covers flammable substances and articles, desensitized explosives which are solids according to subparagraph (a) of the definition "solid" in 1.2.1 and self-reactive liquids or solids and polymerizing substances.

The following are assigned to Class 4.1:

– readily flammable solid substances and articles (see paragraphs 2.2.41.1.3 to 2.2.41.1.8);

– self-reactive solids or liquids (see paragraphs 2.2.41.1.9 to 2.2.41.1.16);

– solid desensitized explosives (see 2.2.41.1.18);

– substances related to self-reactive substances (see 2.2.41.1.19);

– polymerizing substances (see 2.2.41.1.20).

2.2.41.1.2 The substances and articles of Class 4.1 are subdivided as follows:

F Flammable solids, without subsidiary risk:

F1 Organic;

F2 Organic, molten;

F3 Inorganic;

F4 Articles;

FO Flammable solids, oxidizing;

FT Flammable solids, toxic:

FT1 Organic, toxic;

FT2 Inorganic, toxic;

FC Flammable solids, corrosive:

FC1 Organic, corrosive;

FC2 Inorganic, corrosive;

D Solid desensitized explosives without subsidiary risk;

DT Solid desensitized explosives, toxic;

SR Self-reactive substances:

SR1 Not requiring temperature control;

SR2 Requiring temperature control**.**

PM Polymerizing substances:

PM1 Not requiring temperature control;

PM2 Requiring temperature control (not accepted for carriage by rail).

Flammable solids

Definition and properties

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

Readily combustible solids are powdered, granular, or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. The danger may come not only from the fire but also from toxic combustion products. Metal powders are especially dangerous

because of the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.

Classification

2.2.41.1.4 Substances and articles classified as flammable solids of Class 4.1 are listed in Table A of Chapter 3.2. The assignment of organic substances and articles not mentioned by name in Table A of Chapter 3.2 to the relevant entry of 2.2.41.3 in accordance with the provisions of Chapter 2.1 can be based on experience or on the results of the test procedures in accordance with Part III, sub-section 33.2. of the Manual of Tests and Criteria. The assignment of inorganic substances not mentioned by name shall be based on the results of the test procedures in accordance with Part III, sub-section 33.2. of the Manual of Tests and Criteria; experience shall also be taken into account when it leads to a more stringent assignment.

2.2.41.1.5 When substances not mentioned by name are assigned to one of the entries listed in 2.2.41.3 on the basis of the test procedures in accordance with the Manual of Tests and Criteria, Part III, sub-section 33.2., the following criteria apply:

a) With the exception of metal powders or powders of metal alloys, powdery, granular or pasty substances shall be classified as readily flammable substances of Class 4.1 if they can be easily ignited by brief contact with an ignition source (e.g. a burning match), or if, in the event of ignition, the flame spreads rapidly, the burning time is less than 45 seconds for a measured distance of 100 mm or the rate of burning is greater than 2.2 mm/s.

b) Metal powders or powders of metal alloys shall be assigned to Class 4.1 if they can be ignited by a flame and the reaction spreads over the whole length of the sample in 10 minutes or less.

Solids which may cause fire through friction shall be classified in Class 4.1 by analogy with existing entries (e.g. matches) or in accordance with any appropriate special provision.

2.2.41.1.6 On the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, Section33.2.1 and the criteria set out in 2.2.41.1.4 and 2.2.41.1.5, it may also be determined whether the nature of a substance mentioned by name is such that the substance is not subject to the provisions for Class 4.1.

2.2.41.1.7 If substances of Class 4.1, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in Table A of Chapter 3.2 belong, these mixtures shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

Note: *For the classification of solutions and mixtures (such as preparations and wastes), see also 2.1.3.*

Assignment of packaging groups

2.2.41.1.8 Flammable solids classified under the various entries in Table A of Chapter 3.2 shall be assigned to packing groups II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, sub-section 33.2, in accordance with the following criteria:

a) Readily flammable solids which, when tested, have a burning time of less than 45 seconds over a measured distance of 100 mm shall be assigned to:

Packing group II: if the flame passes the wetted zone;

Packing group III: if the wetted zone stops the flame for at least four minutes;

b) Metal powders or powders of metal alloys shall be assigned to:

Packing group II: if, when tested, the reaction spreads over the whole length of the sample in five minutes or less;

Packing group III: if, when tested, the reaction spreads over the whole length of the sample in more than five minutes.

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

Self-reactive substances

Definitions

2.2.41.1.9 For the purposes of Annex 2 to SMGS, self-reactive substances are thermally unstable substances liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). Substances are not considered to be self-reactive substances of Class 4.1, if:

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

b) they are oxidizing substances according to the classification procedure for Class 5.1 (see 2.2.51.1) except that mixtures of oxidizing substances which contain 5% or more of combustible organic sub- stances shall be subjected to the classification procedure defined in Note 2;

c) they are organic peroxides according to the criteria of Class 5.2 (see 2.2.52.1);

d) their heat of decomposition is less than 300 J/g;

e) their self-accelerating decomposition temperature (SADT) (see Note 3 below) is greater than 75 °C for a 50 kg package.

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

Note 2: *Mixtures of oxidizing substances meeting the criteria of Class 5.1 which contain 5% or more of combustible organic substances, which do not meet the criteria mentioned in (a), (c), (d) or (e) above, shall be subjected to the self-reactive substance classification procedure.*

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

A mixture showing the properties of a self-reactive substance, type G, according to the principle given in section 20.4.3 (g) of Part II of the Manual of Tests and Criteria shall be considered for classification as a substance of Class 5.1 (see 2.2.51.1).

Note 3: *The self-accelerating decomposition temperature (SADT) is the lowest temperature at which self-accelerating decomposition may occur with a substance in the packaging as used during carriage. Requirements for the determination of the SADT are given in the Manual of Tests and Criteria, Part II, Chapter 20 and section 28.4.*

Note 4: *Any substance which shows the properties of a self-reactive substance shall be classified as such, even if this substance gives a positive test result according to 2.2.42.1.5 for inclusion in Class 4.2.*

Properties

2.2.41.1.10 The decomposition of self-reactive substances can be initiated by heat, contact with catalytic impurities (e.g. acids, heavy-metal compounds, bases), friction or impact. The rate of decomposition increases with temperature and varies with the substance. Decomposition, particularly if no ignition occurs, may result in the evolution of toxic gases or vapours. For certain self-reactive substances, the temperature shall be controlled.

Some self-reactive substances may decompose explosively, particularly if confined. This characteristic may be modified by the addition of diluents or by the use of appropriate packagings. Certain self-reactive substances burn vigorously. Self-reactive substances are, for example, some compounds of the types listed below:

aliphatic azo compounds (-C-N=N-C-);

organic azides (-C-N_3);

diazonium salts (-$CN_2^+Z^-$);

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

aromatic sulphonylhydrazides (-SO_2-NH-NH_2).

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

Classification

2.2.41.1.11 Self-reactive substances are classified into seven types according to the degree of danger they present. The types of self-reactive substances range from type A, which is not accepted for carriage in the packaging in which it is tested, to type G, which is not subject to the provisions for self-reactive substances of Class 4.1. The classification of types B to F is directly related to the maximum quantity allowed in one packaging. The principles to be applied for classification as well as the applicable classification procedures, test methods and criteria and an example of a suitable test report are given in Part II of the Manual of Tests and Criteria.

2.2.41.1.12 Self-reactive substances which have already been classified and are already permitted for carriage in packagings are listed in 2.2.41.4, those already permitted for carriage in IBCs are listed in 4.1.4.2, packing instruction IBC520 and those already permitted for carriage in tanks according to Chapter 4.2 are listed in 4.2.5.2, portable tank instruction T23. Each permitted substance listed is assigned to a generic entry of Ta- ble A of Chapter 3.2 (UN Nos. 3221 to 3240) and appropriate subsidiary risks and remarks providing relevant transport information are given.
The collective entries specify:

– self-reactive substances typesB, C, D, E, F see. 2.2.41.1.11;

– physical state (liquid/solid).).

The classification of the self-reactive substances listed in 2.2.41.4 is based on the technically pure substance (except where a concentration of less than 100% is specified).

2.2.41.1.13 Classification of self-reactive substances not listed in 2.2.41.4, 4.1.4.2, packing instruction IBC520 or 4.2.5.2, portable tank instruction T23 and assignment to a collective entry shall be made by the competent authority of the country of origin on the basis of a test report. The statement of approval shall contain the classification and the relevant conditions of carriage. If the country of origin is not an SMGS Contracting State, the classification and the conditions of carriage shall be recognized by the competent authority of the first SMGS Contracting State reached by the consignment.

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

2.2.41.1.15 Samples of self-reactive substances or formulations of self-reactive substances not listed in 2.2.41.4, for which a complete set of test results is not available and which are to be carried for further testing or evaluation, shall be assigned to one of the appropriate entries for self-reactive substances type C provided the following conditions are met:

– the available data indicate that the sample would be no more dangerous than self-reactive substances type B;

– the sample is packaged in accordance with packing method OP2 and the quantity per wagon is limited to 10 kg;

Samples requiring temperature control shall not be accepted for carriage by rail.

Desensitization

2.2.41.1.16 In order to ensure safety during carriage, self-reactive substances are in many cases desensitized by use of a diluent. Where a percentage of a substance is stipulated, this refers to the percentage by mass, rounded to the nearest whole number. If a diluent is used, the self-reactive substance shall be tested with the diluent present in the concentration and form used in carriage. Diluents which may allow a self-reactive substance to concentrate to a dangerous extent in the event of leakage from a packaging shall not be used. Any diluent shall be compatible with the self-reactive substance. In this regard, compatible diluents are those solids or liquids which have no detrimental influence on the thermal stability and hazard type of the self-reactive substance.

2.2.41.1.17 (Reserved)

Solid desensitized explosives

2.2.41.1.18 Solid desensitized explosives are substances which are wetted with water or alcohols or are diluted with other substances to suppress their explosive properties. Such entries in Table A of Chapter 3.2 are: UN Nos. 1310, 1320, 1321, 1322, 1336, 1337, 1344, 1347, 1348, 1349, 1354, 1355, 1356, 1357, 1517, 1571, 2555, 2556, 2557, 2852, 2907, 3317, 3319, 3344, 3364, 3365, 3366, 3367, 3368, 3369, 3370, 3376, 3380 and 3474.

Substances related to self-reactive substances

2.2.41.1.19 Substances that:

a) have been provisionally accepted into Class 1 according to Test Series 1 and 2 but exempted from Class 1 by Test Series 6;

b) are not self-reactive substances of Class 4.1;

c) are not substances of Classes 5.1 or 5.2,

are also assigned to Class 4.1. UN Nos. 2956, 3241, 3242 and 3251 are such entries.

Polymerizing substances

Polymerizing substances

2.2.41.1.20 Polymerizing substances are substances which, without stabilization, are liable to undergo a strongly exothermic reaction resulting in the formation of larger molecules or resulting in the formation of polymers under conditions normally encountered in carriage. Such substances are considered to be polymerizing substances of Class 4.1 when:

a) Their self-accelerating polymerization temperature (SAPT) is 75 °C or less under the conditions (with or without chemical stabilization as offered for carriage) and in the packaging, IBC or tank in which the substance or mixture is to be carried;

b) They exhibit a heat of reaction of more than 300 J/g; and

c) They do not meet any other criteria for inclusion in classes 1 to 8.

A mixture meeting the criteria of a polymerizing substance shall be classified as a polymerizing substance of Class 4.1.

Temperature control requirements

2.2.41.1.21 (reserved)

2.2.41.2 Substances not accepted for carriage

2.2.41.2.1 The chemically unstable substances of Class 4.1 shall not be accepted for carriage unless the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end, it shall in particular be ensured that receptacles and tanks do not contain any substance liable to pro mote these reactions.

2.2.41.2.2 Flammable solids, oxidizing, assigned to UN No. 3097 shall not be accepted for carriage unless they meet the requirements for Class 1 (see also 2.1.3.7).

2.2.41.2.3 The following substances shall not be accepted for carriage:

– Self-reactive substances of type A (see Manual of Tests and Criteria, Part II, paragraph 20.4.2 (a));

– Phosphorus sulphides which are not free from yellow and white phosphorus;

Solid densitized explosives other than those listed in Table A of Chapter 3.2;

– Inorganic flammable substances in the molten form other than UN No. 2448 SULPHUR, MOLTEN.

The following self-reactive substances shall not be accepted for carriage by rail:

– Barium azide with a water content less than 50% (mass);

– Self-reactive substances with an SADT ≤ 55 °C, therefore requiring temperature control:

UN 3231 SELF-REACTIVE LIQUID TYPE B, TEMPERATURE CONTROLLED;

UN 3232 SELF-REACTIVE SOLID TYPE B, TEMPERATURE CONTROLLED;

UN 3233 SELF-REACTIVE LIQUID TYPE C, TEMPERATURE CONTROLLED;

UN 3234 SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED;

UN 3235 SELF-REACTIVE LIQUID TYPE D, TEMPERATURE CONTROLLED;

UN 3236 SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED;

UN 3237 SELF-REACTIVE LIQUID TYPE E, TEMPERATURE CONTROLLED;

UN 3238 SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED;

UN 3239 SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED;

UN 3240 SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED;

UN 3238 SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED;

– Polymerizing substances in packagings or IBCs with an SAPT ≤ 50 °C and polymerizing substances in tanks with an SAPT ≤ 45 °C, therefore requiring temperature control:

UN 3533 POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S;

UN 3534 POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.

2.2.41.3 List of collective entries

Subsidary risk			Classification code	UN No.	Name of substance or article
Flammable Solids F	without subsidary risk	organic	F1	3175	SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S.
				1353	FIBRES IMPREGNATED WITH WEAKLY NI- TRATED NITROCELLULOSE, N.O.S. or
				1353	FABRICS IMPREGNATED WITH WEAKLY NI- TRATED NITROCELLULOSE, N.O.S.
				1325	FLAMMABLE SOLID, ORGANIC, N.O.S.
		organic molten	F2	3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.
		inorganic	F3	3089	METAL POWDER, FLAMMABLE, N.O.S.[a),(b)]
				3181	METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S.
				3182	METAL HYDRIDES, FLAMMABLE,N.O.S.(c)
				3178	FLAMMABLE SOLID, INORGANIC, N.O.S.
		articles	F4	3527	POLYESTER RESIN KIT, solid base material
				3541	ARTICLES CONTAINING FLAMMABLE SOLID, N.O.S.
	oxidizing		F0	3097	FLAMMABLE SOLID, OXIDIZING, N.O.S. (not accepted for carriage, see 2.2.41.2.2)
	toxic FT	organic	FT1	2926	FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.
		inorganic	FT2	3179	FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S..
	corrosive FC	organic	FC1	2925	FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.
		inorganic	FC2	3180	FLAMMABLE SOLID, CORROSIVE, INOR- GANIC, N.O.S.
Solid desensitized explosives	without subsidiary risk		D	3319	NITROGLYCERIN MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 2% but not more than 10% nitroglycerin by mass
				3344	PENTAERYTHRITE TETRANITRATE (PEN- TAERYTHRITOL TETRANITRATE, PETN) MIX- TURE, DESENSITIZED, SOLID, N.O.S. with more than 10% but not more than 20% PETN by mass
				3380	DESENSITIZED EXPLOSIVE, SOLID, N.O.S.
	toxic		DT	Only substances listed in Table A of Chapter 3.2 are to be accepted for carriage as substances of Class 4.1	
Self-reactive substances SR	not requiring temperature control		SR1		SELF-REACTIVE LIQUID TYPE A (not accepted for carriage, see 2.2.41.2.3)
					SELF-REACTIVE SOLID TYPE A (not accepte for carriage, see 2.2.41.2.3)
				3221	SELF-REACTIVE LIQUID TYPE B
				3222	SELF-REACTIVE SOLID TYPE B
				3223	SELF-REACTIVE LIQUID TYPE C
				3224	SELF-REACTIVE SOLID TYPE C
				3225	SELF-REACTIVE SOLID TYPE C
				3226	SELF-REACTIVE SOLID TYPE D
				3227	SELF-REACTIVE LIQUID TYPE E
				3228	SELF-REACTIVE SOLID TYPE E
				3229	SELF-REACTIVE LIQUID TYPE F
				3230	SELF-REACTIVE SOLID TYPE F
					SELF-REACTIVE LIQUID TYPE G (not subject to the provisions applicable to Class 4.1, see 2.2.41.1.11
					SELF-REACTIVE SOLID TYPE G (not subject to the provisions applicable to Class 4.1, see 2.2.41.1.11)

	requiring temperature control SR2	3231 SELF-REACTIVE LIQUID TYPE B, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3232 SELF-REACTIVE SOLID TYPE B, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3233 SELF-REACTIVE LIQUID TYPE C, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3234 SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3235 SELF-REACTIVE LIQUID TYPE D, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3236 SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3237 SELF-REACTIVE LIQUID TYPE E, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3238 SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3239 SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3) 3240 SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.41.2.3)
Polymerizing substances PM	**not requiring temperature control PM1**	*3531 3531 POLYMERIZING SUBSTANCE, SOLID, STABILUZED, N.O.S;* *3532 3532 POLYMERIZING SUBSTANCE, lIQUID, STABILUZED, N.O.S;*
	requiring temperature control PM2	*3533 3533 POLYMERIZING SUBSTANCE, SOLID,TEMPERATURE CONTROLLED,* *N.O.S. (not accepted for carriage by rail, see 2.2.41.2.3)* *3534 3534 POLYMERIZING SUBSTANCE, LIQUID,TEMPERATURE CONTROLLED,* *N.O.S. (not accepted for carriage by rail, see 2.2.41.2.3)*

a) Metals and metal alloys in powdered or other flammable form, liable to spontaneous combustion, are substances of Class 4.2.

b) Metals and metal alloys in powdered or other flammable form, which in contact with water, emit flammable gases, are substances of Class 4.3.

c) Metals hydrides which, in contact with water, emit flammable gases, are substances of Class 4.3. Aluminium borohydride or aluminium borohydride in devices are substances of Class 4.2, UN No. 2870.

2.2.41.4 List of currently assigned self-reactive substances (with UN numbers) in packagings.

In the column "Packing Method", codes "OP1" to "OP8" refer to packing methods in 4.1.4.1, packing instruction P520 (see also 4.1.7.1). Self-reactive substances to be carried shall fulfil the classification as listed. For substances permitted in IBCs, see 4.1.4.2, packing instruction IBC520 and, for those permitted in tanks according to Chapter 4.2, see 4.2.5.6, portable tank instruction T23. The formulations not listed in this subsection but listed in packing instruction IBC 520 of 4.1.4.2 and in portable tank instruction T 23 of 4.2.5.2.6 may also be carried packed in accordance with packing method OP8 of packing instruction P 520 of 4.1.4.1.

Note: *The classification given in this table is based on the technically pure substance (except where a concentration of less than 100% is specified). For other concentrations, the substance may be classified differently following the procedures given in Part II of the Manual of Tests and Criteria.*

NAME OF THE SUBSTANCE	Concentration (%)	Packing method	UN No	Remarks
ACETONE-PYROGALLOL COPOLYMER 2-DIAZO-1-NAPHTHOL-5-SULPHONATE	100	OP8	3228	
AZODICARBONAMIDE FORMULATION TYPE B, TEMPERATURE CONTROLLED	< 100		3232	prohibited
AZODICARBONAMIDE FORMULATION TYPE C	< 100	OP6	3224	(3)
AZODICARBONAMIDE FORMULATION TYPE C, TEMPERATURE CONTROLLED	< 100		3234	prohibited
AZODICARBONAMIDE FORMULATION TYPE D	< 100	OP7	3226	(5)
AZODICARBONAMIDE FORMULATION TYPE D, TEMPERATURE CONTROLLED	< 100		3236	prohibited
2,2'-AZODI(2,4-DIMETHYL-4-METHOXYVALERONITRILE)	100		3236	prohibited
2,2'-AZODI(2,4-DIMETHYLVALERONITRILE)	100		3236	prohibited
2,2'-AZODI(ETHYL-2-METHYLPROPIONATE)	100		3235	prohibited
1,1-AZODI(HEXAHYDROBENZONITRILE)	100	OP7	3226	
2,2'-AZODI(ISOBUTYRONITRILE	100		3234	prohibited
2,2'-AZODI(ISOBUTYRONITRILE) as a water based paste	≤ 50	OP6	3224	
2,2'-AZODI(2-METHYLBUTYRO-NITRILE)	100		3236	prohibited
BENZENE-1,3-DISULPHONYL HYDRAZIDE, as a paste	52	OP7	3226	
BENZENE SULPHONYL HYDRAZIDE	100	OP7	3226	
4-(BENZYL(ETHYL)AMINO)-3-ETHOXY-BENZENEDIAZONIUM ZINC CHLORIDE	100	OP7	3226	

NAME OF THE SUBSTANCE	Concentration (%)	Packing method	UN No	Remarks
4-(BENZYL(METHYL)AMINO)-3-ETHOXYBENZENEDIAZONIUM ZINC CHLORIDE	100		3236	prohibited
3-CHLORO-4-DIETHYLAMINOBENZENEDIAZONIUM ZINC CHLORIDE	100	OP7	3226	
2-DIAZO-1-NAPHTHOL-4-SULPHONYL CHLORIDE	100	OP5	3222	(2)
2-DIAZO-1-NAPHTHOL-5-SULPHONYL CHLORIDE	100	OP5	3222	(2)
2-DIAZO-1-NAPHTHOL SULPHONIC ACID ESTER MIXTURE, TYPE D	< 100	OP7	3226	(9)
2,5-DIBUTOXY-4-(4-MORPHOLINYL)-BENZENEDIAZONIUM, TETRACHLOROZINCATE (2:1)	100	OP8	3228	
2,5-DIETHOXY-4-MORPHOLINOBENZENEDIAZONIUM ZINC CHLORIDE	67 – 100		3236	prohibited
2,5-DIETHOXY-4-MORPHOLINOBENZENEDIAZONIUM ZINC CHLORIDE	66		3236	prohibited
2,5-DIETHOXY-4-MORPHOLINOBENZENEDIAZONIUM TETRAFLUOROBORATE	100		3236	prohibited
2,5-DIETHOXY-4-(4-MORPHOLINYL)-BENZENEDIAZONIUM SULPHATE	100	OP7	3226	
2,5-DIETHOXY-4-(PHENYLSULPHONYL)-BENZENEDIAZONIUM ZINC CHLORIDE	67		3236	prohibited
DIETHYLENEGLYCOL BIS (ALLYL CARBONATE) + DI-ISOPROPYLPEROXYDICARBONATE	≥ 88 ≤ 12		3237	prohibited
2,5-DIMETHOXY-4-(4-METHYLPHENYLSULPHONYL)BENZENEDIAZONIUM ZINC CHLORIDE	79		3236	prohibited
4-(DIMETHYLAMINO)-BENZENEDIAZONIUM TRICHLOROZINCATE (-1)	100	OP8	3228	
4-DIMETHYLAMINO-6-(2-DIMETHYLAMINOETHOXY) TOLUENE-2-DIAZONIUM ZINC CHLORIDE	100		3236	prohibited
N,N'-DINITROSO-N,N'-DIMETHYL TEREPHTHALAMIDE, as a paste	72	OP6	3224	
N,N'-DINITROSOPENTAMETHYLENETETRAMINE	82	OP6	3224	(7)
DIPHENYLOXIDE-4,4'-DISULPHONYL HYDRAZIDE	100	OP7	3226	
4-DIPROPYLAMINOBENZENEDIAZONIUM ZINC CHLORIDE	100	OP7	3226	

NAME OF THE SUBSTANCE	Concentration (%)	Packing method	UN No	Remarks
2-(N,N-ETHOXYCARBONYL-PHENYLAMINO)-3-METHOXY-4-(N-METHYL-N-CYCLOHEXYLAMINO) BENZENEDIAZONIUM ZINC CHLORIDE	63 – 92		3236	prohibited
2-(N,N-ETHOXYCARBONYL-PHENYLAMINO)-3-METHOXY-4-(N-METHYL-N-CYCLOHEXYLAMINO) BENZENEDIAZONIUM ZINC CHLORIDE	62		3236	prohibited
N-FORMYL-2-(NITROMETHYLENE)-1,3-PERHYDROTHIAZINE	100		3236	prohibited
2-(2-HYDROXYETHOXY)-1-(PYRROLIDIN-1-YL)BENZENE-4-DIAZONIUM ZINC CHLORIDE	100		3236	prohibited
3-(2-HYDROXYETHOXY)-4-(PYRROLIDIN-1-YL)BENZENE DIAZONIUM ZINC CHLORIDE	100		3236	prohibited
(7-METHOXY-5-METHYL-BENZOTHIOPHEN-2-YL) BORONIC ACID	88 – 100	OP7	3230	(11)
2-(N,N-METHYLAMINOETHYL-CARBONYL)-4-(3,4-DIMETHYL-PHENYLSULPHONYL)BENZENEDIAZONIUM HYDROGEN SULPHATE	96		3236	prohibited
4-METHYLBENZENESULPHONYL-HYDRAZIDE	100	OP7	3226	
3-METHYL-4-(PYRROLIDIN-1YL) BEN-ZENEDIAZONIUM TETRAFLUOROBORATE	95		3234	prohibited
PHOSPHOROTHIOIC ACID, O-[(CYANOPHENYL METHYLENE) AZANYL] O,O-DIETHYL ESTER	82 – 91 (Z isomer)	OP8	3227	(10)
SODIUM 2-DIAZO-1-NAPHTHOL-4-SULPHONATE	100	OP7	3226	
SODIUM 2-DIAZO-1-NAPHTHOL-5-SULPHONATE	100	OP7	3226	
4-NITROSOPHENOL	100		3236	prohibited
SELF-REACTIVE LIQUID, SAMPLE		OP2	3223	(8)
SELF-REACTIVE LIQUID, SAMPLE, TEM-PERATURE CONTROLLED			3233	prohibited
SELF-REACTIVE SOLID, SAMPLE		OP2	3224	(8)
SELF-REACTIVE SOLID, SAMPLE, TEM-PERATURE CONTROLLED			3234	prohibited
TETRAMINE PALLADIUM (II) NITRATE	100		3234	prohibited

Remarks:

(1) *(Reserved)*

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

(3) *Azodicarbonamide formulations which fulfil the criteria of paragraph 20.4.2 (c) of the Manual of Tests and Criteria.*

(4) *(Reserved)*

(5) *Azodicarbonamide formulations which fulfil the criteria of paragraph 20.4.2 (d) of the Manual of Tests and Criteria.*

(6) *(Reserved)*

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

(8) *See 2.2.41.1.15.*

(9) *This entry applies to mixtures of esters of 2-diazo-1-naphthol-4-sulphonic acid and 2-diazo-1-naphthol- 5 sulphonic acid which fulfil the criteria of paragraph 20.4.2 (d) of the Manual of Test*

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

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

2.2.42 CLASS 4.2. SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION

2.2.42.1 Criteria

2.2.42.1.1 The heading of Class 4.2 covers:

– Pyrophoric substances which are substances, including mixtures and solutions (liquid or solid), which even in small quantities ignite on contact with air within five minutes. These are the Class 4.2 sub- stances the most liable to spontaneous combustion; and

– Self-heating substances and articles which are substances and articles, including mixtures and solutions, which, on contact with air, without energy supply, are liable to self-heating. These substances will ignite only in large amounts (kilogrammes) and after long periods of time (hours or days).

2.2.42.1.2 The substances and articles of Class 4.2 are subdivided as follows::

S Substances liable to spontaneous combustion, without subsidiary risk:
S1 Organic, liquid;
S2 Organic, solid;
S3 Inorganic, liquid;
S4 Inorganic, solid;
S5 Organometallic
S6 Articles
SW Substances liable to spontaneous combustion, which, in contact with water, emit flammable gases;
SO Substances liable to spontaneous combustion, oxidizing;
ST Substances liable to spontaneous combustion, toxic:
ST1 Organic, toxic, liquid;
ST2 Organic, toxic, solid;
ST3 Inorganic, toxic, liquid;
ST4 Inorganic, toxic, solid;
SC Substances liable to spontaneous combustion, corrosive:
SC1 Organic, corrosive, liquid;
SC2 Organic, corrosive, solid;
SC3 Inorganic, corrosive, liquid;
SC4 Inorganic, corrosive, solid.

Properties

2.2.42.1.3 Self-heating of a substance is a process where the gradual reaction of that substance with oxygen (in air) generates heat. If the rate of heat production exceeds the rate of heat loss, then the temperature of the substance will rise which, after an induction time, may lead to self-ignition and combustion.

Classification

2.2.42.1.4 Substances and articles classified in Class 4.2 are listed in Table A of Chapter 3.2. The assignment of substances and articles not mentioned by name in Table A of Chapter 3.2 to the relevant specific n.o.s. entry of 2.2.42.3 in accordance with the provisions of Chapter 2.1 can be based on experience or the results of the test procedures in accordance with the Manual of Tests and Criteria, Part III, sub-section 33.4. Assignment to general n.o.s. entries of Class 4.2 shall be based on the results of the test procedures in accordance with the Manual of Tests and Criteria, Part III, sub-section 33.4; experience shall also be taken into account when it leads to a more stringent assignment.

2.2.42.1.5 When substances or articles not mentioned by name are assigned to one of the entries listed in 2.2.42.3 on the basis of the test procedures in accordance with the Manual of Tests and Criteria, Part III, sub-section 33.4, the following criteria shall apply:

a) Solids liable to spontaneous combustion (pyrophoric) shall be assigned to Class 4.2 when they ignite on falling from a height of 1 m or within five minutes;

b) Liquids liable to spontaneous combustion (pyrophoric) shall be assigned to Class 4.2 when:

1) on being poured on an inert carrier, they ignite within five minutes, or

2) in the event of a negative result of the test according to (i), when poured on a dry, indented filter paper (Whatman No. 3 filter), they ignite or carbonize it within five minutes;

c) Substances in which, in a 10 cm sample cube, at 140 °C test temperature, spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours shall be assigned to Class 4.2. This criterion is based on the temperature of the spontaneous combustion of charcoal, which is at 50 °C for a sample cube of 27 m3. Substances with a temperature of spontaneous combustion higher than 50 °C for a volume of 27 m3 are not to be assigned to Class 4.2.

Note 1: *Substances carried in packages with a volume of not more than 3 m3 are exempted from Class 4.2 if, tested with a 10 cm sample cube at 120 °C, no spontaneous combustion nor a rise in temperature to over 180 °C is observed within 24 hours.*

Note 2: *Substances carried in packages with a volume of not more than 450 litres are exempted from Class 4.2 if, tested with a 10 cm sample cube at 100 °C, no spontaneous combustion nor a rise in temperature to over 160 °C is observed within 24 hours.*

Note 3: *Since organometallic substances can be classified in Class 4.2 or 4.3 with additional subsidiary risks, depending on their properties, a specific classification flow chart for these substances is given in 2.3.5.*

2.2.42.1.6 If substances of Class 4.2, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in Table A of Chapter 3.2 belong, these mixtures shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes), see also 2.1.3.

2.2.42.1.7 On the basis of the test procedure in the Manual of Tests and Criteria, Part III, sub-section 33.4 and the criteria set out in 2.2.42.1.5, it may also be determined whether the nature of a substance mentioned by name is such that the substance is not subject to the provisions for this Class.

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Assignment of packing groups

2.2.42.1.8 Substances and articles classified under the various entries in Table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, sub-section 33.4, in accordance with the following criteria:

a) Substances liable to spontaneous combustion (pyrophoric) shall be assigned to packing group I;

b) Self-heating substances and articles in which, in a 2.5 cm sample cube, at 140 °C test temperature, spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours, shall be assigned to packing group II;
Substances with a temperature of spontaneous combustion higher than 50 °C for a volume of 450 litres are not to be assigned to packing group II;

c) Slightly self-heating substances in which, in a 2.5 cm sample cube, the phenomena referred to under (b) are not observed, in the given conditions, but in which in a 10 cm sample cube at 140 °C test temperature spontaneous combustion or a rise in

temperature to over 200 °C is observed within 24 hours, shall be assigned to packing group III.

2.2.42.2 Substances not accepted for carriage

The following substances shall not be accepted for carriage:

– UN No. 3255 tert-BUTYL HYPOCHLORITE; and

– Self-heating solids, oxidizing, assigned to UN No. 3127 unless they meet the requirements for Class 1 (see 2.1.3.7).

2.2.42.3 List of collective entries

Subsidiary risk			Classification code	UN No	Name of the substance or article
Substances liable to spontaneous combustion					
Without subsidiary risk	**organic**	**liquid**	**S1**	2845	PYROPHORIC LIQUID, ORGANIC, N.O.S.
				3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.
				1373	FIBRES or FABRICS, ANIMAL or VEGETABLE or SYNTHETIC, N.O.S. with oil
				2006	PLASTICS, NITROCELLULOSE-BASED, SELF-HEATING, N.O.S.
		solid	**S2**	3313	ORGANIC PIGMENTS, SELF HEATING
				2846	PYROPHORIC SOLID, ORGANIC, N.O.S.
				3088	SELF-HEATING SOLID, ORGANIC, N.O.S.
	inorganic	**liquid**	**S3**	3194	PYROPHORIC LIQUID, INORGANIC, N.O.S.
				3186	SELF-HEATING LIQUID, INORGANIC, N.O.S
				1383	PYROPHORIC METAL, N.O.S. or
				1383	PYROPHORIC ALLOY, N.O.S.
				1378	METAL CATALYST, WETTED with a visible excess of liquid
				2881	METAL CATALYST, DRY
		solid	**S4**	3189	METAL POWDER, SELF-HEATING, N.O.S.[(a)]
				3205	ALKALINE EARTH METAL ALCOHOLATES, N.O.S
				3200	PYROPHORIC SOLID, INORGANIC, N.O.S.
				3190	SELF-HEATING SOLID, INORGANIC, N.O.S.
	Organo-metallic		**S5**	3391	ORGANOMETALLIC SUBSTANCE, SOLID, PYRO PHORIC
				3392	ORGANOMETALLIC SUBSTANCE, LIQUID, PYRO PHORIC
				3400	ORGANOMETALLIC SUBSTANCE, SOLID, SELF- HEATING
	Articles		**S6**	3452	ARTICLES CONTAINING A SUBSTANCE LIABLE TO SPONTANEOUS COMBUSTION, N.O.S.
Water-reactive			**SW**	3393	ORGANOMETALLIC SUBSTANCE, SOLID, PYRO- PHORIC, WATER-REACTIVE
				3394	ORGANOMETALLIC SUBSTANCE, LIQUID, PYROPHORIC, WATER-REACTIVE
Oxidizing			**SO**	3127	SELF-HEATING SOLID, OXIDIZING, N.O.S. (not accepted for carriage, see 2.2.42.2)
Toxic ST	**organic**	**liquid**	**ST1**	3184	SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.
		solid	**ST2**	3128	SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S.
	inorganic	**liquid**	**ST3**	3187	SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.

		solid	**ST4**	3191	SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S.
Corrosive SC	**organic**	**liquid**	**SC1**	3185	SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.
		solid	**SC2**	3126	SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S.
	inorganic	**liquid**	**SC3**	3188	SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.K
		solid	**SC4**	3206	ALKALI METAL ALCOHOLATES, SELF-HEATING, CORROSIVE, N.O.S.
				3192	SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S.

***Note**: [(a)] Dust and powder of metals, non toxic in a non-spontaneous combustible form which nevertheless, in contact with water, emit flammable gases, are substances of Class 4.3.*

2.2.43 CLASS 4.3. SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

2.2.43.1 Criteria

2.2.43.1.1 The heading of Class 4.3 covers substances which react with water to emit flammable gases liable to form explosive mixtures with air, and articles containing such substances.

2.2.43.1.2 Substances and articles of Class 4.3 are subdivided as follows:

W Substances which, in contact with water, emit flammable gases, without subsidiary risk, and articles containing such substances:
- **W1** Liquid;
- **W2** Solid;
- **W3** Articles;

WF1 Substances which, in contact with water, emit flammable gases, liquid, flammable;
WF2 Substances which, in contact with water, emit flammable gases, solid, flammable;
WS Substances which, in contact with water, emit flammable gases, solid, self-heating;
WO Substances which, in contact with water, emit flammable gases, oxidizing, solid;
WT Substances which, in contact with water, emit flammable gases, toxic:
- **WT1** Liquid;
- **WT2** Solid;

WC Substances which, in contact with water, emit flammable gases, corrosive:
- **WC1** Liquid;
- **WC2** Solid;

WFC Substances which, in contact with water, emit flammable gases, flammable, corrosive.

Properties

2.2.43.1.3 Certain substances in contact with water may emit flammable gases that can form explosive mixtures with air. Such mixtures are easily ignited by all ordinary sources of ignition, for example naked lights, sparking handtools or unprotected lamps. The resulting blast wave and flames may endanger people and the envi- ronment. The test method referred to in 2.2.43.1.4 below is used to determine whether the reaction of a substance with water leads to the development of a dangerous amount of gases which may be flammable. This test method shall not be applied to pyrophoric substances.

Classification

2.2.43.1.4 Substances and articles classified in Class 4.3 are listed in Table A of Chapter 3.2. The assignment of substances and articles not mentioned by name in Table A of Chapter 3.2 to the relevant entry of 2.2.43.3 in accordance with the provisions of Chapter 2.1 shall be based on the results of the test procedure in ac- cordance with the Manual of Tests and Criteria, Part III, sub-section 33.5; experience shall also be taken into account when it leads to a more stringent assignment.

2.2.43.1.5 When substances not mentioned by name are assigned to one of the entries listed in 2.2.43.3 on the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, sub-section 33.5, the following criteria shall apply:

A substance shall be assigned to Class 4.3 if:

a) spontaneous ignition of the gas emitted takes place in any step of the test procedure;

b) there is an evolution of flammable gas at a rate greater than 1 litre per kilogramme of the substance to be tested per hour.

Note: *Since organometallic substances can be classified in Class 4.2 or 4.3 with additional subsidiary risks, depending on their properties, a specific classification flow chart for these substances is given in 2.3.5.*

2.2.43.1.6 If substances of Class 4.3, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in Table A of Chapter 3.2 belong, these mixtures shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

Note: *For the classification of solutions and mixtures (such as preparations and wastes) see also 2.1.3*.

2.2.43.1.7 On the basis of the test procedures in accordance with the Manual of Tests and Criteria, Part III, sub-section 33.5, and the criteria set out in 2.2.43.1.5, it may also be determined whether the nature of a substance mentioned by name is such that the substance is not subject to the provisions for this Class.

Assignment of packing groups

2.2.43.1.8 Substances and articles classified under the various entries in Table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, sub-section 33.5, in accordance with the following criteria:

a) Packing group I shall be assigned to any substance which reacts vigorously with water at ambient temperature and generally demonstrates a tendency for the gas produced to ignite spontaneously, or one which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 litres per kilogramme of substance over any one minute period;

b) Packing group II shall be assigned to any substance which reacts readily with water at ambient temperature such that the maximum rate of evolution of flammable gas is equal to or greater than 20 litres per kilogramme of substance per hour, and which does not meet the criteria of packing group I;

c) Packing group III shall be assigned to any substance which reacts slowly with water at ambient temperature such that the maximum rate of evolution of flammable gas is greater than 1 litre per kilogramme of substance per hour, and which does not meet the criteria of packing groups I or II.

2.2.43.2 Substances not accepted for carriage

Water-reactive solids, oxidizing, assigned to UN No. 3133 shall not be accepted for carriage unless they meet the requirements for Class 1 (see also 2.1.3.7).

2.2.43.3 List of collective entries

Subsidiary risk		Classification code	UN No	Name of the substance or article
Substances which, in contact with water, emit flammable gases				
			1389	ALKALI METAL AMALGAM, LIQUID
			1391	ALKALI METAL DISPERSION or
			1391	ALKALINE EARTH METAL DISPERSION
			1392	ALKALINE EARTH METAL AMALGAM, LIQUID
	liquid	**W1**	1420	POTASSIUM METAL ALLOYS, LIQUID
			1422	POTASSIUM SODIUM ALLOYS, LIQUID
			3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER- REACTIVE
			1421	ALKALI METAL ALLOY, LIQUID, N.O.S.
			3148	WATER-REACTIVE LIQUID, N.O.S.
Without subsidiary risk			1390	ALKALI METAL AMIDES
			3170	ALUMINIUM SMELTING BY-PRODUCTS or
W	**solid**	**W2**[a)]	3170	ALUMINIUM REMELTING BY-PRODUCTS
			3401	ALKALI METAL AMALGAM, SOLID
			3402	ALKALINE EARTH METAL AMALGAM, SOLID
			3403	POTASSIUM METAL ALLOYS, SOLID
			3404	POTASSIUM SODIUM ALLOYS, SOLID
			3395	ORGANOMETALLIC SUBSTANCE, SOLID, WATER- REACTIVE
			1393	ALKALINE EARTH METAL ALLOY, N.O.S.
			1409	METAL HYDRIDES, WATER-REACTIVE, N.O.S.
			3208	METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S.
			2813	WATER-REACTIVE SOLID, N.O.S.
			3292	BATTERIES, CONTAINING SODIUM or
			3292	CELLS, CONTAINING SODIUM
	articles	**W3**	3543	ARTICLES CONTAINING A SUBSTANCE WHICH IN CONTACT WITH WATER EMITS FLAMMABLE GASES, N.O.S.
Liquid, flammable		**WF1**	3482	ALKALI METAL DISPERSION, FLAMMABLE or
			3482	ALKALINE EARTH METAL DISPERSION, FLAMMABLE
			3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE
Solid, flammable		**WF2**	3396	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, FLAMMABLE
			3132	WATER-REACTIVE SOLID, FLAMMABLE, N.O.S.
Solid, Self-heating		**WS** [6]	3397	ORGANOMETALLIC SUBSTANCE, SOLID, WATER- REACTIVE, SELF-HEATING
			3209	METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S.
			3135	WATER-REACTIVE SOLID, SELF-HEATING, N.O.S.
Solid, oxidizing		**WO**	3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S. (not accepted for carriage, see 2.2.43.2)
Toxic WT	**liquid**	**WT1**	3130	WATER-REACTIVE LIQUID, TOXIC, N.O.S.
	solid	**WT2**	3134	WATER-REACTIVE SOLID, TOXIC, N.O.S.
Corrosive WC	**liquid**	**WC1**	3129	WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.
	solid	**WC2**	3131	WATER-REACTIVE SOLID, CORROSIVE, N.O.S.

Flammable corrosive	**WFC [B]**	2988	CHLOROSILANES, WATER-REACTIVE, FLAMMABLE, CORROSIVE, N.O.S. (No other collective entry with this classification code available; if need be, classification under a collective entry with a classification code to be determined according to the table of precedence of hazard in 2.1.3.10.)

***Notes**:*

a) Metals and metal alloys which, in contact with water, do not emit flammable gases and are not pyrophoric or self-heating, but which are readily flammable, are substances of Class 4.1. Alkaline-earth metals and alkaline-earth metal alloys in pyrophoric form are substances of Class 4.2 Dust and powders of metals in pyrophoric form are substances of Class 4.2. Metals and metal alloys in pyrophoric form are substances of Class 4.2. Compounds of phosphorus with heavy metals such as iron, copper, etc. are not subject to the provisions of Annex 2 to SMGS.

b) Metals and metal alloys in pyrophoric form are substances of Class 4.2.

c) Chlorosilanes, having a flash-point of less than 23 °C and which, in contact with water, do not emit flammable gases, are substances of Class 3. Chlorosilanes, having a flash-point equal to or greater than 23 °C and which, in contact with water, do not emit flammable gases, are substances of Class 8.

2.2.51 CLASS 5.1 OXIDIZING SUBSTANCES

2.2.51.1 Criteria

2.2.51.1.1 The heading of Class 5.1 covers substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause or contribute to the combustion of other material, and articles containing such substances.

2.2.51.1.2 The substances of Class 5.1 and articles containing such substances are subdivided as follows:

O Oxidizing substances without subsidiary risk or articles containing such substances:

O1 Liquid

O2 Solid

O3 Articles

OF Oxidizing substances, solid, flammable

OS Oxidizing substances, solid, self-heating

OW Oxidizing substances, solid which, in contact with water, emit flammable gases

OT Oxidizing substances, toxic

OT1 Liquid

OT2 Solid

OC Oxidizing substances, corrosive

OC1 Liquid

OC2 Solid

OTC Oxidizing substances, toxic, corrosive.

2.2.51.1.3 Substances and articles classified in Class 5.1 are listed in Table A of Chapter 3.2. The assignment of substances and articles not mentioned by name in Table A of Chapter 3.2 to the relevant entry of 2.2.51.3 in accordance with the provisions of Chapter 2.1 can be based on the tests, methods and criteria in 2.2.51.1.6 to 2.2.51.1.9 below and the Manual of Tests and Criteria, Part III, Section 34.4. In the event of divergence between test results and known experience, judgement based on known experience shall take precedence over test results.

2.2.51.1.4 If substances of Class 5.1, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in Table A of Chapter 3.2 belong, these mixtures or solutions shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

Note: *For the classification of solutions and mixtures (such as preparations and wastes), see also Section 2.1.3.*

2.2.51.1.5 On the basis of the test procedures in the Manual of Tests and Criteria, Part III, Section 34.4 and the criteria set out in 2.2.51.1.6 to 2.2.51.1.9 it may also be determined whether the nature of a substance mentioned by name in Table A of Chapter 3.2 is such that the substance is not subject to the provisions for this class.

Oxidizing solids

Classification

2.2.51.1.6 When oxidizing solid substances not mentioned by name in Table A of Chapter 3.2 are assigned to one of the entries listed in 2.2.51.3 on the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, sub-section 34.4.1 (test O.1) or alternatively, sub section 34.4.3 (test O.3), the following criteria shall apply:

a) In the test O.1, a solid substance shall be assigned to Class 5.1 if, in the 4:1 or the 1:1 sample-to-cellulose ratio (by mass) tested, it ignites or burns or exhibits mean burning times equal to or less than that of a 3:7 mixture (by mass) of potassium bromate and cellulose; or

b) In the test O.3, a solid substance shall be assigned to Class 5.1 if, in the 4:1 or the 1:1 sample-to-cellulose ratio (by mass) tested, it exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose.

2.2.51.1.7 By exception, solid ammonium nitrate based fertilizers shall be classified in accordance with the procedure as set out in the Manual of Tests and Criteria, Part III, Section 39.

Assignment of packing groups

2.2.51.1.8 Oxidizing solids classified under the various entries in Table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, sub-section 34.4.1 (test O.1) or sub-section 34.4.3 (test O.3), in accordance with the following criteria:

a) Test O.1:

i) Packing group I: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture, by mass, of potassium bromate and cellulose;

ii) Packing group II: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for packing group I are not met;

iii) Packing group III: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for packing groups I and II are not met;

b) Test O.3

i) Packing group I: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate greater than the mean burning rate of a 3:1 mixture (by mass) of calcium peroxide and cellulose;

ii) Packing group II: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:1 mixture (by mass) of calcium peroxide and cellulose, and the criteria for packing group I are not met;

iii) Packing group III: any substance which, in the 4:1 or 1:1 sample-to-cellulose (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose, and the criteria for packing groups I and II are not met.

Oxidizing liquids

Classification

2.2.51.1.9 When oxidizing liquid substances not mentioned by name in Table A of Chapter 3.2 are assigned to one of the entries listed in 2.2.51.3 on the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, sub-section 34.4.2, the following criteria shall apply:

A liquid substance shall be assigned to Class 5.1 if, in the 1:1 mixture, by mass, of substance and cellulose tested, it exhibits a pressure rise of 2070 kPa gauge or more and a mean pressure rise time equal to or less than the mean pressure rise time of a 1:1 mixture, by mass, of 65% aqueous nitric acid and cellulose.

Assignment of packing groups

2.2.51.1.10 Oxidizing liquids classified under the various entries in Table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, section 34.4.2, in accordance with the following criteria:

a) Packing group I: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture, by mass, of substance and cellulose is less than that of a 1:1 mixture, by mass, of 50% perchloric acid and cellulose;

b) Packing group II: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure

rise time of a 1:1 mixture, by mass, of 40% aqueous sodium chlorate solution and cellulose; and the criteria for packing group I are not met;

c) Packing group III: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 65% aqueous nitric acid and cellulose; and the criteria for packing groups I and II are not met.

2.2.51.2 Substances not accepted for carriage

2.2.51.2.1 The chemically unstable substances of Class 5.1 shall not be accepted for carriage unless the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end it shall in particular be ensured that receptacles and tanks do not contain any material liable to promote these reactions.

2.2.51.2.2 The following substances and mixtures shall not be accepted for carriage:

– Oxidizing solids, self-heating, assigned to UN No. 3100, oxidizing solids, water-reactive, assigned to UN No. 3121 and oxidizing solids, flammable, assigned to UN No. 3137, unless they meet the require- ments for Class 1 (see also 2.1.3.7);

– Hydrogen peroxide, not stabilized or hydrogen peroxide, aqueous solutions, not stabilized containing more than 60% hydrogen peroxide;

– Tetranitromethane not free from combustible impurities;

– Perchloric acid solutions containing more than 72% (mass) acid, or mixtures of perchloric acid with any liquid other than water;

– Chloric acid solution containing more than 10% chloric acid or mixtures of chloric acid with any liquid other than water;

– Halogenated fluor compounds other than UN Nos. 1745 BROMINE PENTAFLUORIDE; 1746 BRO- MINE TRIFLUORIDE and 2495 IODINE PENTAFLUORIDE of Class 5.1 as well as UN Nos. 1749 CHLORINE TRIFLUORIDE and 2548 CHLORINE PENTAFLUORIDE of Class 2;

– Ammonium chlorate and its aqueous solutions and mixtures of a chlorate with an ammonium salt;

– Ammonium chlorite and its aqueous solutions and mixtures of a chlorite with an ammonium salt;

– Mixtures of a hypochlorite with an ammonium salt;

– Ammonium bromate and its aqueous solutions and mixtures of a bromate with an ammonium salt;

– Ammonium permanganate and its aqueous solutions and mixtures of a permanganate with an ammonium salt;

– Ammonium nitrate containing more than 0.2% combustible substances (including any organic substance calculated as carbon) unless it is a constituent of a substance or article of Class 1;

– Ammonium nitrate based fertilizers with compositions that lead to exit boxes 4, 6, 8, 15, 31, or 33 of the flowchart of paragraph 39.5.1 of the Manual of Tests and Criteria, Part III, Section 39, unless they have been assigned a suitable UN number in Class 1;

– Ammonium nitrate based fertilizers with compositions that lead to exit boxes 20, 23 or 39 of the flowchart of paragraph 39.5.1 of the Manual of Tests and Criteria, Part III, Section 39, unless they have been assigned a suitable UN number in Class 1 or, provided that the suitability for carriage has been demonstrated and that this has been approved by the competent authority, in Class 5.1 other than UN No. 2067;

Note: *The term "competent authority" means the competent authority of the country of origin. If the country of origin is not an SMGS Contracting State, the classification and conditions of carriage shall be recognized by the competent authority of the first SMGS Contracting State reached by the consignment.*

– Ammonium nitrite and its aqueous solutions and mixtures of an inorganic nitrite with an ammonium salt;

– Mixtures of potassium nitrate, sodium nitrite and an ammonium salt.

2.2.51.3 List of collective entries

Subsidiary risk		Classification code	UN No.	Name of the substance or article
Oxidizing substances and articles Containing such substances				
Without subsidiary risk O	**Liquid**	**O1**	3210	CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
			3211	PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
			3213	BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
			3214	PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
			3216	PERSULPHATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
			3218	NITRATES, INORGANIC, AQ UEOUS SOLUTION, N.O.S.
			3219	NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S.
			3139	OXIDIZING LIQUID, N.O.S.
	solid	**O2**	1450	BROMATES, INORGANIC, N.O.S.
			1461	CHLORATES, INORGANIC, N.O.S.
			1462	CHLORITES, INORGANIC, N .O.S.
			1477	NITRATES, INORGANIC, N.O.S.
			1481	PERCHLORATES, INORGANIC, N.O.S.
			1482	PERMANGANATES, INORGANIC, N.O.S
			1483	PEROXIDES, INORGANIC, N.O.S.
			2627	NITRITES, INORGANIC, N.O.S.
			3212	HYPOCHLORITES, INORGANIC, N.O.S.
			3215	PERSULPHATES, INORGANIC, N.O.S.
			1479	OXIDIZING SOLID, N.O.S.
	articles	**O3**	3356	OXYGEN GENERATOR, CHEMICAL
			3544	ARTICLES CONTAINING OXIDIZING SUBSTANCE, N.O.S.
Solid, flammable		**OF**	3137	OXIDIZING SOLID, FLAMMA BLE, N.O.S. (not accepted for carriage, see 2.2.51.2)
Solid, self-heating		**OS**	3100	OXIDIZING SOLID, SELF-HEATING, N.O.S. (not accepted for carriage, see 2.2.51.2)
Solid, water-reactive		**OW**	3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S. (not accepted for carria see 2.2.51.2)
Toxic OT	**liquid**	**OT1**	3099	OXIDIZING LIQUID, TOXIC, N.O.S.
	solid	**OT2**	3087	OXIDIZING SOLID, TOXIC, N.O.S.
Corrosive OC	**liquid**	**OC1**	3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.
	solid	**OC2**	3085	OXIDIZING SOLID, CORROSIVE, N.O.S
Toxic corrosive		**OTC**	(No collective entry with this classification code available; if need be, classification under a collective entry with a classification code to be determined according to the of precedence of hazard in 2.1.3.10.)	

2.2.52 CLASS 5.2 ORGANIC PEROXIDES

2.2.52.1 *Criteria*

2.2.52.1.1 The heading of Class 5.2 covers organic peroxides and formulations of organic peroxides.

2.2.52.1.2 The substances of Class 5.2 are subdivided as follows:

P1 Organic peroxides, not requiring temperature control;

P2 Organic peroxides, requiring temperature control (not accepted for carriage by rail).

Definition

2.2.52.1.3 Organic peroxides are organic substances which contain the bivalent -O-O- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals

Properties

2.2.52.1.4 Organic peroxides are liable to exothermic decomposition at normal or elevated temperatures. The decomposition can be initiated by heat, contact with impurities (e.g. acids, heavy-metal compounds, amines), friction or impact. The rate of decomposition increases with temperature and varies with the organic peroxide formulation. Decomposition may result in the evolution of harmful, or flammable, gases or vapours. Some organic peroxides may decompose explosively, particularly if confined. This characteristic may be modified by the addition of diluents or by the use of appropriate packagings. Many organic peroxides burn vigorously. Contact of organic peroxides with the eyes is to be avoided. Some organic peroxides will cause serious injury to the cornea, even after brief contact, or will be corrosive to the skin.

Note: *Test methods for determining the flammability of organic peroxides are set out in the Manual of Tests and Criteria, Part III, sub-section 32.4. Because organic peroxides may react vigorously when heated, it is recommended to determine their flash-point using small sample sizes such as described in ISO 3679:1983.*

Classification

2.2.52.1.5 Any organic peroxide shall be considered for classification in Class 5.2 unless the organic peroxide formulation contains:

a) Not more than 1.0% available oxygen from the organic peroxides when containing not more than 1.0% hydrogen peroxide;

(b) Not more than 0.5% available oxygen from the organic peroxides when containing more than 1.0% but not more than 7.0% hydrogen peroxide.

Note: *The available oxygen content (%) of an organic peroxide formulation is given by the formula*

$$16 \times \sum (n_i \times c_i / m_i)$$

where:

n_i *– number of peroxygen groups per molecule of organic peroxide i;*

c_i *– concentration (mass %) of organic peroxide i; and*

m_i *– molecular mass of organic peroxide i.*

2.2.52.1.6 Organic peroxides are classified into seven types according to the degree of danger they present. The types of organic peroxide range from type A, which is not accepted for carriage in the packaging in which it is tested, to type G, which is not subject to the provisions of Class 5.2. The classification of types B to F is directly related to the maximum quantity allowed in one packaging. The principles to be applied to the classification of substances not listed in 2.2.52.4 are set out in the Manual of Tests and Criteria, Part II.

2.2.52.1.7 Organic peroxides which have already been classified and are already permitted for carriage in packagings are listed in 2.2.52.4, those already permitted for carriage in IBCs are listed in 4.1.4.2, packing instruction IBC520 and those already permitted for carriage in tanks in accordance with Chapters 4.2 and 4.3 are listed in 4.2.5.2, portable tank instruction T23. Each permitted substance listed is assigned to a generic entry of Table A of Chapter 3.2 (UN Nos. 3101 to 3120) and appropriate subsidiary risks and remarks providing relevant transport information are given.

These generic entries specify:

– the type (B, C, D, E, F) of organic peroxide (see. 2.2.52.1.6);

– physical state (liquid/solid).

Mixtures of these formulations may be classified as the same type of organic peroxide as that of the most dangerous component and be carried under the conditions of carriage given for this type. However, as two stable components can form a thermally less stable mixture, the self-accelerating decomposition temperature (SADT) of the mixture shall be determined.

2.2.52.1.8 Classification of organic peroxides not listed in 2.2.52.4, 4.1.4.2, packing instruction IBC520 or 4.2.5.2, portable tank instruction T23, and assignment to a collective entry shall be made by the competent authority of the country of origin. The statement of approval shall contain the classification and the relevant conditions of carriage. If the country of origin is not an SMGS Contracting State, the classification and conditions of carriage shall be recognized by the competent authority of the first SMGS Contracting State reached by the consignment.

2.2.52.1.9 Samples of organic peroxides or formulations of organic peroxides not listed in 2.2.52.4, for which a com- plete set of test results is not available and which are to be carried for further testing or evaluation, shall be assigned to one of the appropriate entries for organic peroxides type C provided the following conditions are met:

– the available data indicate that the sample would be no more dangerous than organic peroxides type B;

– the sample is packaged in accordance with packing method OP2 and the quantity per wagon is limited to 10 kg.

Samples requiring temperature control shall not be accepted for carriage by rail.

Desensitization of organic peroxides

2.2.52.1.10 In order to ensure safety during carriage, organic peroxides are in many cases desensitized by organic liquids or solids, inorganic solids or water. Where a percentage of a substance is stipulated, this refers to the percentage by mass, rounded to the nearest whole number. In general, desensitization shall be such that, in case of spillage, the organic peroxide will not concentrate to a dangerous extent.

2.2.52.1.11 Unless otherwise stated for the individual organic peroxide formulation, the following definition(s) shall apply to diluents used for desensitization:

– diluents type A are organic liquids which are compatible with the organic peroxide and which have a boiling point of not less than 150 °C. Type A diluents may be used for desensitizing all organic peroxides.

– diluents type B are organic liquids which are compatible with the organic peroxide and which have a boiling point of less than 150 °C but not less than 60 °C and a flash-point of not less than 5 °C.

Type B diluents may be used for desensitization of all organic peroxides, provided that the boiling point of the liquid is at least 60 °C higher than the SADT in a 50 kg package.

2.2.52.1.12 Diluents, other than type A or type B, may be added to organic peroxide formulations as listed in 2.2.52.4, provided that they are compatible. However, replacement of all or part of a type A or type B diluent by another diluent with differing properties requires that the organic peroxide formulation be re-assessed in accordance with the normal acceptance procedure for Class 5.2.

2.2.52.1.13 Water may only be used for the desensitization of organic peroxides which are listed in 2.2.52.4 or in the competent authority decision according to 2.2.52.1.8 as being "with water" or "as a stable dispersion in water". Samples of organic peroxides or formulations of organic peroxides not listed in 2.2.52.4 may also be desensitized with water provided the requirements of 2.2.52.1.9 are met.

2.2.52.1.14 Organic and inorganic solids may be used for desensitization of organic peroxides, provided that they are compatible. Compatible liquids and solids are those which have no detrimental influence on the thermal stability and hazard type of the organic peroxide formulation.

2.2.52.1.15 -

2.2.52.1.16 (Reserved)

2.2.52.2 Substances not accepted for carriage

The following organic peroxides shall not be accepted for carriage under the requirements of Class 5.2:

- Organic peroxides, type A (see Manual of Tests and Criteria, Part II, paragraph 20.4.3 a)].

The following organic peroxides requiring temperature control are not to be accepted for carriage by rail:

- Organic peroxides, types B and C with an SADT (self-accelerating decomposition temperature) ≤ 50 °C:

UN 3111 ORGANIC PEROXIDE TYPE B, LIQUID, TEMPERATURE CONTROLLED;

UN 3112 ORGANIC PEROXIDE TYPE B, SOLID, TEMPERATURE CONTROLLED;

UN 3113 ORGANIC PEROXIDE TYPE C, LIQUID, TEMPERATURE CONTROLLED;

UN 3114 ORGANIC PEROXIDE TYPE C, SOLID, TEMPERATURE CONTROLLED;

- Organic peroxides type D showing a violent or medium effect when heated under confinement with an SADT ≤ 50 °C or showing a low or no effect when heated under confinement with an SADT ≤ 45 °C:

UN 3115 ORGANIC PEROXIDE TYPE D, LIQUID, TEMPERATURE CONTROLLED;

UN 3116 ORGANIC PEROXIDE TYPE D, SOLID, TEMPERATURE CONTROLLED

- Organic peroxides types E and F with an SADT ≤ 45 °C:

UN 3117 ORGANIC PEROXIDE TYPE E, LIQUID, TEMPERATURE CONTROLLED;

UN 3118 ORGANIC PEROXIDE TYPE E, SOLID, TEMPERATURE CONTROLLED;

UN 3119 ORGANIC PEROXIDE TYPE F, LIQUID, TEMPERATURE CONTROLLED;

UN 3120 ORGANIC PEROXIDE TYPE F, SOLID, TEMPERATURE CONTROLLED

2.2.52.3 List of collective entries

Subsidiary risk	Classification code	UN No.	Name of the substance or article
Organic peroxides			
			ORGANIC PEROXIDE TYPE A, LIQUID (not accepted for carriage, see 2.2.52.2)
			ORGANIC PEROXIDE TYPE A, SOLID (not accepted for carriage, see 2.2.52.2)
		3101	ORGANIC PEROXIDE TYPE B, LIQUID
		3102	ORGANIC PEROXIDE TYPE B, SOLID
		3103	ORGANIC PEROXIDE TYPE C, LIQUID
		3104	ORGANIC PEROXIDE TYPE C, SOLID
		3105	ORGANIC PEROXIDE TYPE D, LIQUID
Not requiring temperature control	**P1**	3106	ORGANIC PEROXIDE TYPE D, SOLID
		3107	ORGANIC PEROXIDE TYPE E, LIQUID
		3108	ORGANIC PEROXIDE TYPE E, SOLID
		3109	ORGANIC PEROXIDE TYPE F, LIQUID
		3110	ORGANIC PEROXIDE TYPE F, SOLID
			ORGANIC PEROXIDE TYPE G, LIQUID (not subject to the provisions applicable to Class 5.2, see 2.2.52.1.6)
			ORGANIC PEROXIDE TYPE G, SOLID (not subject to the provisions appli to Class 5.2, see 2.2.52.1.6)
		3545	ARTICLES CONTAINING ORGANIC PEROXIDE, N.O.S.
		3111	ORGANIC PEROXIDE TYPE B, LIQUID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3112	ORGANIC PEROXIDE TYPE B, SOLID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3113	ORGANIC PEROXIDE TYPE C, LIQUID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3114	ORGANIC PEROXIDE TYPE C, SOLID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3115	ORGANIC PEROXIDE TYPE D, LIQUID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
Requiring temperature control	**P2**	3116	ORGANIC PEROXIDE TYPE D, SOLID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3117	ORGANIC PEROXIDE TYPE E, LIQUID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3118	ORGANIC PEROXIDE TYPE E, SOLID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3119	ORGANIC PEROXIDE TYPE F, LIQUID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)
		3120	ORGANIC PEROXIDE TYPE F, SOLID, TEMPERATURE CONTROLLED (not accepted for carriage by rail, see 2.2.52.2)

2.2.52.4 List of currently assigned organic peroxides in packagings (with UN numbers)

Note: *In the column "Packing Method", codes "OP1" to "OP8" refer to packing methods in 4.1.4.1 packing instruction P520 (see also 4.1.7.1). Organic peroxides to be carried shall fulfil the classification as listed. For substances permitted in IBCs, see 4.1.4.2, packing instruction IBC520 and, for those permitted in tanks according to Chapters 4.2 and 4.3, see 4.2.5.6, portable tank instruction T23. The formulations not listed in this packing instruction but listed in packing instruction IBC 520 of 4.1.4.2 and in portable tank instruction T 23 of 4.2.5.2.6 may also be carried packed in accordance with packing method OP8 of packing instruction P 520 of 4.1.4.1.*

ORGANIC PEROXIDE	**Concentration (%)**	**Diluent type A (%)**	**Diluent type B (%) 1)**	**Inert solid (%)**	**Water (%)**	**Packing method**	**UN No. (generic entry)**	**Subsidiary risks a remarks**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
ACETYL ACETONE PEROXIDE	≤42	≥48			≥8	OP7	3105	2)
"	≤ 35	≤ 57			≥8	OP8	3107	
"	≤ 32 as a paste					OP7	3106	20)
ACETYL CYCLOHEXANESULPHONYL PEROXIDE	≤ 82				≥12		3112	Carriage prohibited
"	≤ 32		≥ 68				3115	Carriage prohibited
tert-AMYL HYDROPEROXIDE	≤ 88	≥ 6			≥ 6	OP8	3107	
tert-AMYL PEROXYACETATE	≤ 62	≥ 38				OP7	3105	
tert-AMYL PEROXYBENZOATE	≤ 100					OP5	3103	
tert-AMYL PEROXY-2-ETHYLHEXANOA	≤100						3115	Carriage prohibited
tert-AMYL PEROXY-2-ETHYLHEXYL CARBONATE	≤100					OP7	3105	
tert-AMYLPEROXY ISOPROPYL CARBONATE	≤ 77		≥ 23				3115	Carriage prohibited
tert-AMYL PEROXYNEODECANOATE	≤ 47	≥ 53					3119	Carriage prohibited
tert-AMYL PEROXYPIVALATE	≤ 77		≥ 23				3113	Carriage prohibited
tert-AMYLPEROXY-3,5,5-TRIMETHYLHEXANOATE	≤100					OP7	3105	
tert-BUTYL CUMYL PEROXIDE	> 42 - 100					OP8	3109	
"	≤52			≥ 48		OP8	3108	
n-BUTYL-4,4-DI-(tert-BUTYLPEROXY) VALERATE	> 52 - 100					OP5	3103	
"	≤ 52			≥ 48		OP8	3108	
tert-BUTYL HYDROPEROXIDE	> 79 - 90				≥ 10	OP5	3103	13)
"	≤ 80	≥ 20				OP7	3105	4) 13)
"	≤ 79				> 14	OP8	3107	13) 23)
"	≤ 72				≥ 28	OP8	3109	13)
tert-BUTYL HYDROPEROXIDE + DI-tert-BUTYLPEROXIDE	< 82 + > 9				≥ 7	OP5	3103	13)
tert-BUTYL MONOPEROXYMALEATE	> 52 - 100					OP5	3102	3)
"	≤ 52	≥ 48				OP6	3103	
"	≤ 52			≥ 48		OP8	3108	
"	≤ 52 – as a paste					OP8	3108	
tert-BUTYL PEROXYACETATE	> 52 - 77	≥ 23				OP5	3101	3)
"	> 32 - 52	≥ 48				OP6	3103	
"	≤ 32		≥ 68			OP8	3109	
tert-BUTYL PEROXYBENZOATE	> 77 - 100					OP5	3103	
"	> 52 - 77	≥ 23				OP7	3105	
"	≤ 52			≥ 48		OP7	3106	
tert-BUTYL PEROXYBUTYL FUMARATE	≤ 52	≥ 48				OP7	3105	
tert-BUTYL PEROXYCROTONATE	≤ 77	≥ 23				OP7	3105	
tert-BUTYL PEROXYDIETHYLACETATE	≤100						3113	Carriage prohibited
tert-BUTYL PEROXY-2-ETHYLHEXANO	> 52 - 100						3113	Carriage prohibited
"	> 32 - 52		≥ 48				3117	Carriage prohibited
"	≤52			≥ 48			3118	Carriage prohibited
"	≤ 32		≥ 68				3119	Carriage prohibited
tert-BUTYL PEROXY-2-ETHYLHEXANO + 2,2-DI-(tert-BUTYLPEROXY)BUTANE	≤ 12 + ≤ 14	≥14		≥ 60		OP7	3106	
"	≤ 31 + ≤ 36		≥ 33				3115	Carriage prohibited
tert-BUTYL PEROXY-2-ETHYLHEXYLCARBONATE	≤ 100					OP7	3105	
tert-BUTYL PEROXYISOBUTYRATE	> 52 - 77		≥ 23				3111	Carriage prohibited

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) 1)	Inert solid (%)	Water (%)	Packing method	UN No. (generic entry)	Subsidiary risks a remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
"	≤ 52		≥ 48				3115	Carriage prohibited
tert-BUTYLPEROXY ISOPROPYLCARBONATE	≤ 77	≥ 23				OP5	3103	
"	≤ 62		≥ 38			OP7	3105	
1-(2-tert-BUTYLPEROXY ISOPROPYL)-ISOPROPENYLBENZENE	≤ 77	≥ 23				OP7	3105	
"	≤ 42			≥ 58		OP8	3108	
tert-BUTYL PEROXY-2-METHYLBENZO	≤ 100					OP5	3103	
tert-BUTYL PEROXYNEODECANOATE	> 77 - 100					OP7	3115	Carriage prohibited
"	≤ 77		≥23				3115	Carriage prohibited
"	≤ 52 as a stable dispersion in water						3119	Carriage prohibited
"	≤ 42 as a stable dispersion in water (frozen).						3118	Carriage prohibited
"	≤ 32	≥ 68					3119	Carriage prohibited
tert-BUTYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23					3115	Carriage prohibited
	≤ 42 as a stable dispersion in water						3117	
tert-BUTYL PEROXYPIVALATE	> 67 - 77	≥ 23					3113	Carriage prohibited
"	> 27 - 67		≥33				3115	Carriage prohibited
"	≤ 27		≥ 73				3119	Carriage prohibited
tert-BUTYL PEROXY STEARYLCARBONATE	≤100					OP7	3106	
tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE	> 37 - 100					OP7	3105	
"	≤ 42			≥58		OP7	3106	
"	≤ 37		≥ 63			OP8	3109	
3-CHLOROPEROXYBENZOIC ACID	> 57 - 86			≥ 14		OP1	3102	3)
"	≤ 57			≥ 3	≥ 40	OP7	3106	
"	≤ 77			≥ 6	≥ 17	OP7	3106	
CUMYL HYDROPEROXIDE	> 90 - 98	≥ 10				OP8	3107	13)
"	≤ 90	≥ 10				OP8	3109	13) 18)
CUMYL PEROXYNEODECANOATE	≤87	≥13					3115	Carriage prohibited
"	≤ 77		≥ 23				3115	Carriage prohibited
"	≤ 52 as a stable dispersion in water						3119	Carriage prohibited
CUMYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23					3115	Carriage prohibited
CUMYL PEROXYPIVALATE	≤ 77		≥ 23				3115	Carriage prohibited
CYCLOHEXANONE PEROXIDE(S)	≤ 91				≥ 9	OP6	3104	13)
"	≤ 72	≥ 28				OP7	3105	5)
"	≤ 72 as a paste					OP7	3106	5) 20)
"	≤ 32			≥ 68			нет	29)
DIACETONE ALCOHOL PEROXIDES	≤ 57		≥ 26		≥ 8		3115	Carriage prohibited
DIACETYL PEROXIDE	≤ 27		≥ 73				3115	Carriage prohibited
DI-tert-AMYL PEROXIDE	≤ 100					OP8	3107	
2,2-DI-(tert-AMYLPEROXY)-BUTANE	≤57	≥43				OP7	3105	
1,1-DI-(tert-AMYLPEROXY)CYCLOHEXANE	≤ 82	≥ 18				OP6	3103	
DIBENZOYL PEROXIDE	> 52 - 100			≤ 48		OP2	3102	3)
"	> 77 - 94				≥ 6	OP4	3102	3)
"	≤ 77				≥ 23	OP6	3104	
"	≤ 62			≥ 28	≥ 10	OP7	3106	
"	> 52 - 62 – as a paste					OP7	3106	20)
"	> 35 – 52			≥ 48		OP7	3106	
"	> 36 – 42	≥ 18			≤ 40	OP8	3107	
"	≤ 56,5 - as a paste				≥15	OP8	3108	
"	≤ 52 – as a paste					OP8	3108	20)
"	≤ 42 as a stable dispersion in water					OP8	3109	
"	≤ 35			≥ 65			нет	29)
DI-tert-BUTYL PEROXIDE	> 52 - 100					OP8	3107	
"	≤ 52		≥ 48			OP8	3109	25)
DI-tert-BUTYL PEROXYAZELATE	≤ 52	≥48				OP7	3105	
2,2-DI-(tert-BUTYLPEROXY)BUTANE	≤ 52	≥ 48				OP6	3103	
1,1-DI-(tert-BUTYLPEROXY) CYCLOHEXANE	≤72		≥28			OP5	3103	30)
1,1-DI-(tert-BUTYLPEROXY) CYCLOHEXANE + tert-BUTYL PEROXY-ETHYLHEXANOATE	≤ 43 + ≤ 16	≥ 41				OP7	3105	
1,1-DI-(tert-BUTYLPEROXY) CYCLOHEXANE	> 80 - 100					OP5	3101	3)

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) 1)	Inert solid (%)	Water (%)	Packing method	UN No. (generic entry)	Subsidiary risks a remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
"	> 52 - 80	≥ 20				OP5	3103	
"	> 42 - 52	≥ 48				OP7	3105	
"	≤ 42	≥ 13		≥ 45		OP7	3106	
"	≤ 27	≥ 25				OP8	3107	21)
"	≤ 42	≥ 58				OP8	3109	
"	≤ 13	≥ 13	≥ 74			OP8	3109	
DI-n-BUTYL PEROXYDICARBONATE	> 27 -52		≥ 48				3115	Carriage prohibited
"	≤ 27		≥ 73				3117	Carriage prohibited
"	≤□ 42 as a stable dispersion in water						3118	Carriage prohibited
DI-sec-BUTYL PEROXYDICARBONATE	> 52 - 100						3113	Carriage prohibited
"	≤ 52	≥ 48					3115	Carriage prohibited
DI-(4-tert-BUTYLCYCLOHEXYL)-PEROXYDICARBONATE	≤100						3114	Carriage prohibited
"	≤ 42 as a stable dispersion in water						3119	Carriage prohibited
	≤ 42 as a paste						3118	Carriage prohibited
DI-(tert-BUTYLPEROXYISOPROPYL) BENZENE(S)	> 42 - 100			≤ 57		OP7	3106	
"	≤ 42			≥ 58			нет	29)
DI-(tert-BUTYLPEROXY) PHTHALATE	> 42 - 52	≥ 48				OP7	3105	
"	≤ 52 as a paste					OP7	3106	20)
"	≤ 42	≥ 58				OP8	3107	
2,2-DI-(tert-BUTYLPEROXY) PROPANE	≤ 52	≥ 48				OP7	3105	
"	≤ 42	≥ 13		≥ 45		OP7	3106	
1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE	> 90 - 100					OP5	3101	3)
"	≤ 90		≥10			OP5	3103	30)
"	> 57 - 90	≥ 10				OP5	3103	
"	≤ 77		≥23			OP5	3103	
"	≤ 57			≥43		OP8	3110	
"	≤ 57	≥ 43				OP8	3107	
"	≤ 32	≥ 26	≥ 42			OP8	3107	
DICETYL PEROXYDICARBONATE	≤ 100						3120	Carriage prohibited
"	≤ 42 as a stable dispersion in water						3119	Carriage prohibited
DIDECANOYL PEROXIDE	≤ 100						3114	Carriage prohibited
DI-4-CHLOROBENZOYL PEROXIDE	≤ 77				≥ 23	OP5	3102	3)
"	≤52 – as a paste					OP7	3106	20)
"	≤ 32			≥ 68			нет	29)
DICUMYL PEROXIDE	> 52 - 100					OP8	3110	12)
"	≤ 52			≥ 48			нет	29)
2,2-DI-(4,4-DI (tert-BUTYLPEROXY) CYCLOHEXYL) PROPANE	≤ 42			≥ 58		OP7	3106	
"	≤ 22		≥ 78			OP8	3107	
DI-2,4-DICHLOROBENZOYL PEROXIDE	≤ 52 – as a paste						3118	Carriage prohibited
DI-4- DICHLOROBENZOYL PEROXIDE	≤77				≥ 23	OP5	3102	3)
"	≤ 52 – as a paste with silicon oil					OP7	3106	
DI-(2-ETHOXYETHYL) PEROXYDICARBONATE	≤52		≥ 48				3115	Carriage prohibited
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE	> 77 - 100						3113	Carriage prohibited
"	≤ 77		≥ 23				3115	Carriage prohibited
"	≤ 62 as a stable dispersion in water						3119	Carriage prohibited
"	≤52 as a stable dispersion in water						3120	Carriage prohibited
2,2-DIHYDROPEROXYPROPANE	≤ 27			≥ 73		OP5	3102	3)
DI-(1-HYDROXYCYCLOHEXYL) PEROXIDE	≤100					OP7	3106	
DIISOBUTYRYL PEROXIDE	> 32 - 52		≥ 48				3111	Carriage prohibited
"	≤ 32		≥ 68				3115	Carriage prohibited
	≤ 42 as a stable dispersion in wa-t						3119	Carriage prohibited
DI-ISOPROPYLBENZENE DIHYDROPEROXIDE	≤ 82	≥ 5			≥ 5	OP7	3106	24)
DIISOPROPYL PEROXYDICARBONATE	> 52 - 100						3112	Carriage prohibited
"	≤ 52		≥ 48				3115	Carriage prohibited
„	≤ 32	≥ 68					3115	Carriage prohibited
DI-(1-HYDROXYCYCLOHEXYL) PEROXIDE	≤100					OP7	3106	
"	≤ 42 as a stable dispersion in water					OP8	3109	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) 1)	Inert solid (%)	Water (%)	Packing method	UN No. (generic entry)	Subsidiary risks a remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DI-(3-METHOXYBUTYL) PEROXYDICARBONATE	≤ 52		≥ 48				3115	Carriage prohibited
DI-(2-METHYLBENZOYL) PEROXID	≤ 87				≥ 13		3112	Carriage prohibited
DI-(3-METHYLBENZOYL) PEROXID BENZOYL (3-METHYLBENZOYL) PEROXIDE + DIBENZOYL PEROXI	≤ 20 + ≤ 18 + ≤ 4		≥ 58				3115	Carriage prohibited
2,5-DIMETHYL-2,5-DI-(BENZOYLPERO HEXANE	> 82 - 100					OP5	3102	3)
"	≤ 82			≥ 18		OP7	3106	
"	≤ 82				≥ 18	OP5	3104	
2,5-DIMETHYL-2,5-DI-(tert-BUTYLPERO HEXANE	> 90 - 100					OP5	3103	
"	> 52 - 90	≥ 10				OP7	3105	
"	≤47 as a paste					OP8	3108	
"	≤ 52	≥ 48				OP8	3109	
"	≤ 77			≥ 23		OP8	3108	
2,5-DIMETHYL-2,5-DI-(tert-BUTYLPERO HEXYNE-3	> 52 - 86	≥ 14				OP5	3103	26)
"	≤ 52			≥ 48		OP7	3106	
"	> 86 - 100					OP5	3101	3)
2,5-DIMETHYL-2,5-DI-(2-ETHYLHEXANOYLPEROXY) HEXANE	≤100						3113	Carriage prohibited
2,5-DIMETHYL-2,5-DIHYDROPEROXYHEXANE	≤ 82				≥ 18	OP6	3104	
2,5-DIMETHYL-2,5-DI-(3,5,5-TRIMETHYLHEXANOYLPEROXY) HEXANE	≤ 77	≥ 23				OP7	3105	
1,1-DIMETHYL-3-HYDROXYBUTYLPEROXYNEOHEPTAN E	≤ 52	≥ 48					3117	Carriage prohibited
DIMYRISTYL PEROXYDICARBONATE	≤100						3116	Carriage prohibited
"	≤ 42 as a stable dispersion in water						3119	Carriage prohibited
DI-(2-NEODECANOYLPEROXYISOPRO BENZENE	≤ 52	≥ 48					3115	Carriage prohibited
DI-n-NONANOYL PEROXIDE	≤100						3116	Carriage prohibited
DI-n-OCTANOYL PEROXIDE	≤100						3114	Carriage prohibited
DIPEROXY DODECANEDIOIC ACID	□ ≤13			≥ 87	-		нет	29)
DI-(2-PHENOXYETHYL) PEROXYDICARBONATE	> 85 - 100					OP5	3102	3)
"	≤ 85				≥ 15	OP7	3106	
DIPROPIONYL PEROXIDE	≤ 27		≥ 73				3117	Carriage prohibited
DI-n-PROPYL PEROXYDICARBONATE	≤100						3113	Carriage prohibited
"	□ ≤77		≥ 23				3113	Carriage prohibited
DISUCCINIC ACID PEROXIDE	> 72 - 100					OP4	3102	3) 17)
"	≤ 72				≥ 28		3116	Carriage prohibited
DI-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE	> 52 - 82	≥ 18					3115	Carriage prohibited
"	> 38-52	≥ 48		+10	+15		3119	Carriage prohibited
"	≤ 52 as a stable dispersion in water						3119	Carriage prohibited
"	≤ 38	≥ 62					3119	Carriage prohibited
ETHYL 3,3-DI-(tert-AMYLPEROXY) BUTYRATE	≤ 67	≥ 33				OP7	3105	
ETHYL 3,3-DI-(tert-BUTYLPEROXY) BUTYRATE	> 77 - 100					OP5	3103	
"	≤ 77	≥ 23				OP7	3105	
"	≤ 52			≥ 48		OP7	3106	
tert-HEXYL PEROXYNEODECANOATE	≤ 71	≥ 29					3115	Carriage prohibited
tert-HEXYL PEROXYPIVALATE	≤ 72		≥ 28				3115	Carriage prohibited
"	≤ 52 as a stable dispersion in water					OP8	3117	
ISOPROPYL sec-BUTYL PEROXYDICARBONATE + DI-sec-BUTY	≤ 32 + ≤ 15–18 +	≥ 38					3115	Carriage prohibited

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) 1)	Inert solid (%)	Water (%)	Packing method	UN No. (generic entry)	Subsidiary risks a remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PEROXYDICARBONATE + DI-ISOPROP	≤ 12 - 15							
ISOPROPYL sec-BUTYL PEROXYDICARBONATE + DI-sec-BUTY PEROXYDICARBONATE + DI-ISOPROP PEROXYDICARBONATE	≤ 52 + ≤ 28 + ≤ 22						3111	Carriage prohibited
ISOPROPYLCUMYL HYDROPEROXIDE	≤ 72	≥ 28				OP8	3109	13)
p-MENTHYL HYDROPEROXIDE	> 72 - 100					OP7	3105	13)
"	≤ 72	≥ 28				OP8	3109	27)
METHYLCYCLOHEXANONE PEROXID	≤ 67		≥ 33				3115	Carriage prohibited
METHYL ETHYL KETONE PEROXIDE(S	See remark 8	≥ 48				OP5	3101	3) 8) 13)
"	See remark 9	≥ 55				OP7	3105	9)
"	See remark 10	≥ 60				OP8	3107	10)
METHYL ISOBUTYL KETONE PEROXID	≤ 62	≥ 19				OP7	3105	22)
ORGANIC PEROXIDE, LIQUID, SAMPLE						OP2	3103	11)
ORGANIC PEROXIDE, LIQUID, SAMPLE,TEMPERATURE CONTROLLED							3113	Carriage prohibited
ORGANIC PEROXIDE, SOLID, SAMPLE						OP2	3104	11)
ORGANIC PEROXIDE, SOLID, SAMPLE, TEMPERATURE CONTROLLED							3114	Carriage prohibited
PEROXYACETIC ACID, TYPE D, stabilized	≤ 43					OP7	3105	13) 14) 19)
PEROXYACETIC ACID, TYPE E, stabilized	≤ 43					OP8	3107	13) 15) 19)
PEROXYACETIC ACID, TYPE F, stabilized	≤ 43					OP8	3109	13) 16) 19)
1-PHENYLETHYL HYDROPEROXIDE	≤ 38		≥ 62			OP8	3109	
PINANYL HYDROPEROXIDE	> 56 - 100					OP7	3105	13)
"	≤ 56	≥ 44				OP8	3109	
1,1,3,3-TETRAMETHYLBUTYL HYDROPEROXIDE	≤100					OP7	3105	
1,1,3,3-TETRAMETHYLBUTYL PEROXY-2 ETHYLHEXANOATE	≤100						3115	Carriage prohibited
1,1,3,3- TETRAMETHYLBUTYL PEROXYNEODECANOATE	≤ 72		≥ 28				3115	Carriage prohibited
"	≤ 52 as a stable dispersion in water						3119	Carriage prohibited
1,1,3,3-TETRAMETHYL-BUTYL PEROXYPIVALATE	≤ 37		≥ 63				3115	Carriage prohibited
3,6,9-TRIETHYL-3,6,9-TRIMETHYL-TRIPEROXONANE	≤ 42	≥ 58				OP7	3105	28)
tert-AMYLPEROXY ISOPROPYL CARBONATE	≤ 77	≥ 23				OP5	3103	
1,6-Di-(tert-BUTYLPEROXY-CARBONYLOXY) HEXANE	≤ 72	≥ 28				OP5	3103	
DICETYL PEROXYDICARBONATE	≤ as a stable dispersion in wate						3119	Carriage prohibited
1-(2-ETHYLHEXANOYL-PEROXY)-1,3-DIMETHYLBUTYL PEROXYPIVALATE	≤ 52	≥ 45	≥ 10			OP7	3115	
PEROXYLAURIC ACID	≤ 100					OP8	3118	
POLYETHER POLY-tert-BUTYLPEROXYCARBONATE	≤ 52		≥ 48			OP8	3107	
1,1,3,3-TETRAMETHYL-BUTYL PEROXYPIVALATE	≤ 77	≥ 23					3115	
3-HYDROXY-1,1-DIMETHYLBUTYL PEROXYNEODECANOATE	≤ 77	≥ 23					3115	Carriage prohibited
3-HYDROXY-1,1-DIMETHYLBUTYL PEROXYNEODECANOATE	≤ 52 as a stable dispersion in water						3119	Carriage prohibited
3-HYDROXY-1,1-DIMETHYLBUTYL PEROXYNEODECANOATE	≤ 52	≥ 48					3117	Carriage prohibited
METHYL ISOPROPYL KETONE PEROXIDE(S)	see remark 31)	≥ 70				OP8	3109	31)

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) 1)	Inert solid (%)	Water (%)	Packing method	UN No. (generic entry)	Subsidiary risks a remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3,3,5,7,7-PENTAMETHYL-1,2,4-TRIOXEPANE	≤ 100					~~OP8~~	3107	
3,6,9-TRIETHYL-3,6,9-TRIMETHYL-1,4,TRIPEROXONANE	≤ 17	≥ 18	≥ 65			OP8	3110	
[3R-(3R,5aS,6S,8aS,9R,10R,12S, 12aR**)]-DECAHYDRO-10-METHOXY-3,6,9-TRIMETHYL-3,12-EPOXY-12H-PYRANO[4,3-j]-1,2-BENZODIOXEPIN)	≤ 100					OP7	3106	

Remarks: *1) Diluent type B may always be replaced by diluent type A. The boiling point of diluent type B shall be at least 60 °C higher than the SADT of the organic peroxide.*

2) Available oxygen ≤ 4.7%.

3) "EXPLOSIVE" subsidiary risk label required (Model No.1, see 5.2.2.2.2).

4) Diluent may be replaced by di-tert-butyl peroxide.

5) Available oxygen ≤ 9%.

6) (Reserved)

7) (Reserved)

8) Available oxygen > 10% and ≤ 10.7%, with or without water

9) Available oxygen ≤ 10%, with or without water

10) Available oxygen ≤ 8.2%, with or without water

11) See 2.2.52.1.9

12) Up to 2 000 kg per receptacle assigned to ORGANIC PEROXIDE TYPE F on the basis of large scale trials.

13) CORROSIVE" subsidiary risk label required (Model No.8, see 5.2.2.2.2).

14) Peroxyacetic acid formulations which fulfil the criteria of the Manual of Tests and Criteria, paragraph 20.4.3 (d).

15) Peroxyacetic acid formulations which fulfil the criteria of the Manual of Tests and Criteria, paragraph 20.4.3 (e).

16) Peroxyacetic acid formulations which fulfil the criteria of the Manual of Tests and Criteria, paragraph 20.4.3 (f).

17) Addition of water to this organic peroxide will decrease its thermal stability.

18) No "CORROSIVE" subsidiary risk label (Model No.8, see 5.2.2.2.2) required for concentrations below 80%.

19) Mixtures with hydrogen peroxide, water and acid(s).

20) With diluent type A, with or without water.

21) With ≥25% diluent type A by mass, and in addition ethylbenzene.

22) With ≥19% diluent type A by mass, and in addition methyl isobutyl ketone.

23) With < 6% di-tert-butyl peroxide.

24) With ≤ 8% 1-isopropylhydroperoxy-4-isopropylhydroxybenzene.

25) Diluent type B with boiling point > 110 °C.

26) With < 0.5% hydroperoxides content.

27) For concentrations more than 56%, "CORROSIVE" subsidiary risk label required (Model No.8, see 5.2.2.2.2).

28) Available active oxygen ≤ 7.6% in diluent Type A having a 95% boil-off point in the range of 200 °C – 260 °C.

29) Not subject to the requirements of Annex 2 to SMGS for Class 5.2.

30) Diluent type B with boiling point > 130 °C.

31) Active oxygen ≤ 6.7%.

32) Active oxygen ≤ 4.15%.

2.2.61 CLASS 6.1 TOXIC (POISONOUS) SUBSTANCES

2.2.61.1 ***Criteria***

2.2.61.1.1 The heading of Class 6.1 covers substances of which it is known by experience or regarding which it is presumed from experiments on animals that in relatively small quantities they are able by a single action or by action of short duration to cause damage to human health, or death, by inhalation, by cutaneous absorp- tion or by ingestion.

Note: *Genetically modified microorganisms and organisms shall be assigned to this Class if they meet the conditions for this Class.*

2.2.61.1.2 Substances of Class 6.1 are subdivided as follows:

T Toxic substances without subsidiary risk:

T1 Organic, liquid

T2 Organic, solid

T3 Organometallic substances

T4 Inorganic, liquid

T5 Inorganic, solid

T6 Liquid, used as pesticides

T7 Solid, used as pesticides

T8 Samples;

T9 Other toxic substances

T10 Articles

TF Toxic substances, flammable

TF1 Liquid

TF2 Liquid, used as pesticides

TF3 Solid

TS Toxic substances, self-heating, solid

TW Toxic substances, which, in contact with water, emit flammable gases

TW1 Liquid

TW2 Solid

TO Toxic substances, oxidizing

TO1 Liquid

TO2 Solid

TC Toxic substances, corrosive

TC1 Organic, liquid

TC2 Organic, solid

TC3 Inorganic, liquid

TC4 Inorganic, solid

TFC Toxic substances, flammable, corrosive.

TFW Toxic substances, flammable, which, in contact with water, emit flammable gases.

Definitions

2.2.61.1.3 Acute oral intoxication level LD50 (median lethal dose) for acute oral toxicity is the statistically derived single dose of a substance that can be expected to cause death within 14 days in 50 per cent of young adult albino rats when administered by the oral route. The LD50 value is expressed in terms of mass of test substance per mass of test animal (mg/kg);

LD50 for acute dermal toxicity is that dose of the substance which, administered by continuous contact for 24 hours with the bare skin of albino rabbits, is most likely to cause death within 14 days in one half of the animals tested. The number of animals tested shall be sufficient to give a statistically significant result and be in conformity with good pharmacological practice. The result is expressed in milligrams per kg body mass;

LC_{50} for acute toxicity on inhalation is that concentration of vapour, mist or dust which, administered by continuous inhalation to both male and female young adult albino rats for one hour, is most likely to cause death within 14 days in one half of the animals tested. A solid substance shall be tested if at least 10% (by mass) of its total mass is likely to be dust in a respirable range, e.g. the aerodynamic diameter of that particlefraction is 10 µm or less. A liquid substance shall be tested if a mist is likely to be generated in a leakage of the transport containment.

Both for solid and liquid substances more than 90% (by mass) of a specimen prepared for inhalation toxicity shall be in the respirable range as defined above. The result is expressed in milligrams per litre of air for dusts and mists or in millilitres per cubic metre of air (parts per million) for vapours.

Classification and assignment of packing groups

2.2.61.1.4 Substances of Class 6.1 shall be classified in three packing groups according to the degree of danger they present for carriage, as follows:

– Packing group I: highly toxic substances,

– Packing group II: упаковки II: toxic substances,

– Packing group III: slightly toxic substances.

2.2.61.1.5 Substances, mixtures, solutions and articles classified in Class 6.1 are listed in Table A of Chapter 3.2. The assignment of substances, mixtures and solutions not mentioned by name in Table A of Chapter 3.2 to the relevant entry of 2.2.61.3 and to the relevant packing group in accordance with the provisions of Chapter 2.1, shall be made according to the following criteria in 2.2.61.1.6 to 2.2.61.1.11.

2.2.61.1.6 To assess the degree of toxicity, account shall be taken of human experience of instances of accidental poisoning, as well as special properties possessed by any individual substances: liquid state, high volatility, any special likelihood of cutaneous absorption, and special biological effects.

2.2.61.1.7 In the absence of observations on humans, the degree of toxicity shall be assessed using the available data from animal experiments in accordance with the table below:

	Packing group	**Oral toxicity LD_{50}, mg/kg**	**Dermal toxicity LD50 (mg/kg)**	**Inhalation toxicity by dusts and mists LC50 (mg/l)**
Highly toxic	I	≤ 5	≤ 50	≤ 0,2
Toxic	II	> 5-50	> 50 - 200	> 0,2-2
Slightly toxic	III [a)]	> 50-300	> 200 – 1000	> 2-4

[a)] Tear gas substances shall be included in packing group II even if data concerning their toxicity correspond to packing group III criteria.

2.2.61.1.7.1 Where a substance exhibits different degrees of toxicity for two or more kinds of exposure, it shall be classified under the highest such degree of toxicity.

2.2.61.1.7.2 Substances meeting the criteria of Class 8 and with an inhalation toxicity of dusts and mists (LC50) leading to packing group I shall only be accepted for an allocation to Class 6.1 if the toxicity through oral ingestion or dermal contact is at least in the range of packing groups I or II. Otherwise an assignment to Class 8 shall be made if appropriate (see 2.2.8.1.4.5).

2.2.61.1.7.3 The criteria for inhalation toxicity of dusts and mists are based on LC50 data relating to 1-hour exposure, and where such information is available it shall be used. However, where only LC50 data relating to 4-hour exposure are available, such figures can be multiplied by four and the product substituted in the above cri- teria, i.e. LC50 value multiplied by four (4 hour) is considered the equivalent of LC50 (1 hour).

Inhalation toxicity of vapours

2.2.61.1.8 Liquids giving off toxic vapours shall be classified into the following groups where "V" is the saturated vapour concentration (in ml/m3 of air) (volatility) at 20 °C and standard atmospheric pressure:

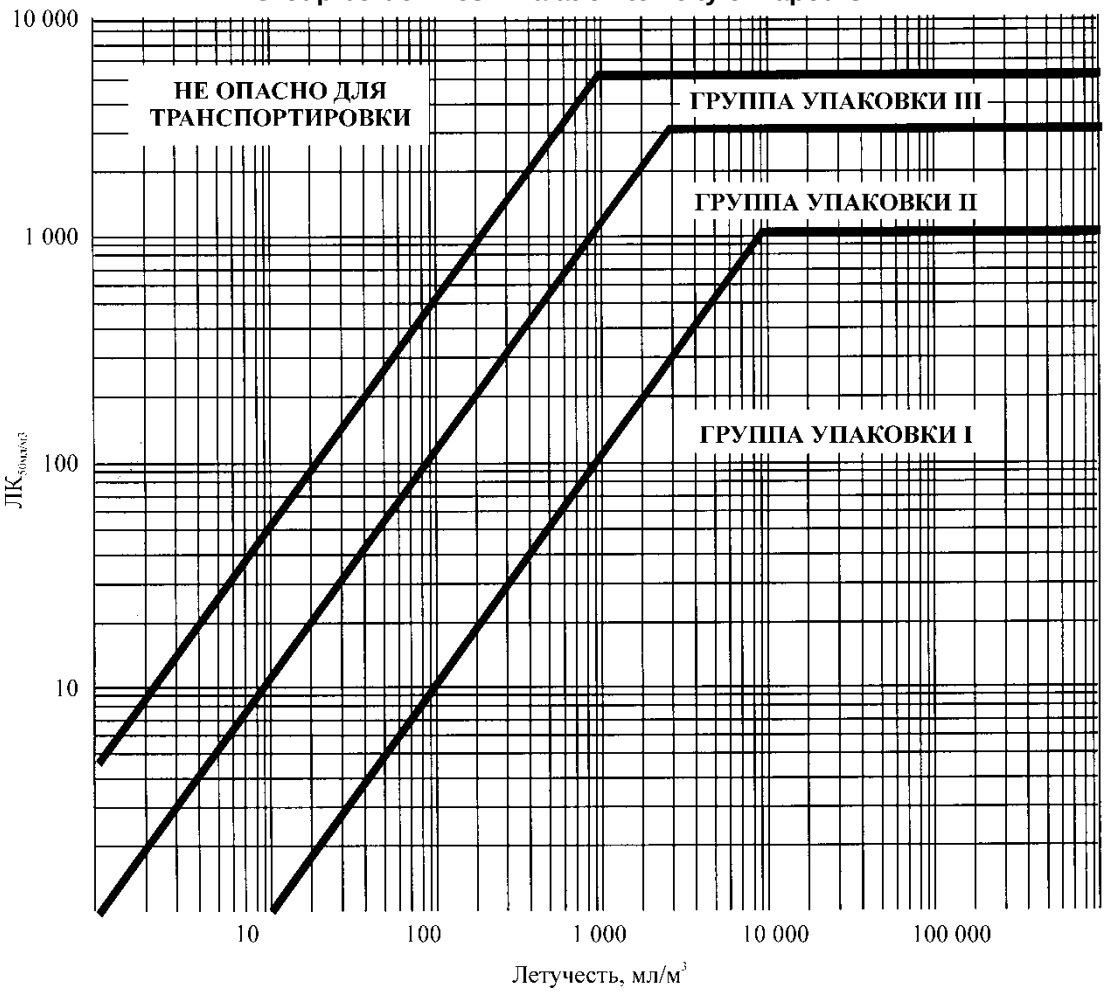
	Packing group	**Vapour concentration**
Highly toxic	I	Where V ≥ 10 LC50 and LC50 ≤ 1 000 ml/m3
Toxic	II	Where V ≥ LC50 and LC50 ≤ 3 000 ml/m3 and the criteria for packing group I are not met
Slightly toxic	III[a)]	Where V ≥ 1/5 LC50 and LC50 ≤ 5 000 ml/m3 and the criteria for packing groups I and II are not met

a) Tear gas substances shall be included in packing group II even if data concerning their toxicity correspond to packing group III criteria.

These criteria for inhalation toxicity of vapours are based on LC50 data relating to 1-hour exposure, and where such information is available, it shall be used.

However, where only LC_{50} data relating to 4-hour exposure to the vapours are available, such figures can be multiplied by two and the product substituted in the above criteria, i.e. LC_{50} (4 hour) × 2 is considered the equivalent of LC_{50} (1 hour).

Group borderlines inhalation toxicity of vapours



(Not dangerous for transport, Packing Group III, Packing Group II, Packing Group I, Volatility ml/m³)

In this figure, the criteria are expressed in graphical form, as an aid to easy classification. However, due to approximations inherent in the use of graphs, substances falling on or near group borderlines shall be checked using numerical criteria.

Mixtures of liquids

2.2.61.1.9 *Mixtures of liquids* which are toxic on inhalation shall be assigned to packing groups according to the following criteria:

2.2.61.1.9.1 If LC50 is known for each of the toxic substances constituting the mixture, the packing group may be determined as follows:

a) Calculation of the LC50 of the mixture:

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

where:

f_i – molar fraction of constituent i of the mixture;

LC_{50i} – average lethal concentration of constituent i in ml/m³.

b) Calculation of volatility of each mixture constituent:

$$V_i = \frac{P_i \times 10^6}{101{,}3}, \quad ml \ / m3,$$

where:

P_i – partial pressure of constituent i in kPa at 20 °C and at standard atmospheric pressure.

c) Calculation of the ratio of volatility to LC50:

$$R = \sum_{i=1}^{n} \frac{V_i}{LC_{50i}}$$

d) The values calculated for LC50 (mixture) and R are then used to determine the packing group of the mixture:

Packing group I R ≥ 10 and LC_{50} (mixture) ≤1000 ml/m³;

Packing group II R ≥ 1 and LC_{50} (mixture) ≤ 3000 ml/m³, If the mixture does not meet the criteria for packing group I;

Packing group III R ≥ 1/5 and LC_{50} (mixture) ≤ 5000 ml/m³, если смесь не отвечает критериям отнесения к группе упаковки I или II.

2.2.61.1.9.2 In the absence of LC50 data on the toxic constituent substances, the mixture may be assigned to a group based on the following simplified threshold toxicity tests. When these threshold tests are used, the most re- strictive group shall be determined and used for carrying the mixture.

2.2.61.1.9.3 A mixture is assigned to packing group I only if it meets both of the following criteria:

a) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 1 000 ml/m3 vaporized mixture in air. Ten albino rats (5 male and 5 female) are exposed to the test at- mosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have an LC50 equal to or less than 1 000 ml/m³;

b) A sample of vapour in equilibrium with the liquid mixture is diluted with 9 equal volumes of air to form a test atmosphere. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have a volatility equal to or greater than 10 times the mixture LC50.

2.2.61.1.9.4 A mixture is assigned to packing group II only if it meets both of the following criteria, and does not meet the criteria for packing group I:

a) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 3 000 ml/m3 vaporized mixture in air. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have an LC50 equal to or less than 3 000 ml/m3;

b) A sample of the vapour in equilibrium with the liquid mixture is used to form a test atmosphere. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have a volatility equal to or greater than the mixture LC50.

2.2.61.1.9.5 A mixture is assigned to packing group III only if it meets both of the following criteria, and does not meet the criteria for packing groups I or II:

a) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 5 000 ml/m3 vaporized mixture in air. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have an LC50 equal to or less than 5 000 ml/m3;

b) The vapour concentration (volatility) of the liquid mixture is measured and if the vapour concentration is equal to or greater than 1 000 ml/m3, the mixture is presumed to have a volatility equal to or greater than 1/5 the mixture LC50.

Methods for determining oral and dermal toxicity of mixtures

2.2.61.1.10 When classifying and assigning the appropriate packing group to mixtures in Class 6.1 in accordance with the oral and dermal toxicity criteria (see 2.2.61.1.3), it is necessary to determine the acute LD50 of the mixture.

2.2.61.1.10.1 If a mixture contains only one active substance, and the LD50 of that constituent is known, in the absence of reliable acute oral and dermal toxicity data on the actual mixture to be carried, the oral or dermal LD50 may be obtained by the following method:

$$\text{LD}_{50}\ \text{value of preparation} = \frac{LD50\ value\ of\ active\ substance\ \times 100}{\text{percentage of active substance by mass)}}$$

2.2.61.1.10.2 If a mixture contains more than one active constituent, there are three possible approaches that may be used to determine the oral or dermal LD50 of the mixture. The preferred method is to obtain reliable acute oral and dermal toxicity data on the actual mixture to be carried. If reliable, accurate data are not available, then either of the following methods may be performed:

a) Classify the formulation according to the most hazardous constituent of the mixture as if that constituent were present in the same concentration as the total concentration of all active constituents; or

b) Apply the formula:

$$\frac{C_A}{T_A} + \frac{C_B}{T_B} + \cdots + \frac{C_Z}{T_Z} = \frac{100}{T_M}$$

where:

C – the percentage concentration of constituent A, B, ..., Z in the mixture;

T – the oral LD50 values of constituent A, B, ... Z;

T_M – the oral LD50 value of the mixture.

Note: *This formula can also be used for dermal toxicities, provided that this information is available on the same species for all constituents. The use of this formula does not take into account any potentia tion or protective phenomena.*

Classification of pesticides

2.2.61.1.11 All active pesticide substances and their preparations for which the LC50 and/or LD50 values are known and which are classified in Class 6.1 shall be classified under appropriate packing groups in accordance with the criteria given in 2.2.61.1.6 to 2.2.61.1.9. Substances and preparations which are characterized by subsidiary risks shall be classified according to the precedence of hazard Table in 2.1.3.10 with the assignment of appropriate packing groups.

2.2.61.1.11.1 If the oral or dermal LD50 value for a pesticide preparation is not known, but the LD50 value of its active substance(s) is known, the LD50 value for the preparation may be obtained by applying the procedures in 2.2.61.1.10.

Note*: LD50 toxicity data for a number of common pesticides may be obtained from the most current edition of the document "The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification" available from the International Programme on Chemical Safety, World Health Organisation (WHO), 1211 Geneva 27, Switzerland. While that document may be used as a source of LD50 data for pesticides, its classification system shall not be used for purposes of transport classification of, or assignment of packing groups to, pesticides, which shall be in accordance with the requirements of Annex 2 to SMGS.*

2.2.61.1.11.2 The proper shipping name used in the carriage of the pesticide shall be selected on the basis of the active ingredient, of the physical state of the pesticide and any subsidiary risks it may exhibit (see 3.1.2).

2.2.61.1.12 If substances of Class 6.1, as a result of admixtures, come into categories of risk different from those to which the substances mentioned by name in Table A of Chapter 3.2 belong, these mixtures or solutions shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

***Note**: For the classification of solutions and mixtures (such as preparations and wastes), see also 2.1.3.*

2.2.61.1.13 *On the basis of the criteria of 2.2.61.1.6 to 2.2.61.1.11, it may also be determined whether the nature of a solution or mixture mentioned by name or containing a substance mentioned by name is such that the solution or mixture is not subject to the requirements for this Class.6.1.*

2.2.61.1.14 Substances, solutions and mixtures, with the exception of substances and preparations used as pesticides, which are not classified as acute toxic category 1, 2 or 3 according to GHS or document No. 9 of *the List*, may be considered as substances not belonging to Class 6.1.

2.2.61.2 *Substances not accepted for carriage*

2.2.61.2.1 Chemically unstable substances of Class 6.1 shall not be accepted for carriage unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of carriage. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions. If temperature control is required to prevent polymerization of a substance the substance shall not be accepted for carriage:

- in a packaging or IBC with an SAPT of 50 °C or less,
- or in a tank with an SAPT of 45 °C or less.

2.2.61.2.2 The following substances and mixtures shall not be accepted for carriage:

– Hydrogen cyanide, anhydrous or in solution, which do not meet the descriptions of UN Nos. 1051, 1613, 1614 and 3294;

– Metal carbonyls, having a flash-point below 23 °C, other than UN Nos. 1259 NICKEL CARBONYL and 1994 IRON PENTACARBONYL;

– 2,3,7,8– TETRACHLORODIBENZO-P-DIOXINE (TCDD) in concentrations considered highly toxic in accordance with the criteria in 2.2.61.1.7;

– № UN No. 2249 DICHLORODIMETHYL ETHER, SYMMETRICAL;

– Preparations of phosphides without additives inhibiting the emission of toxic flammable gases.

The following substances shall not be accepted for carriage by rail:

– Barium azide, dry or with less than 50% water or alcohols;

– UN 0135 MERCURY FULMINATE, WETTED.

2.2.61.3 List of collective entries

Subsidary risk	Classification code	UN No.	Name of substance or article
Toxic substances			
Without subsidiary r	**Organic**		
	liquid [a] **T1**	1583	CHLOROPICRIN MIXTURE, N.O.S.
		1602	DYE, LIQUID, TOXIC, N.O.S., or
		1602	DYE INTERMEDIATE, LIQUID, TOXIC, N.O.S..
		1693	TEAR GAS SUBSTANCE, LIQUID, N.O.S.
		1851	MEDICINE, LIQUID, TOXIC, N.O.S.
		2206	ISOCYANATES, TOXIC, N.O.S. or
		2206	ISOCYANATE SOLUTION, TOXIC, N.O.S
		3140	ALKALOIDS, LIQUID, N.O.S. or
		3140	ALKALOID SALTS, LIQUID, N.O.S..
		3142	DISINFECTANT, LIQUID, TOXIC, N.O.S.
		3144	NICOTINE COMPOUND, LIQUID, N.O.S. or
		3144	NICOTINE PREPARATION, LIQUID, N.O.S.
		3172	TOXINS, EXTRACTED FROM LIVING SOURCES, LIQUID, N.O.S.
		3276	NITRILES, LIQUID, TOXIC, N.O.S.
		3278	ORGANOPHOSPHORUS COMPOUND, LIQUID, TOXIC, N.O.S.
		3381	TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
		3382	TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or eq to 1 000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}
		2810	TOXIC LIQUID, ORGANIC, N.O.S.
	Solid [a,b] **T2**	1544	ALKALOIDS, SOLID, N.O.S. or
		1544	ALKALOID SALTS, SOLID, N.O.S.
		1601	DISINFECTANT, SOLID, TOXIC, N.O.S.
		1655	NICOTINE COMPOUND, SOLID, N.O.S., or
		1655	NICOTINE PREPARATION, SOLID, N.O.S.
		3143	DYE, SOLID, TOXIC, N.O.S. or
		3143	DYE INTERMEDIATE, SOLID, TOXIC, N.O.S.
		3249	MEDICINE, SOLID, TOXIC, N.O.S.
		3439	NITRILES, SOLID, TOXIC, N.O.S.
		3448	TEAR GAS SUBSTANCE, SOLID, N.O.S.
		3462	TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.
	Organometallic [c,d] **T3**	2026	PHENYLMERCURIC COMPOUND, N.O.S.
		2788	ORGANOTIN COMPOUND, LIQUID, N.O.S.
		3146	ORGANOTIN COMPOUND, SOLID, N.O.S.
		3280	ORGANOARSENIC COMPOUND, LIQUID, N.O.S.
		3281	METAL CARBONYLS, LIQUID, N.O.S.
		3465	ORGANOARSENIC COMPOUND, SOLID, N.O.S.
		3466	METAL CARBONYLS, SOLID, N.O.S.
		3282	ORGANOMETALLIC COMPOUND, LIQUID, TOXIC, N.O.S.
		3467	ORGANOMETALLIC COMPOUND, SOLID, TOXIC, N.O.S.
	Liquid[e] **T4**	1556	ARSENIC COMPOUND, LIQUID, N.O.S., inorganic including: Arsenates, n.o.s.; Arsenites, n.o.s.; and Ar¬senic sulphides, N.O.S.
		1935	CYANIDE SOLUTION, N.O.S.
		2024	MERCURY COMPOUND, LIQUID, N.O.S.
		3141	ANTIMONY COMPOUND, INORGANIC, LIQUID, N.O.S.
		3287	TOXIC LIQUID, INORGANIC, N.O.S.
		3440	SELENIUM COMPOUND, LIQUID, N.O.S.
		3381	TOXIC BY INHALATION LIQUID, N.O.S with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
		3382	TOXIC BY INHALATION LIQUID, N.O.S. with an LC_{50} lower than or equal to 1 000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}

Inorganic	**Solid**[f,g] **T5**	1549	ANTIMONY COMPOUND, INORGANIC, SOLID, N.O.S.
		1557	ARSENIC COMPOUND, SOLID, N.O.S., including: Arsenates, n.o.s.; Arsenites, n.o.s.;
		1564	BARIUM COMPOUND, N.O.S.
		1566	BERYLLIUM COMPOUND, N.O.S.
		1588	CYANIDES, INORGANIC, SOLID, N.O.S.
		1707	THALLIUM COMPOUND, N.O.S.
		2025	MERCURY COMPOUND, SOLID, N.O.S.
		2291	LEAD COMPOUND, SOLUBLE, N.O.S.
		2570	CADMIUM COMPOUND
		2630	SELENATES or
		2630	SELENITES
		2856	FLUOROSILICATES, N.O.S.
		3283	SELENIUM COMPOUND, SOLID, N.O.S.
		3284	TELLURIUM COMPOUND, N.O.S.
		3285	VANADIUM COMPOUND, N.O.S.
		3288	TOXIC SOLID, INORGANIC, N.O.S.
Pesticides	**Liquid**[n] **T6**	2992	CARBAMATE PESTICIDE, LIQUID, TOXIC
		2994	ARSENICAL PESTICIDE, LIQUID, TOXIC
		2996	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC
		2998	TRIAZINE PESTICIDE, LIQUID, TOXIC
		3006	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC
		3010	COPPER BASED PESTICIDE, LIQUID, TOXIC
		3012	MERCURY BASED PESTICIDE, LIQUID, TOXIC
		3014	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC
		3016	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC
		3018	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC
		3020	ORGANOTIN PESTICIDE, LIQUID, TOXIC
		3026	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC
		3348	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC
		3352	PYRETHROID PESTICIDE, LIQUID, TOXIC
		2902	PESTICIDE, LIQUID, TOXIC, N.O.S.
	Solid[h] **T7**	2757	CARBAMATE PESTICIDE, SOLID, TOXIC
		2759	ARSENICAL PESTICIDE, SOLID, TOXIC
		2761	ORGANOCHLORINE PESTICIDE, SOLID, TOXIC
		2763	TRIAZINE PESTICIDE, SOLID, TOXIC
		2771	THIOCARBAMATE PESTICIDE, SOLID, TOXIC
		2775	COPPER BASED PESTICIDE, SOLID, TOXIC
		2777	MERCURY BASED PESTICIDE, SOLID, TOXIC
		2779	SUBSTITUTED NITROPHENOL PESTICIDE, SOLID, TOXIC
		2781	BIPYRIDILIUM PESTICIDE, SOLID, TOXIC
		2783	ORGANOPHOSPHORUS PESTICIDE, SOLID, TOXIC
		2786	ORGANOTIN PESTICIDE, SOLID, TOXIC
		3027	COUMARIN DERIVATIVE PESTICIDE, SOLID,TOXIC
		3048	ALUMINIUM PHOSPHIDE PESTICIDE
		3345	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC
		3349	PYRETHROID PESTICIDE, SOLID, TOXIC
		2588	PESTICIDE, SOLID, TOXIC, N.O.S.
Samples	**T8**	3315	CHEMICAL SAMPLE, TOXIC
Other toxic substances[i]	**T9**	3243	SOLIDS CONTAINING TOXIC LIQUID, N.O.S.
Articles	**T10**	3546	ARTICLES CONTAINING TOXIC SUBSTANCE, N.O.S.

Flammable TF	**Liquid[j,k]**	**TF1**	3071	MERCAPTANS, LIQUID, TOXIC, FLAMMABLE, N.O.S. or
			3071	MERCAPTAN MIXTURE, LIQUID, TOXIC, FLAMMABLE, N.O.S.
			3080	ISOCYANATES, TOXIC, FLAMMABLE, N.O.S.or
			3080	ISOCYANATE SOLUTION, TOXIC, FLAMMABLE, N.O.S.
			3275	NITRILES, TOXIC, FLAMMABLE, N.O.S.
			3279	ORGANOPHOSPHORUS COMPOUND, TOXIC, FLAMMABLE, N.O.S.
			3383	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
			3384	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1 000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}
			2929	TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S.
	Pesticides (flash-point less than 23°C)	**TF2**	2991	CARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			2993	ARSENICAL PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			2995	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			2997	TRIAZINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3005	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3009	COPPER BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3011	MERCURY BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3013	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3015	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3017	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3019	ORGANOTIN PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3025	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3347	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			3351	PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE
			2903	PESTICIDE, LIQUID, TOXIC, FLAMMABLE, N.O.S.
	Solid	**TF3**	1700	TEAR GAS CANDLES
			2930	TOXIC SOLID, FLAMMABLE, ORGANIC, N.O.S.
			3535	TOXIC SOLID, FLAMMABLE, INORGANIC, N.O.S.
Solid, Self-heating[c]		**TS**	3124	TOXIC SOLID, SELF-HEATING, N.O.S.
Water-reactive [d] TW	**Liquid**	**TW1**	3385	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
			3386	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an LC_{50} lower than or equal to 1 000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}
			3123	TOXIC LIQUID, WATER-REACTIVE, N.O.S.
	Solid[i]	**TW2**	3125	TOXIC SOLID, WATER-REACTIVE, N.O.S.
Oxidizing[M] TO	**Liquid**	**TO1**	3387	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
			3388	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an LC_{50} lower than or equal to 1 000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}
			3122	TOXIC LIQUID, OXIDIZING, N.O.S.
	Solid	**TO2**	3086	TOXIC SOLID, OXIDIZING, N.O.S.
Organic	**Liquid**	**TC1**	3277	CHLOROFORMATES, TOXIC, CORROSIVE, N.O.S.
			3361	CHLOROSILANES, TOXIC, CORROSIVE, N.O.S.
			3389	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
			3390	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1 000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}
			2927	TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S.

		Solid	**TC2**	2928	TOXIC SOLID, CORROSIVE, ORGANIC, N.O.S.
Corrosive [n] TC		**Liquid**	**TC3**	3389	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
				3390	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1 000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}
				3289	TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S.
	Inorganic				
		Solid	**TC4**	3290	TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S.
Flammable, corrosive			**TFC**	2742	CHLOROFORMATES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.
				3362	CHLOROSILANES, TOXIC, CORROSIVE, FLAM-MABLE, N.O.S.
				3488	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
				3489	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour concentration greater than or equal to 10 LC_{50}.
Flammable, water-reactive			**TFW**	3490	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 200 ml/m^3 and saturated vapour concentration greater than or equal to 500 LC_{50}
				3491	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an LC_{50} lower than or equal to 1000 ml/m^3 and saturated vapour

Remarks:

a) Substances and preparations containing alkaloids or nicotine used as pesticides shall be classified under UN No. 2588 PESTICIDES, SOLID, TOXIC, N.O.S., UN No. 2902 PESTICIDES, LIQUID, TOXIC, N.O.S. or UN No. 2903 PESTICIDES, LIQUID, TOXIC, FLAMMABLE, N.O.S.

b) Active substances and triturations or mixtures of substances intended for laboratories and experiments and for the manufacture of pharmaceutical products with other substances shall be classified accord ing to their toxicity (see 2.2.61.1.7 to 2.2.61.1.11).

c) Self-heating substances, slightly toxic and spontaneously combustible organometallic compounds, are substances of Class 4.2.

d) Water-reactive substances, slightly toxic, and water-reactive organometallic compounds, are substances of Class 4.3.

e) Mercury fulminate, wetted with not less than 20% water, or mixture of alcohol and water by mass is a substance of Class 1, UN No. 0135.

f) Ferricyanides, ferrocyanides, alkaline thiocyanates and ammonium thiocyanates are not subject to the provisions of Annex 2 to SMGS.

g) Lead salts and lead pigments which, when mixed in a ratio of 1:1000 with 0.07M hydrochloric acid and stirred for one hour at a temperature of 23 °C ± 2 °C, exhibit a solubility of 5% or less, are not subject to the provisions of Annex 2 to SMGS.

h) Articles impregnated with this pesticide, such as fibreboard plates, paper strips, cotton-wool balls, sheets of plastics material, in hermetically closed wrappings, are not subject to the provisions of Annex 2 to SMGS.

i) Mixtures of solids which are not subject to the provisions of Annex 2 to SMGS and of toxic liquids may be carried under UN No. 3243 without first applying the classification criteria of Class 6.1, provided there is no free liquid visible at the time the substance is loaded or at the time the packaging, wagon or container is closed. Each packaging shall correspond to a design type that has passed a leakproofness test at the packing group II level. This entry shall not be used for solids containing a packing group I liquid.

j) Highly toxic and toxic flammable liquids having a flash-point below 23 °C are substances of Class 3 except those which are highly toxic by inhalation, as defined in 2.2.61.1.4 to 2.2.61.1.9. Liquids which are highly toxic by inhalation are indicated as "toxic by inhalation" in their proper shipping name in Col umn (2) or by special provision 354 in Column (6) of Table A of Chapter 3.2.

k) Flammable liquids, slightly toxic, with the exception of substances and preparations used as pesticides, having a flash-point between 23 °C and 60 °C inclusive, are substances of Class 3.

l) Metal phosphides assigned to UN Nos. 1360, 1397, 1432, 1714, 2011 and 2013 are substances of Class 4.3.

m) Oxidizing substances, slightly toxic, are substances of Class 5.1.

n) Substances slightly toxic and slightly corrosive, are substances of Class 8.

2.2.62 CLASS 6.2 INFECTIOUS SUBSTANCES

2.2.62.1 Criteria

2.2.62.1.1 The heading of Class 6.2 covers infectious substances. Infectious substances are substances which are known or are reasonably expected to contain pathogens. Pathogens are defined as microorganisms (including bacteria, viruses, parasites, fungi) and other agents such as prions, which can cause disease in humans or animals.

Note 1: *Genetically modified microorganisms and organisms, biological products, diagnostic specimens and infected live animals shall be assigned to this Class if they meet the conditions for the class 6.2. The carriage of unintentionally or naturally infected live animals is subject only to the relevant rules and regulations of the respective countries of origin, transit and destination.*

Note 2*: Toxins from plant, animal or bacterial sources which do not contain any infectious substances or organisms or which are not contained in them are substances of Class 6.1, UN No. 3172 or 3462.*

2.2.62.1.2 Substances of Class 6.2 are subdivided as follows:

I1 Infectious substances affecting humans

I2 Infectious substances affecting animals only

I3 Clinical waste

I4 Biological substances

Definitions

2.2.62.1.3 For the purposes of Annex 2 to SMGS:

"Biological products" are those products derived from living organisms which are manufactured and distributed in accordance with the requirements of appropriate national authorities, which may have special licensing requirements, and are used either for prevention, treatment, or diagnosis of disease in humans or animals, or for development, experimental or investigational purposes related thereto. They include, but are not limited to, finished or unfinished products such as vaccines;

"Cultures" are the result of a process by which pathogens are intentionally propagated. This definition does not include human or animal patient specimens as defined in this paragraph;

"Medical or clinical wastes" are wastes derived from the veterinary treatment of animals, the medical treatment of humans or from bio-research;

"Patient specimens" are those, collected directly from humans or animals, including, but not limited to, excreta, secreta, blood and its components, tissue and tissue fluid swabs, and body parts being carried for purposes such as research, diagnosis, investigational activities, disease treatment and prevention.

Classification

2.2.62.1.4 Infectious substances shall be classified in Class 6.2 and assigned to UN Nos. 2814, 2900, 3291, 3373 or 3549, as appropriate.

Infectious substances are divided into the following categories:

2.2.62.1.4.1 Category A: An infectious substance which is carried in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals. Indicative examples of substances that meet these criteria are given in the table in this paragraph.

Note: *An exposure occurs when an infectious substance is released outside of the protective packaging, resulting in physical contact with humans or animals.*

(a) Infectious substances meeting these criteria which cause disease in humans or both in humans and animals shall be assigned to UN No. 2814. Infectious substances which cause disease only in animals shall be assigned to UN No. 2900;

(b) Assignment to UN No. 2814 or UN No. 2900 shall be based on the known medical history and symptoms of the source human or animal, endemic local conditions, or professional judgement concerning individual circumstances of the source human or animal.

Note 1: *The proper shipping name for UN No. 2814 is "INFECTIOUS SUBSTANCE, AFFECTING HUMANS". The proper shipping name for UN No. 2900 is "INFECTIOUS SUBSTANCE, AFFECTING ANIMALS only".*

Note 2: *The following table is not exhaustive. Infectious substances, including new or emerging pathogens, which do not appear in the table but which meet the same criteria shall be assigned to Category A. In addition, if there is doubt as to whether or not a substance meets the criteria it shall be included in Category A.*

Note 3: *In the following table, the microorganisms written in italics are bacteria or fungi.*

Indicative examples of infectious substances included in Category A in any form unless otherw indicated (see 2.2.62.1.4.1)	
UN Number and name	Microorganism
UN No. 2814 Infectious substances affecting humans	Bacillus anthracis (cultures only) *Brucella abortus* (cultures only) Brucella melitensis (cultures only) *Brucella suis* (cultures only) Burkholderia mallei - Pseudomonas mallei - Glanders (cultures only) Burkholderia pseudomallei - Pseudomonas pseudomallei (cultures only) *Chlamydia psittaci* - avian strains (cultures only) Clostridium botulinum (cultures only) Coccidioides immitis (cultures only) Coxiella burnetii (cultures only) Crimean-Congo haemorrhagic fever virus Dengue virus (cultures only) Eastern equine encephalitis virus (cultures only) *Escherichia coli*, verotoxigenic (cultures only)[10] Ebola virus Flexal virus Francisella tularensis (cultures only) Guanarito virus Hantaan virus Hantavirus causing haemorrhagic fever with renal syndrome Hendra virus Hepatitis B virus (cultures only) Herpes B virus (cultures only) Human immunodeficiency virus (cultures only) Highly pathogenic avian influenza virus (cultures only) Japanese Encephalitis virus (cultures only) Junin virus Kyasanur Forest disease virus Lassa virus Machupo virus Marburg virus Monkeypox virus Mycobacterium tuberculosis (cultures only)[10] Nipah virus

[10] Nevertheless, when the cultures are intended for diagnostic or clinical purposes, they may be classified as infectious substances of Category B.

Indicative examples of infectious substances included in Category A in any form unless otherw indicated (see 2.2.62.1.4.1)	
UN Number and name	Microorganism
	Omsk haemorrhagic fever virus Poliovirus (cultures only) Rabies virus (cultures only) Rickettsia prowazekii (cultures only) Rickettsia rickettsii (cultures only) Rift Valley fever virus (cultures only) Russian spring-summer encephalitis virus (cultures only) Sabia virus *Shigella dysenteriae*, тип 1 (cultures only)[10] Tick-borne encephalitis virus (cultures only) Variola virus Venezuelan equine encephalitis virus (cultures only) West Nile virus (cultures only) Yellow fever virus (cultures only) *Yersinia pestis* (cultures only)
UN No. 2900 Infectious substances affecting animals only	African swine fever virus (cultures only) Avian paramyxovirus Type 1 - Velogenic Newcastle dise (cultures only) Classical swine fever virus (cultures only) Foot and mouth disease virus (cultures only) Lumpy skin disease virus (cultures only) *Mycoplasma mycoides* - Contagious bovine pleuropneumo (cultures only) Peste des petits ruminants virus (cultures only) Rinderpest virus (cultures only) Sheep-pox virus (cultures only) Goatpox virus (cultures only) Swine vesicular disease virus (cultures only) Vesicular stomatitis virus (cultures only)

2.2.62.1.4.2 Category B: An infectious substance which does not meet the criteria for inclusion in Category A. Infectious substances in Category B shall be assigned to UN No. 3373.

Note: *The proper shipping name of UN No. 3373 is "BIOLOGICAL SUBSTANCE, CATEGORY B".*

2.2.62.1.5 *Exemptions*

2.2.62.1.5.1 Substances which do not contain infectious substances or substances which are unlikely to cause disease in humans or animals are not subject to the provisions of Annex 2 to SMGS unless they meet the criteria for inclusion in another class.

2.2.62.1.5.2 Substances containing microorganisms which are non-pathogenic to humans or animals are not subject to Annex 2 to SMGS unless they meet the criteria for inclusion in another class.

2.2.62.1.5.3 Substances in a form that any present pathogens have been neutralized or inactivated such that they no longer pose a health risk are not subject to Annex 2 to SMGS unless they meet the criteria for inclusion in another class.

Note: *Medical equipment which has been drained of free liquid is deemed to meet the requirements of this paragraph and is not subject to the provisions of Annex 2 to SMGS.*

2.2.62.1.5.4 Substances where the concentration of pathogens is at a level naturally encountered (including foodstuff and water samples) and which are not considered to pose a significant risk of infection are not subject to Annex 2 to SMGS unless they meet the criteria for inclusion in another class.

2.2.62.1.5.5 Dried blood spots, collected by applying a drop of blood onto absorbent material, are not subject to Annex 2 to SMGS.

2.2.62.1.5.6 Faecal occult blood screening samples are not subject to Annex 2 to SMGS.

2.2.62.1.5.7 Blood or blood components which have been collected for the purposes of transfusion or for the preparation of blood products to be used for transfusion or transplantation and any tissues or organs intended for use in transplantation as well as samples drawn in connection with such purposes are not subject to Annex 2 to SMGS**.**

2.2.62.1.5.8 Human or animal specimens for which there is minimal likelihood that pathogens are present are not subject to Annex 2 to SMGS if the specimen is carried in a packaging which will prevent any leakage and which is marked with the words "EXEMPT HUMAN SPECIMEN" or "EXEMPT ANIMAL SPECIMEN", as appropriate.

The packaging is deemed to comply with the above requirements if it meets the following conditions:

a) The packaging consists of three components:

- a leak-proof primary receptacle(s) ;
- a leak-proof secondary packaging; and
- an outer packaging of adequate strength for its capacity, mass and intended use, and with at least one surface having minimum dimensions of 100 mm x 100 mm;

b) For liquids, absorbent material in sufficient quantity to absorb the entire contents is placed between the primary receptacle(s) and the secondary packaging so that, during carriage, any release or leak of a liquid substance will not reach the outer packaging and will not compromise the integrity of the cushioning material;

c) When multiple fragile primary receptacles are placed in a single secondary packaging, they are either individually wrapped or separated to prevent contact between them.

Note 1: *An element of professional judgment is required to determine if a substance is exempt under this paragraph. That judgment should be based on the known medical history, symptoms and individual circumstances of the source, human or animal, and endemic local conditions. Examples of specimens which may be carried under this paragraph include*

- *the blood or urine tests to monitor cholesterol levels, blood glucose levels, hormone levels, or prostate specific antibodies (PSA);*
- *those required to monitor organ function such as heart, liver or kidney function for humans or animals with non-infectious diseases, or for therapeutic drug monitoring;*
- *those conducted for insurance or employment purposes and are intended to determine the presence of drugs or alcohol;*
- *pregnancy test;*
- *biopsies to detect cancer; and*
- *antibody detection in humans or animals in the absence of any concern for infection (e.g. evaluation of vaccine induced immunity, diagnosis of autoimmune disease, etc.).*

Note 2*:* *For air transport, packagings for specimens exempted under this paragraph shall meet the conditions in (a) to (c).*

2.2.62.1.5.9 Except for:

a) Medical waste (UN Nos. 3291 and 3549);

b) Medical devices or equipment contaminated with or containing infectious substances in Category A (UN No. 2814 or UN No. 2900); and

c) Medical devices or equipment contaminated with or containing other dangerous goods that meet the definition of another class,

medical devices or equipment potentially contaminated with or containing infectious substances which are being carried for disinfection, cleaning, sterilization, repair, or

equipment evaluation are not subject to the provisions of Annex 2 to SMGS other than those of this paragraph if packed in packagings designed and constructed in such a way that, under normal conditions of carriage, they cannot break, be punctured or leak their contents. Packagings shall be designed to meet the construction requirements listed in 6.1.4 or 6.6.4.

These packagings shall meet the general packing requirements of 4.1.1.1 and 4.1.1.2 and be capable of retaining the medical devices and equipment when dropped from a height of 1.2 m.

The packagings shall be marked "USED MEDICAL DEVICE" or "USED MEDICAL EQUIPMENT". When using overpacks, these shall be marked in the same way, except when the inscription remains visible.

2.2.62.1.6 (Reserved)

2.2.62.1.7 (Reserved)

2.2.62.1.8 (Reserved)

2.2.62.1.9 Biological products

For the purposes of Annex 2 to SMGS, biological products are divided into the following groups:

a) those which are manufactured and packaged in accordance with the requirements of appropriate national authorities and carried for the purposes of final packaging or distribution, and use for personal health care by medical professionals or individuals. Substances in this group are not subject to the provisions of Annex 2 to SMGS;

(b) those which do not fall under paragraph (a) and are known or reasonably believed to contain infectious substances and which meet the criteria for inclusion in Category A or Category B. Substances in this group shall be assigned to UN Nos. 2814, 2900 or 3373, as appropriate.

Note: *Some licensed biological products may present a biohazard only in certain parts of the world. In that case, competent authorities may require these biological products to be in compliance with local requirements for infectious substances or may impose other restrictions.*

2.2.62.1.10 Genetically modified microorganisms and organisms

Genetically modified microorganisms not meeting the definition of infectious substance shall be classified according to section 2.2.9.

2.2.62.1.11 Medical or clinical wastes

2.2.62.1.11.1 Medical or clinical wastes containing

a) Category A infectious substances shall be assigned to UN No. 2814, UN No. 2900 or UN No. 3549, as appropriate. Solid medical waste containing Category A infectious substances generated from the medical treatment of humans or veterinary treatment of animals may be assigned to UN No. 3549. The UN No. 3549 entry shall not be used for waste from bio-research or liquid waste;

b) Category B infectious substances shall be assigned to UN No. 3291

Note 1: *The proper shipping name for UN No. 3549 is "MEDICAL WASTE, CATEGORY A, AFFECTING HUMANS, solid" or "MEDICAL WASTE, CATEGORY A, AFFECTING ANIMALS only, solid"*

Note 2: *Medical or clinical wastes assigned to number 18 01 03 (Wastes from human or animal health care and/or related research – wastes from natal care, diagnosis, treatment or prevention of disease in humans – wastes whose collection and disposal is subject to special requirements in order to prevent infection) or 18 02 02 (Wastes from human or animal health care and/or related research – wastes from research, diagnosis, treatment or prevention of disease involving animals – wastes whose collection and disposal is subject to special requirements in order to prevent infection) ac- cording to the Document No. 9A of the List shall be classified according to the provisions set out in this paragraph, based on the medical or veterinary diagnosis concerning the patient or the animal.*

2.2.62.1.11.2 Medical or clinical wastes which are reasonably believed to have a low probability of containing infectious substances shall be assigned to UN No. 3291. For the assignment, international, regional or national waste catalogues may be taken into account.

Note 1: *The proper shipping name for UN No. 3291 is "CLINICAL WASTE, UNSPECIFIED, N.O.S." or "(BIO) MEDICAL WASTE, N.O.S". or "REGULATED MEDICAL WASTE, N.O.S.".*

***Note 2**: Notwithstanding the classification criteria set out above, medical or clinical wastes assigned to number 18 01 04 (Wastes from human or animal health care and/or related research – wastes from natal care, diagnosis, treatment or prevention of disease in humans – wastes whose collection and disposal is not subject to special requirements in order to prevent infection) or 18 02 03 (Wastes from human or animal health care and/or related research – wastes from research, diagnosis, treatment or prevention of disease involving animals – wastes whose collection and disposal is not subject to special requirements in order to prevent infection) according to the Document No. 9A of the List, are not subject to the provisions of Annex 2 to SMGS.*

2.2.62.1.11.3 Decontaminated medical or clinical wastes which previously contained infectious substances are not subject to the provisions of Annex 2 to SMGS unless they meet the criteria for inclusion in another class.

2.2.62.1.11.4 (Reserved).

2.2.62.1.12 Infected animals

2.2.62.1.12.1 Unless an infectious substance cannot be consigned by any other means, live animals shall not be used to consign such a substance. A live animal which has been intentionally infected and is known or suspected to contain an infectious substance shall only be carried under terms and conditions approved by the competent.

***Note:** The approval of the competent authorities shall be issued on the basis of the relevant rules for the carriage of live animals, taking into consideration dangerous goods aspects. The authorities that are competent to lay down these conditions and rules for approval shall be regulated at national level.*

If there is no approval by a competent authority of an SMGS Contracting State, the competent authority of an SMGS Contracting State may recognize an approval issued by the competent authority of a country that is not an SMGS Contracting State.

Rules for the carriage of livestock are, for example, contained in documents Nos. 10 and 11 of the List.

2.2.62.1.12.2 (Reserved)

2.2.62.2 Substances not accepted for carriage

Live vertebrate or invertebrate animals shall not be used to carry an infectious agent unless the agent can not be carried by other means or unless this carriage has been approved by the competent authority (see 2.2.62.1.12.1).

2.2.62.3 List of collective entries

Classification code explanation	Classification code	UN NO.	Name of the substance or article
Effects on humans	**I1**	2814	INFECTIOUS SUBSTANCE, AFFECTING HUMANS
Effects on animals only	**I2**	2900	INFECTIOUS SUBSTANCE, AFFECTING ANIMALS only
Clinical waste	**I3**	3549	MEDICAL WASTE, CATEGORY A, AFFECTING HUMANS, solid or
		3549	MEDICAL WASTE, CATEGORY A, AFFECTING ANIMALS only, solid
		3291	CLINICAL WASTE, UNSPECIFIED, N.O.S. or
		3291	(BIO)MEDICAL WASTE, N.O.S. or
		3291	REGULATED MEDICAL WASTE, N.O.S.
Biological substance	**I4**	3373	BIOLOGICAL SUBSTANCE, CATEGORY B

2.2.7 CLASS 7 RADIOACTIVE MATERIEL

2.2.7.1 Definitions

2.2.7.1.1 ***Radioactive material*** means any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in 2.2.7.2.2.1 to 2.2.7.2.2.6.

2.2.7.1.2 Radioactive contamination

Radioactive contamination means **агрязнение радиоактивное** the presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm2 for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm^2 for all other alphaemitters.

Non-fixed radioactive contamination means contamination that can be removed from a surface during routine conditions of carriage.

Fixed radioactive contamination means contamination that can't be removed from a surface during routine conditions of carriage.

2.2.7.1.3 Definitions of specific terms

A_1 and A_2:

A1 means the activity value of special form radioactive material which is listed in Table 2.2.7.2.2.1 or de- rived in 2.2.7.2.2.2 and is used to determine the activity limits for the requirements of Annex 2 to SMGS.

A2 means the activity value of radioactive material, other than special form radioactive material, which is listed in Table 2.2.7.2.2.1 or derived in 2.2.7.2.2.2 and is used to determine the activity limits for the requirements of Annex 2 to SMGS.

Fissile nuclides means uranium-233, uranium-235, plutonium-239 and plutonium-241.

Fissile material means a material containing any of the fissile nuclides. Excluded from the definition of fissile material are the following:

(a) Natural uranium or depleted uranium which is unirradiated;

(b) Natural uranium or depleted uranium which has been irradiated in thermal reactors only;

(c) Material with fissile nuclides less than a total of 0.25 g;

(d) Any combination of (a), (b) and/or (c).

These exclusions are only valid if there is no other material with fissile nuclides in the package or in the consignment if shipped unpackaged.

Low dispersible radioactive material means either a solid radioactive material or a solid radioactive material in a sealed capsule, that has limited dispersibility and is not in powder form.

Low specific activity (LSA) material means radioactive material which by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply. External shielding materials surrounding the LSA material shall not be considered in determining the estimated average specific activity.

Low toxicity alpha emitters are**:** natural uranium; depleted uranium; natural thorium; uranium-235 or uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical and chemical concentrates; or alpha emitters with a half-life of less than 10 days.

Special form radioactive material means either:

(a) An indispersible solid radioactive material; or

(b) A sealed capsule containing radioactive material.

Specific activity of a radionuclide means the activity per unit mass of that nuclide. The specific activity of a material shall mean the activity per unit mass of the material in which the radionuclides are essentially uniformly distributed.

Surface contaminated object (SCO[11]) means a solid object which is not itself radioactive but which has ra-dioactive material distributed on its surface.

Unirradiated thorium means thorium containing not more than 10-7 g of uranium-233 per gram of thorium-232.

[11] "*SCO" is an abbreviation of the English term "Surface Contaminated Object"*

Unirradiated uranium means uranium containing not more than 2 × 103 Bq of plutonium per gram of uranium-235, not more than 9 × 106 Bq of fission products per gram of uranium-235 and not more than 5 × 10-3 g of uranium-236 per gram of uranium-235.

Uranium natural, depleted, enriched means the following:

Natural uranium means uranium (which may be chemically separated) containing the naturally occur-ring distribution of uranium isotopes (approximately 99.28% uranium-238, and 0.72% uranium-235 by mass).

Depleted uranium means uranium containing a lesser mass percentage of uranium-235 than in natural uranium.

Enriched uranium means uranium containing a greater mass percentage of uranium-235 than 0.72%.

In all cases, a very small mass percentage of uranium-234 is present.

2.2.7.2 Classification

2.2.7.2.1 *General provisions*

2.2.7.2.1.1 Radioactive material shall be assigned to one of the UN numbers specified in Table 2.2.7.2.1.1, in accordance with 2.2.7.2.4 and 2.2.7.2.5, taking into account the material characteristics determined in 2.2.7.2.3.

Table 2.2.7.2.1.1 Assignment of UN numbers

	UN No.	Proper shipping name and descriptiona [a]
Excepted packages (1.7.1.5)		
	2908	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – EMPTY PACKAGING
	2909	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM
	2910	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – LIMITED QUANTITY OF MATERIAL
	2911	RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – INSTRUMENTS or ARTICLES
	3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE less than 0.1 kg per package, non-fissile or fissile-excepted [b,c]
Low specific activity radioactive material (2.2.7.2.3.1)		
	2912	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I), non-fissile or fissile-excepted[b]
	3321	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), non fissile or fissile-excepted[b]
	3322	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III), non fissile or fissile-excepted[b]
	3324	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), FISSILE
	3325	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, (LSA-III), FISSILE
Surface contaminated objects (2.2.7.2.3.2)		
	2913	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I, SCO-II or SCO-III), non-fissile or fissile-excepted[b]
	3326	RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II), FISSILE
Type A packages (2.2.7.2.4.4)		
	2915	RADIOACTIVE MATERIAL, TYPE A PACKAGE, non-special form, non-fissile or fissile- excepted[b]
	3327	RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE, non-special form
	3332	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, non fissile or fissile- excepted[b]
	3333	RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSILE
Type B(U) packages (2.2.7.2.4.6)		
	2916	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, non-fissile or fissile-excepted[b]
	3328	RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSILE
Type B(M) packages (2.2.7.2.4.6)		
	2917	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, non-fissile or fissile-excepted[b]
	3329	RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSILE
Type C packages (2.2.7.2.4.6)		
	3323	RADIOACTIVE MATERIAL, TYPE C PACKAGE, non fissile or fissile-excepted[b]
	3330	RADIOACTIVE MATERIAL, TYPE C PACKAGE, FISSILE
Special arrangement (2.2.7.2.5)		
	2919	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, non-fissile or fissile-excepted[b]
	3331	RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT,

		FISSILE
Uranium hexafluoride (2.2.7.2.4.5)		
	2977	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE
	2978	RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted[b]
	3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE less than 0.1 kg per package, non-fissile or fissile-excepted[b,c]

[a] *The proper shipping name is found in the column "proper shipping name and description" and is restricted to that part shown in capital letters. In the cases of UN Nos. 2909, 2911, 2913 and 3326, where alternative proper shipping names are separated by the word "or" only the relevant proper shipping name shall be used.*

[b] *The term "fissile-excepted" refers only to material excepted under 2.2.7.2.3.5*

[c] *For UN No. 3507, see also special provision 369 in Chapter 3.3*

2.2.7.2.2 Determination of basic radionuclide values

2.2.7.2.2.1 The following basic values for individual radionuclides are given in Table 2.2.7.2.2.1:

a) A1 and A2 in TBq;

b) Activity concentration limits for exempt material in Bq/g;

c) Activity limits for exempt consignments in Bq.

Table 2.2.7.2.2.1: Basic radionuclides values for individual radionuclides

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Actinium (89)				
Ac-225 (a)	8×10^{-1}	6×10^{-3}	1×10^{1}	1×10^{4}
Ac-227 (a)	9×10^{-1}	9×10^{-5}	1×10^{-1}	1×10^{3}
Ac-228	6×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Silver (47)				
Ag-105	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Ag-108m (a)	7×10^{-1}	7×10^{-1}	1×10^{1} (b)	1×10^{6} (b)
Ag-110m (a)	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Ag-111	2×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Aluminium (13)				
Al-26	1×10^{-1}	1×10^{-1}	1×10^{1}	1×10^{5}
Americium (95)				
Am-241	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Am-242m (a)	1×10^{1}	1×10^{-3}	1×10^{0} (b)	1×10^{4} (b)
Am-243 (a)	5×10^{0}	1×10^{-3}	1×10^{0} (b)	1×10^{3} (b)
Argon (18)				
Ar-37	4×10^{1}	4×10^{1}	1×10^{6}	1×10^{8}
Ar-39	4×10^{1}	2×10^{1}	1×10^{7}	1×10^{4}
Ar-41	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{9}
Arsenic (33)				
As-72	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
As-73	4×10^{1}	4×10^{1}	1×10^{3}	1×10^{7}
As-74	1×10^{0}	9×10^{-1}	1×10^{1}	1×10^{6}
As-76	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
As-77	2×10^{1}	7×10^{-1}	1×10^{3}	1×10^{6}
Astatine (85)				
At-211 (a)	2×10^{1}	5×10^{-1}	1×10^{3}	1×10^{7}
Gold (79)				
Au-193	7×10^{0}	2×10^{0}	1×10^{2}	1×10^{7}
Au-194	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Au-195	1×10^{1}	6×10^{0}	1×10^{2}	1×10^{7}
Au-198	1×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Au-199	1×10^{1}	6×10^{-1}	1×10^{2}	1×10^{6}

Radionuclide (atomic number)	**A_1, (TBq)**	**A_2, (TBq)**	**Activity concen tration limit for exempt material (Bq/g)**	**Activity limit for an exempt consignment (Bq)**
Barium (56)				
Ba-131 (a)	2×10^0	2×10^0	1×10^2	1×10^6
Ba-133	3×10^0	3×10^0	1×10^2	1×10^6
Ba-133m	2×10^1	6×10^{-1}	1×10^2	1×10^6
Ba-135m	2×10^1	6×10^{-1}	1×10^2	1×10^6
1	2	3	4	5
Ba-140 (a)	5×10^{-1}	3×10^{-1}	1×10^1 (b)	1×10^5 (b)
Beryllium (4)				
Be-7	2×10^1	2×10^1	1×10^3	1×10^7
Be-10	4×10^1	6×10^{-1}	1×10^4	1×10^6
Bismuth (83)				
Bi-205	7×10^{-1}	7×10^{-1}	1×10^1	1×10^6
Bi-206	3×10^{-1}	3×10^{-1}	1×10^1	1×10^5
Bi-207	7×10^{-1}	7×10^{-1}	1×10^1	1×10^6
Bi-210	1×10^0	6×10^{-1}	1×10^3	1×10^6
Bi-210m (a)	6×10^{-1}	2×10^{-2}	1×10^1	1×10^5
Bi-212 (a)	7×10^{-1}	6×10^{-1}	1×10^1 (b)	1×10^5 (b)
Berkelium (97)				
Bk-247	8×10^0	8×10^{-4}	1×10^0	1×10^4
Bk-249 (a)	4×10^1	3×10^{-1}	1×10^3	1×10^6
Bromine (35)				
Br-76	4×10^{-1}	4×10^{-1}	1×10^1	1×10^5
Br-77	3×10^0	3×10^0	1×10^2	1×10^6
Br-82	4×10^{-1}	4×10^{-1}	1×10^1	1×10^6
Carbon (6)				
C-11	1×10^0	6×10^{-1}	1×10^1	1×10^6
C-14	4×10^1	3×10^0	1×10^4	1×10^7
Calcium (20)				
Ca-41	Unlimited	Unlimited	1×10^5	1×10^7
Ca-45	4×10^1	1×10^0	1×10^4	1×10^7
Ca-47 (a)	3×10^0	3×10^{-1}	1×10^1	1×10^6
Cadmium (48)				
Cd-109	3×10^1	2×10^0	1×10^4	1×10^6
Cd-113m	4×10^1	5×10^{-1}	1×10^3	1×10^6
Cd-115 (a)	3×10^0	4×10^{-1}	1×10^2	1×10^6
Cd-115m	5×10^{-1}	5×10^{-1}	1×10^3	1×10^6
Cerium (58)				
Ce-139	7×10^0	2×10^0	1×10^2	1×10^6
Ce-141	2×10^1	6×10^{-1}	1×10^2	1×10^7
Ce-143	9×10^{-1}	6×10^{-1}	1×10^2	1×10^6
Ce-144 (a)	2×10^{-1}	2×10^{-1}	1×10^2 (b)	1×10^5 (b)
Californium (98)				
Cf-248	4×10^1	6×10^{-3}	1×10^1	1×10^4
Cf-249	3×10^0	8×10^{-4}	1×10^0	1×10^3
Cf-250	2×10^1	2×10^{-3}	1×10^1	1×10^4
Cf-251	7×10^0	7×10^{-4}	1×10^0	1×10^3
Cf-252	1×10^{-1}	3×10^{-3}	1×10^1	1×10^4
Cf-253 (a)	4×10^1	4×10^{-2}	1×10^2	1×10^5
Cf-254	1×10^{-3}	1×10^{-3}	1×10^0	1×10^3
Chlorine (17)				
Cl-36	1×10^1	6×10^{-1}	1×10^4	1×10^6
Cl-38	2×10^{-1}	2×10^{-1}	1×10^1	1×10^5
Curium (96)				
Cm-240	4×10^1	2×10^{-2}	1×10^2	1×10^5
Cm-241	2×10^0	1×10^0	1×10^2	1×10^6

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Cm-242	4×10^{1}	1×10^{-2}	1×10^{2}	1×10^{5}
Cm-243	9×10^{0}	1×10^{-3}	1×10^{0}	1×10^{4}
Cm-244	2×10^{1}	2×10^{-3}	1×10^{1}	1×10^{4}
Cm-245	9×10^{0}	9×10^{-4}	1×10^{0}	1×10^{3}
Cm-246	9×10^{0}	9×10^{-4}	1×10^{0}	1×10^{3}
Cm-247 (a)	3×10^{0}	1×10^{-3}	1×10^{0}	1×10^{4}
Cm-248	2×10^{-2}	3×10^{-4}	1×10^{0}	1×10^{3}
Cobalt (27)				
Co-55	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Co-56	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Co-57	1×10^{1}	1×10^{1}	1×10^{2}	1×10^{6}
Co-58	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Co-58m	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Co-60	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Chromium (24)				
Cr-51	3×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Caesium (55)				
Cs-129	4×10^{0}	4×10^{0}	1×10^{2}	1×10^{5}
Cs-131	3×10^{1}	3×10^{1}	1×10^{3}	1×10^{6}
Cs-132	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{5}
Cs-134	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{4}
Cs-134m	4×10^{1}	6×10^{-1}	1×10^{3}	1×10^{5}
Cs-135	4×10^{1}	1×10^{0}	1×10^{4}	1×10^{7}
Cs-136	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Cs-137 (a)	2×10^{0}	6×10^{-1}	1×10^{1} (b)	1×10^{4} (b)
Copper (29)				
Cu-64	6×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Cu-67	1×10^{1}	7×10^{-1}	1×10^{2}	1×10^{6}
Dysprosium (66)				
Dy-159	2×10^{1}	2×10^{1}	1×10^{3}	1×10^{7}
Dy-165	9×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Dy-166 (a)	9×10^{-1}	3×10^{-1}	1×10^{3}	1×10^{6}
Erbium (68)				
Er-169	4×10^{1}	1×10^{0}	1×10^{4}	1×10^{7}
Er-171	8×10^{-1}	5×10^{-1}	1×10^{2}	1×10^{6}
Europium (63)				
Eu-147	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Eu-148	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Eu-149	2×10^{1}	2×10^{1}	1×10^{2}	1×10^{7}
Eu-150 (short lived)	2×10^{0}	7×10^{-1}	1×10^{3}	1×10^{6}
Eu-150 (long lived)	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Eu-152	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Eu-152m	8×10^{-1}	8×10^{-1}	1×10^{2}	1×10^{6}
Eu-154	9×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Eu-155	2×10^{1}	3×10^{0}	1×10^{2}	1×10^{7}
Eu-156	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Fluorine (9)				
F-18	1×10^{0}	6×10^{-1}	1×10^{1}	1×10^{6}
Iron (26)				
Fe-52 (a)	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{6}
Fe-55	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{6}
Fe-59	9×10^{-1}	9×10^{-1}	1×10^{1}	1×10^{6}
Fe-60 (a)	4×10^{1}	2×10^{-1}	1×10^{2}	1×10^{5}
Gallium (31)				
Ga-67	7×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Ga-68	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Ga-72	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Gadolinium (64)				
Gd-146 (a)	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Gd-148	2×10^{1}	2×10^{-3}	1×10^{1}	1×10^{4}
Gd-153	1×10^{1}	9×10^{0}	1×10^{2}	1×10^{7}
Gd-159	3×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Germanium (32)				
Ge-68 (a)	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Ge-69	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Ge-71	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{8}
Ge-77	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Hafnium (72)				
Hf-172 (a)	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Hf-175	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Hf-181	2×10^{0}	5×10^{-1}	1×10^{1}	1×10^{6}
Hf-182	Unlimited	Unlimited	1×10^{2}	1×10^{6}
Mercury (80)				
Hg-194 (a)	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Hg-195m (a)	3×10^{0}	7×10^{-1}	1×10^{2}	1×10^{6}
Hg-197	2×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Hg-197m	1×10^{1}	4×10^{-1}	1×10^{2}	1×10^{6}
Hg-203	5×10^{0}	1×10^{0}	1×10^{2}	1×10^{5}
Holmium (67)				
Ho-166	4×10^{-1}	4×10^{-1}	1×10^{3}	1×10^{5}
Ho-166m	6×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Iodine (53)				
I-123	6×10^{0}	3×10^{0}	1×10^{2}	1×10^{7}
I-124	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
I-125	2×10^{1}	3×10^{0}	1×10^{3}	1×10^{6}
I-126	2×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
I-129	Unlimited	Unlimited	1×10^{2}	1×10^{5}
I-131	3×10^{0}	7×10^{-1}	1×10^{2}	1×10^{6}
I-132	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
I-133	7×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
I-134	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
I-135 (a)	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Indium (49)				
In-111	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
In-113m	4×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
In-114m (a)	1×10^{1}	5×10^{-1}	1×10^{2}	1×10^{6}
In-115m	7×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Iridium (77)				
Ir-189 (a)	1×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Ir-190	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Ir-192	1×10^{0}(c)	6×10^{-1}	1×10^{1}	1×10^{4}
Ir-193m	4×10^{1}	4×10^{0}	1×10^{4}	1×10^{7}
Ir-194	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
Potassium (19)				
K-40	9×10^{-1}	9×10^{-1}	1×10^{2}	1×10^{6}
K-42	2×10^{-1}	2×10^{-1}	1×10^{2}	1×10^{6}
K-43	7×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Krypton (36)				
Kr-79	4×10^{0}	2×10^{0}	1×10^{3}	1×10^{5}
Kr-81	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Kr-85	1×10^{1}	1×10^{1}	1×10^{5}	1×10^{4}
Kr-85m	8×10^{0}	3×10^{0}	1×10^{3}	1×10^{10}
Kr-87	2×10^{-1}	2×10^{-1}	1×10^{2}	1×10^{9}
Lanthanum (57)				
La-137	3×10^{1}	6×10^{0}	1×10^{3}	1×10^{7}
La-140	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Lutetium (71)				
Lu-172	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Lu-173	8×10^{0}	8×10^{0}	1×10^{2}	1×10^{7}
Lu-174	9×10^{0}	9×10^{0}	1×10^{2}	1×10^{7}
Lu-174m	2×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Lu-177	3×10^{1}	7×10^{-1}	1×10^{3}	1×10^{7}
Magnesium (12)				
Mg-28 (a)	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Manganese (25)				
Mn-52	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Mn-53	Unlimited	Unlimited	1×10^{4}	1×10^{9}
Mn-54	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Mn-56	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Molybdenum (42)				
Mo-93	4×10^{1}	2×10^{1}	1×10^{3}	1×10^{8}
Mo-99 (a)	1×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Nitrogen (7)				
N-13	9×10^{-1}	6×10^{-1}	1×10^{2}	1×10^{9}
Sodium (11)				
Na-22	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Na-24	2×10^{-1}	2×10^{-1}	1×10^{1}	1×10^{5}
Niobium (41)				
Nb-93m	4×10^{1}	3×10^{1}	1×10^{4}	1×10^{7}
Nb-94	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Nb-95	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Nb-97	9×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Neodymium (60)				
Nd-147	6×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Nd-149	6×10^{-1}	5×10^{-1}	1×10^{2}	1×10^{6}
Nickel (28)				
Ni-57	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Ni-59	Unlimited	Unlimited	1×10^{4}	1×10^{8}
Ni-63	4×10^{1}	3×10^{1}	1×10^{5}	1×10^{8}
Ni-65	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Neptunium (93)				
Np-235	4×10^{1}	4×10^{1}	1×10^{3}	1×10^{7}
Np-236 (short lived)	2×10^{1}	2×10^{0}	1×10^{3}	1×10^{7}
Np-236 (long lived)	9×10^{0}	2×10^{-2}	1×10^{2}	1×10^{5}
Np-237	2×10^{1}	2×10^{-3}	1×10^{0} (b)	1×10^{3} (b)
Np-239	7×10^{0}	4×10^{-1}	1×10^{2}	1×10^{7}
Osmium (76)				
Os-185	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Os-191	1×10^{1}	2×10^{0}	1×10^{2}	1×10^{7}
Os-191m	4×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Os-193	2×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Os-194 (a)	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
Phosphorus (15)				
P-32	5×10^{-1}	5×10^{-1}	1×10^{3}	1×10^{5}
P-33	4×10^{1}	1×10^{0}	1×10^{5}	1×10^{8}

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Protactinium (91)				
Pa-230 (a)	2×10^{0}	7×10^{-2}	1×10^{1}	1×10^{6}
Pa-231	4×10^{0}	4×10^{-4}	1×10^{0}	1×10^{3}
Pa-233	5×10^{0}	7×10^{-1}	1×10^{2}	1×10^{7}
Lead (82)				
Pb-201	1×10^{0}	1×10^{0}	1×10^{-1}	1×10^{6}
Pb-202	4×10^{1}	2×10^{1}	1×10^{3}	1×10^{6}
Pb-203	4×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Pb-205	Unlimited	Unlimited	1×10^{4}	1×10^{7}
Pb-210 (a)	1×10^{0}	5×10^{-2}	1×10^{1} (b)	1×10^{4} (b)
Pb-212 (a)	7×10^{-1}	2×10^{-1}	1×10^{1} (b)	1×10^{5} (b)
Palladium (46)				
Pd-103 (a)	4×10^{1}	4×10^{1}	1×10^{3}	1×10^{8}
Pd-107	Unlimited	Unlimited	1×10^{5}	1×10^{8}
Pd-109	2×10^{0}	5×10^{-1}	1×10^{3}	1×10^{6}
Promethium (61)				
Pm-143	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Pm-144	7×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Pm-145	3×10^{1}	1×10^{1}	1×10^{3}	1×10^{7}
Pm-147	4×10^{1}	2×10^{0}	1×10^{4}	1×10^{7}
Pm-148m (a)	8×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Pm-149	2×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Pm-151	2×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Polonium (84)				
Po-210	4×10^{1}	2×10^{-2}	1×10^{1}	1×10^{4}
Praseodymium (59)				
Pr-142	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{5}
Pr-143	3×10^{0}	6×10^{-1}	1×10^{4}	1×10^{6}
Platinum (78)				
Pt-188 (a)	1×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Pt-191	4×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Pt-193	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Pt-193m	4×10^{1}	5×10^{-1}	1×10^{3}	1×10^{7}
Pt-195m	1×10^{1}	5×10^{-1}	1×10^{2}	1×10^{6}
Pt-197	2×10^{1}	6×10^{-1}	1×10^{3}	1×10^{6}
Pt-197m	1×10^{1}	6×10^{-1}	1×10^{2}	1×10^{6}
Plutonium (94)				
Pu-236	3×10^{1}	3×10^{-3}	1×10^{1}	1×10^{4}
Pu-237	2×10^{1}	2×10^{1}	1×10^{3}	1×10^{7}
Pu-238	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Pu-239	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Pu-240	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{3}
Pu-241 (a)	4×10^{1}	6×10^{-2}	1×10^{2}	1×10^{5}
Pu-242	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Pu-244 (a)	4×10^{-1}	1×10^{-3}	1×10^{0}	1×10^{4}
Radium (88)				
Ra-223 (a)	4×10^{-1}	7×10^{-3}	1×10^{2} (b)	1×10^{5} (b)
Ra-224 (a)	4×10^{-1}	2×10^{-2}	1×10^{1} (b)	1×10^{5} (b)
Ra-225 (a)	2×10^{-1}	4×10^{-3}	1×10^{2}	1×10^{5}
Ra-226 (a)	2×10^{-1}	3×10^{-3}	1×10^{1} (b)	1×10^{4} (b)
Ra-228 (a)	6×10^{-1}	2×10^{-2}	1×10^{1} (b)	1×10^{5} (b)
Rubidium (37)				
Rb-81	2×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Rb-83 (a)	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Rb-84	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Rb-86	5×10^{-1}	5×10^{-1}	1×10^{2}	1×10^{5}
Rb-87	Unlimited	Unlimited	1×10^{4}	1×10^{7}
Rb (nat)	Unlimited	Unlimited	1×10^{4}	1×10^{7}
Rhenium (75)				
Re-184	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Re-184m	3×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Re-186	2×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Re-187	Unlimited	Unlimited	1×10^{6}	1×10^{9}
Re-188	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{5}
Re-189 (a)	3×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Re (nat)	Unlimited	Unlimited	1×10^{6}	1×10^{9}
Rhodium (45)				
Rh-99	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Rh-101	4×10^{0}	3×10^{0}	1×10^{2}	1×10^{7}
Rh-102	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Rh-102m	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Rh-103m	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{8}
Rh-105	1×10^{1}	8×10^{-1}	1×10^{2}	1×10^{7}
Radon (86)				
Rn-222 (a)	3×10^{-1}	4×10^{-3}	1×10^{1} (b)	1×10^{8} (b)
Ruthenium (44)				
Ru-97	5×10^{0}	5×10^{0}	1×10^{2}	1×10^{7}
Ru-103 (a)	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Ru-105	1×10^{0}	6×10^{-1}	1×10^{1}	1×10^{6}
Ru-106 (a)	2×10^{-1}	2×10^{-1}	1×10^{2} (b)	1×10^{5} (b)
Sulphur (16)				
S-35	4×10^{1}	3×10^{0}	1×10^{5}	1×10^{8}
Antimony (51)				
Sb-122	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{4}
Sb-124	6×10^{-1}	6×10^{-1}	1×10^{1}	1×10^{6}
Sb-125	2×10^{0}	1×10^{0}	1×10^{2}	1×10^{6}
Sb-126	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Scandium (21)				
Sc-44	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{5}
Sc-46	5×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Sc-47	1×10^{1}	7×10^{-1}	1×10^{2}	1×10^{6}
Sc-48	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Selenium (34)				
Se-75	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Se-79	4×10^{1}	2×10^{0}	1×10^{4}	1×10^{7}
Silicion (14)				
Si-31	6×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Si-32	4×10^{1}	5×10^{-1}	1×10^{3}	1×10^{6}
Samarium (62)				
Sm-145	1×10^{1}	1×10^{1}	1×10^{2}	1×10^{7}
Sm-147	Unlimited	Unlimited	1×10^{1}	1×10^{4}
Sm-151	4×10^{1}	1×10^{1}	1×10^{4}	1×10^{8}
Sm-153	9×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Tin (50)				
Sn-113 (a)	4×10^{0}	2×10^{0}	1×10^{3}	1×10^{7}
Sn-117m	7×10^{0}	4×10^{-1}	1×10^{2}	1×10^{6}
Sn-119m	4×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Sn-121m (a)	4×10^{1}	9×10^{-1}	1×10^{3}	1×10^{7}
Sn-123	8×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Sn-125	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{5}

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Sn-126 (a)	6×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Strontium (38)				
Sr-82 (a)	2×10^{-1}	2×10^{-1}	1×10^{1}	1×10^{5}
Sr-83	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{8}
Sr-85	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Sr-85m	5×10^{0}	5×10^{0}	1×10^{2}	1×10^{7}
Sr-87m	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Sr-89	6×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Sr-90 (a)	3×10^{-1}	3×10^{-1}	1×10^{2} (b)	1×10^{4} (b)
Sr-91 (a)	3×10^{-1}	3×10^{-1}	1×10^{1}	1×10^{5}
Sr-92 (a)	1×10^{0}	3×10^{-1}	1×10^{1}	1×10^{6}
Tritium (1)				
T(H-3)	4×10^{1}	4×10^{1}	1×10^{6}	1×10^{9}
Tantalum (73)				
Ta-178 (long lived)	1×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Ta-179	3×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
Ta-182	9×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{4}
Terbium (65)				
Tb-149	8×10^{-1}	8×10^{-1}	1×10^{1}	3×10^{6}
Tb-157	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Tb-158	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Tb-160	1×10^{0}	6×10^{-1}	1×10^{1}	1×10^{6}
Tb-161	3×10^{1}	7×10^{-1}	1×10^{3}	1×10^{6}
Technetium (43)				
Tc-95m (a)	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Tc-96	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Tc-96m (a)	4×10^{-1}	4×10^{-1}	1×10^{3}	1×10^{7}
Tc-97	Unlimited	Unlimited	1×10^{3}	1×10^{8}
Tc-97m	4×10^{1}	1×10^{0}	1×10^{3}	1×10^{7}
Tc-98	8×10^{-1}	7×10^{-1}	1×10^{1}	1×10^{6}
Tc-99	4×10^{1}	9×10^{-1}	1×10^{4}	1×10^{7}
Tc-99m	1×10^{1}	4×10^{0}	1×10^{2}	1×10^{7}
Tellurium (52)				
Te-121	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Te-121m	5×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Te-123m	8×10^{0}	1×10^{0}	1×10^{2}	1×10^{7}
Te-125m	2×10^{1}	9×10^{-1}	1×10^{3}	1×10^{7}
Te-127	2×10^{1}	7×10^{-1}	1×10^{3}	1×10^{6}
Te-127m (a)	2×10^{1}	5×10^{-1}	1×10^{3}	1×10^{7}
Te-129	7×10^{-1}	6×10^{-1}	1×10^{2}	1×10^{6}
Te-129m (a)	8×10^{-1}	4×10^{-1}	1×10^{3}	1×10^{6}
Te-131m (a)	7×10^{-1}	5×10^{-1}	1×10^{1}	1×10^{6}
Te-132 (a)	5×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{7}
Thorium (90)				
Th-227	1×10^{1}	5×10^{-3}	1×10^{1}	1×10^{4}
Th-228 (a)	5×10^{-1}	1×10^{-3}	1×10^{0} (b)	1×10^{4} (b)
Th-229	5×10^{0}	5×10^{-4}	1×10^{0} (b)	1×10^{3} (b)
Th-230	1×10^{1}	1×10^{-3}	1×10^{0}	1×10^{4}
Th-231	4×10^{1}	2×10^{-2}	1×10^{3}	1×10^{7}
Th-232	Unlimited	Unlimited	1×10^{1}	1×10^{4}
Th-234 (a)	3×10^{-1}	3×10^{-1}	1×10^{3} (b)	1×10^{5} (b)
Th (nat)	Unlimited	Unlimited	1×10^{0} (b)	1×10^{3} (b)
Titanium (22)				
Ti-44 (a)	5×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
Thallium (81)				

Radionuclide (atomic number)	**A_1, (TBq)**	**A_2, (TBq)**	**Activity concen tration limit for exempt material (Bq/g)**	**Activity limit for an exempt consignment (Bq)**
Tl-200	9×10^{-1}	9×10^{-1}	1×10^{1}	1×10^{6}
Tl-201	1×10^{1}	4×10^{0}	1×10^{2}	1×10^{6}
Tl-202	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Tl-204	1×10^{1}	7×10^{-1}	1×10^{4}	1×10^{4}
Thulium (69)				
Tm-167	7×10^{0}	8×10^{-1}	1×10^{2}	1×10^{6}
Tm-170	3×10^{0}	6×10^{-1}	1×10^{3}	1×10^{6}
Tm-171	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{8}
Уран (92)				
U-230 (fast lung absorption) (a), (d)	4×10^{1}	1×10^{-1}	1×10^{1} (b)	1×10^{5} (b)
U-230 (medium lung absorption) (a), (e)	4×10^{1}	4×10^{-3}	1×10^{1}	1×10^{4}
U-230 (slow lung absorption) (a), (f)	3×10^{1}	3×10^{-3}	1×10^{1}	1×10^{4}
U-232 (fast lung absorption) (d)	4×10^{1}	1×10^{-2}	1×10^{0} (b)	1×10^{3} (b)
U-232 (medium lung absorption) (e)	4×10^{1}	7×10^{-3}	1×10^{1}	1×10^{4}
U-232 (slow lung absorption) (f)	1×10^{1}	1×10^{-3}	1×10^{1}	1×10^{4}
U-233 (fast lung absorption) (d)	4×10^{1}	9×10^{-2}	1×10^{1}	1×10^{4}
U-233 (medium lung absorption) (e)	4×10^{1}	2×10^{-2}	1×10^{2}	1×10^{5}
U-233 (slow lung absorption) (f)	4×10^{1}	6×10^{-3}	1×10^{1}	1×10^{5}
U-234 (fast lung absorption) (d)	4×10^{1}	9×10^{-2}	1×10^{1}	1×10^{4}
U-234 (medium lung absorption) (e)	4×10^{1}	2×10^{-2}	1×10^{2}	1×10^{5}
U-234 (slow lung absorption) (f)	4×10^{1}	6×10^{-3}	1×10^{1}	1×10^{5}
U-235 (all lung absorption types) (a), (d), (e), (f)	Unlimited	Unlimited	1×10^{1} (b)	1×10^{4} (b)
U-236 (fast lung absorption) (d)	Unlimited	Unlimited	1×10^{1}	1×10^{4}
U-236 (medium lung absorption) (e)	4×10^{1}	2×10^{-2}	1×10^{2}	1×10^{5}
U-236 (slow lung absorption) (f)	4×10^{1}	6×10^{-3}	1×10^{1}	1×10^{4}
U-238 (all lung absorption types) (d),(e),(f)	Unlimited	Unlimited	1×10^{1} (b)	1×10^{4} (b)
U (nat)	Unlimited	Unlimited	1×10^{0} (b)	1×10^{3} (b)
U (enriched to 20% or less) (g)	Unlimited	Unlimited	1×10^{0}	1×10^{3}
U (depleted)	Unlimited	Unlimited	1×10^{0}	1×10^{3}
Vanadium (23)				
V-48	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{5}
V-49	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{7}
Tungsten (74)				
W-178 (a)	9×10^{0}	5×10^{0}	1×10^{1}	1×10^{6}
W-181	3×10^{1}	3×10^{1}	1×10^{3}	1×10^{7}
W-185	4×10^{1}	8×10^{-1}	1×10^{4}	1×10^{7}
W-187	2×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
W-188 (a)	4×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
Xenon (54)				
Xe-122 (a)	4×10^{-1}	4×10^{-1}	1×10^{2}	1×10^{9}
Xe-123	2×10^{0}	7×10^{-1}	1×10^{2}	1×10^{9}
Xe-127	4×10^{0}	2×10^{0}	1×10^{3}	1×10^{5}
Xe-131m	4×10^{1}	4×10^{1}	1×10^{4}	1×10^{4}
Xe-133	2×10^{1}	1×10^{1}	1×10^{3}	1×10^{4}
Xe-135	3×10^{0}	2×10^{0}	1×10^{3}	1×10^{10}

Radionuclide (atomic number)	A_1, (TBq)	A_2, (TBq)	Activity concen tration limit for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Yttrium (39)				
Y-87 (a)	1×10^{0}	1×10^{0}	1×10^{1}	1×10^{6}
Y-88	4×10^{-1}	4×10^{-1}	1×10^{1}	1×10^{6}
Y-90	3×10^{-1}	3×10^{-1}	1×10^{3}	1×10^{5}
Y-91	6×10^{-1}	6×10^{-1}	1×10^{3}	1×10^{6}
Y-91m	2×10^{0}	2×10^{0}	1×10^{2}	1×10^{6}
Y-92	2×10^{-1}	2×10^{-1}	1×10^{2}	1×10^{5}
Y-93	3×10^{-1}	3×10^{-1}	1×10^{2}	1×10^{5}
Ytterbium (70)				
Yb-169	4×10^{0}	1×10^{0}	1×10^{2}	1×10^{7}
Yb-175	3×10^{1}	9×10^{-1}	1×10^{3}	1×10^{7}
Zinc (30)				
Zn-65	2×10^{0}	2×10^{0}	1×10^{1}	1×10^{6}
Zn-69	3×10^{0}	6×10^{-1}	1×10^{4}	1×10^{6}
Zn-69m (a)	3×10^{0}	6×10^{-1}	1×10^{2}	1×10^{6}
Zirconium (40)				
Zr-88	3×10^{0}	3×10^{0}	1×10^{2}	1×10^{6}
Zr-93	Unlimited	Unlimited	1×10^{3} (b)	1×10^{7} (b)
Zr-95 (a)	2×10^{0}	8×10^{-1}	1×10^{1}	1×10^{6}
Zr-97 (a)	4×10^{-1}	4×10^{-1}	1×10^{1} (b)	1×10^{5} (b)

a) A1 and/or A2 values for these parent radionuclides include contributions from their progeny with half- lives less than 10 days, as listed in the following:

Mg-28	Al-28
Ar-42	K-42
Ca-47	Sc-47
Ti-44	Sc-44
Fe-52	Mn-52m
Fe-60	Co-60m
Zn-69m	Zn-69
Ge-68	Ga-68
Rb-83	Kr-83m
Sr-82	Rb-82
Sr-90	Y-90
Sr-91	Y-91m
Sr-92	Y-92
Y-87	Sr-87m
Zr-95	Nb-95m
Zr-97	Nb-97m, Nb-97
Mo-99	Tc-99m
Tc-95m	Tc-95
Tc-96m	Tc-96
Ru-103	Rh-103m
Ru-106	Rh-106
Pd-103	Rh-103m
Ag-108m	Ag-108
Ag-110m	Ag-110
Cd-115	In-115m
In-114m	In-114

Sn-113	In-113m
Sn-121m	Sn-121
Sn-126	Sb-126m
Te-118	Sb-118
Te-127m	Te-127
Te-129m	Te-129
Te-131m	Te-131
Te-132	I-132
I-135	Xe-135m
Xe-122	I-122
Cs-137	Ba-137m
Ba-131	Cs-131
Ba-140	La-140
Ce-144	Pr-144m, Pr-144
Pm-148m	Pm-148
Gd-146	Eu-146
Dy-166	Ho-166
Hf-172	Lu-172
W-178	Ta-178
W-188	Re-188
Re-189	Os-189m
Os-194	Ir-194
Ir-189	Os-189m
Pt-188	Ir-188
Hg-194	Au-194
Hg-195m	Hg-195
Pb-210	Bi-210
Pb-212	Bi-212, Tl-208, Po-212
Bi-210m	Tl-206
Bi-212	Tl-208, Po-212
At-211	Po-211
Rn-222	Po-218, Pb-214, At-218, Bi-214, Po-214
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Po-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
Ra-225	Ac-225, Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
Ra-226	Rn-222, Po-218, Pb-214, At-218, Bi-214, Po-214
Ra-228	Ac-228
Ac-225	Fr-221, At-217, Bi-213, Tl-209, Po-213, Pb-209
Ac-227	Fr-223
Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208, Po-212
Th-234	Pa-234m, Pa-234
Pa-230	Ac-226, Th-226, Fr-222, Ra-222, Rn-218, Po-214
U-230	Th-226, Ra-222, Rn-218, Po-214
U-235	Th-231
Pu-241	U-237
Pu-244	U-240, Np-240m
Am-242m	Am-242, Np-238
Am-243	Np-239

Cm-247	Pu-243
Bk-249	Am-245
Cf-253	Cm-249

b) Parent nuclides and their progeny included in secular equilibrium are listed in the following (the activity to be taken into account is that of the parent nuclide only):

Sr-90	*Y-90*
Zr-93	*Nb-93m*
Zr-97	*Nb-97*
Ru-106	*Rh-106*
Ag-108m	*Ag-108*
Cs-137	*Ba-137m*
Ce-144	*Pr-144*
Ba-140	*La-140*
Bi-212	*Tl-208 (0,36), Po-212 (0,64)*
Pb-210	*Bi-210, Po-210*
Pb-212	*Bi-212, Tl-208 (0,36), Po-212 (0,64)*
Rn-222	*Po-218, Pb-214, Bi-214, Po-214*
Ra-223	*Rn-219, Po-215, Pb-211, Bi-211, Tl-207*
Ra-224	*Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0,36), Po-212 (0,64)*
Ra-226	*Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210*
Ra-228	*Ac-228*
Th-228	*Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0,36), Po-212 (0,64)*
Th-229	*Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209*
Th-nat.	*Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0,36), Po-212 (0,64)*[12]
Th-234	*Pa-234m*
U-230	*Th-226, Ra-222, Rn-218, Po-214*
U-232	*Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0,36), Po-212 (0,64)*
U-235	*Th-231*
U-238	*Th-234, Pa-234m*
U-nat.	*Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb- 214, Bi-214, Po-214, Pb-210, Bi-210, Po-210* [11]
Np-237	*Pa-233*
Am-242m	*Am-242*
Am-243	*Np-239*

c) The quantity may be determined from a measurement of the rate of decay or a measurement of the dose ratel at a prescribed distance from the source.

d) These values apply only to compounds of uranium that take the chemical form of UF_6, UO_2F_2 and $UO_2(NO_3)_2$ in both normal and accident conditions of carriage.

e) These values apply only to compounds of uranium that take the chemical form of UO_3, UF_4, UCl_4 and hexavalent compounds in both normal and accident conditions of carriage.

f) These values apply to all compounds of uranium other than those specified in (d) and (e) above.

g) These values apply to unirradiated uranium only.

2.2.7.2.2.2 For individual radionuclides

a) Which are not listed in Table 2.2.7.2.2.1 the determination of the basic radionuclide values referred to in 2.2.7.2.2.1 shall require multilateral approval. For these radionuclides, activity concentration limits for exempt material and activity limits for exempt consignments shall be calculated in accordance with the principles established in "Radiation Protection and Safety of Radiation Sources: International Basic

[12] In the case of Th-natural, the parent nuclide is Th-232, in the case of U-natural the parent nuclide is U238.

Safety Standards", IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014). It is permissible to use an A2 value calculated using a dose coefficient for the appropriate lung absorption type as recommended by the International Commission on Radiological Protection, if the chemical forms of each radionuclide under both normal and accident conditions of carriage are taken into consideration. Alternatively, the radionuclide values in Table 2.2.7.2.2.2 may be used without obtaining competent authority approval;

b) In instruments or articles in which the radioactive material is enclosed or is included as a component part of the instrument or other manufactured article and which meet 2.2.7.2.4.1.3 (c), alternative basic radionuclide values to those in Table 2.2.7.2.2.1 for the activity limit for an exempt consignment are permitted and shall require multilateral approval. Such alternative activity limits for an exempt consignment shall be calculated in accordance with the principles set out in GSR Part 3.

Table 2.2.7.2.2.2:

Basic radionuclide values for unknown radionuclides or mixtures

Radioactive contents	A_1,	A_2,	Activity concentration limit for exempt material	Activity limit for an exempt consignment, Bq
	(TBq)	(TBq)	(Bq/g)	(Bq/g)
Only beta or gamma emitting nuclides are known to be present	0,1	0,02	1×10^{1}	1×10^{4}
Alpha emitting nuclides but no neutron emitters are known to be present	0,2	9×10^{-5}	1×10^{-1}	1×10^{3}
Neutron emitting nuclides are known to be present or no relevant data are available	0,001	9×10^{-5}	1×10^{-1}	1×10^{3}

2.2.7.2.2.3 In the calculations of A1 and A2 for a radionuclide not in Table 2.2.7.2.2.1, a single radioactive decay chain in which the radionuclides are present in their naturally occurring proportions, and in which no daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide, shall be considered as a single radionuclide; and the activity to be taken into account and the A1 or A2 value to be applied shall be those corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and such daughter nuclides shall be considered as mixtures of different nuclides

2.2.7.2.2.4 For mixtures of radionuclides, the basic radionuclide values referred to in 2.2.7.2.2.1 may be determined as follows:

$$X_m = \frac{1}{\sum_i \frac{f(i)}{X(i)}},$$

where:

f(i) – is the fraction of activity or activity concentration of radionuclide i in the mixture;

X(i) – is the appropriate value of A1 or A2, or the activity concentration limit for exempt material or the activity limit for an exempt consignment as appropriate for the radionuclide i; and

Xm – is the derived value of A1 or A2, or the activity concentration limit for exempt material or the activity limit for an exempt consignment in the case of a mixture.

2.2.7.2.2.5 When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest radionuclide value, as appropriate, for the radionuclides in each group may be used in applying the formulas in 2.2.7.2.2.4 and 2.2.7.2.4.4. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest radionuclide values for the alpha emitters or beta/gamma emitters, respectively.

2.2.7.2.2.6 For individual radionuclides or for mixtures of radionuclides for which relevant data are not available, the values shown in Table 2.2.7.2.2.2 shall be used.

2.2.7.2.3 Determination of other material characteristics

2.2.7.2.3.1 *Low specific activity (LSA) material*

2.2.7.2.3.1.1 (Reserved)

2.2.7.2.3.1.2 LSA material shall be in one of three groups:

a) LSA-I

1) uranium and thorium ores and concentrates of such ores, and other ores containing naturally occur- ring radionuclides;

2) natural uranium, depleted uranium, natural thorium or their compounds or mixtures, that are unirradiated and in solid or liquid form;

3) radioactive material for which the A2 value is unlimited. Fissile material may be included only if ex- cepted under 2.2.7.2.3.5;

4) radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the values for activity concentration specified in 2.2.7.2.2.1 to 2.2.7.2.2.6. Fissile material may be included only if excepted under 2.2.7.2.3.5;

b) LSA-II

1) water with tritium concentration up to 0.8 TBq/l;

2) other material in which the activity is distributed throughout and the estimated average specific ac- tivity does not exceed 10-4 A2/g for solids and gases, and 10-5 A2/g for liquids;

c) LSA-III – Solids (e.g. consolidated wastes, activated materials), excluding powders, in which:

1) the radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen and ceramic);

2) the estimated average specific activity of the solid, excluding any shielding material, does not exceed 2 × 10-3 A2/g.

2.2.7.2.3.1.3 Reserved

2.2.7.2.3.1.4 Reserved

2.2.7.2.3.1.5 Reserved

2.2.7.2.3.2 ***Surface contaminated object (SCO):***

SCO is classified in one of three groups:

a) SCO-I: A solid object on which:

1) the non-fixed contamination on the accessible surface averaged over 300 cm2 (or the area of the surface if less than 300 cm^2) does not exceed 4 Bq/cm2 for beta and gamma emitters and low toxicity alpha emitters, or 0.4 Bq/cm2 for all other alpha emitters; and

2) the fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4 × 104 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4 × 103 Bq/cm^2 for all other alpha emitters; and

3)the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm2 (or the area of the surface if less than 300 cm^2) does not exceed 4 × 104 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4 × 103 Bq/cm^2 for all other alpha emitters;

b) SCO-II: A solid object on which either the fixed or non-fixed contamination on the surface exceeds the applicable limits specified for SCO-I in (a) above and on which:

1) the non-fixed contamination on the accessible surface averaged over 300 cm2 (or the area of the surface if less than 300 cm^2) does not exceed 400 Bq/cm^2 for beta and

gamma emitters and low toxicity alpha emitters, or 40 Bq/cm^2 for all other alpha emitters; and

2) the fixed contamination on the accessible surface, averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8 × 105 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8 × 104 Bq/cm^2 for all other alpha emitters; and

3) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm2) does not exceed 8 × 105 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8 × 104 Bq/cm^2 for all other alpha emitters.

c) SCO-III: A large solid object which, because of its size, cannot be carried in a type of package described in RID and for which:

1) All openings are sealed to prevent release of radioactive material during conditions defined in 4.1.9.2.4 (e);

2) The inside of the object is as dry as practicable;

3) The non-fixed contamination on the external surfaces does not exceed the limits specified in 4.1.9.1.2; and

4) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm2 does not exceed 8 × 105 Bq/cm2 for beta and gamma emitters and low toxicity alpha emitters, or 8 × 104 Bq/cm2 for all other alpha emitters.

2.2.7.2.3.3 Special form radioactive material

2.2.7.2.3.3.1 Special form radioactive material shall have at least one dimension not less than 5 mm. When a sealed capsule constitutes part of the special form radioactive material, the capsule shall be so manufactured that it can be opened only by destroying it. The design for special form radioactive material requires unilateral approval.

2.2.7.2.3.3.2 Special form radioactive material shall be of such a nature or shall be so designed that if it is subjected to the tests specified in 2.2.7.2.3.3.4 to 2.2.7.2.3.3.8, it shall meet the following requirements:

a) It would not break or shatter under the impact, percussion and bending tests 2.2.7.2.3.3.5 (a), (b), (c) and 2.2.7.2.3.3.6 (a) as applicable

b) It would not melt or disperse in the applicable heat test 2.2.7.2.3.3.5 (d) or 2.2.7.2.3.3.6 (b) as applicable; and

c) The activity in the water from the leaching tests specified in 2.2.7.2.3.3.7 and 2.2.7.2.3.3.8 would not exceed 2 kBq; or alternatively for sealed sources, the leakage rate for the volumetric leakage assessment test specified in ISO 9978:1992 "Radiation Protection – Sealed Radioactive Sources – Leakage Test Methods", would not exceed the applicable acceptance threshold acceptable to the competent authority.

2.2.7.2.3.3.3 Demonstration of compliance with the performance standards in 2.2.7.2.3.3.2 shall be in accordance with 6.4.12.1 and 6.4.12.2.

2.2.7.2.3.3.4 Specimens that comprise or simulate special form radioactive material shall be subjected to the impact test, the percussion test, the bending test, and the heat test specified in 2.2.7.2.3.3.5 or alternative tests as authorized in 2.2.7.2.3.3.6. A different specimen may be used for each of the tests. Following each test, a leaching assessment or volumetric leakage test shall be performed on the specimen by a method no less sensitive than the methods given in 2.2.7.2.3.3.7 for indispersible solid material or 2.2.7.2.3.3.8 for encapsulated material.

2.2.7.2.3.3.5 The relevant test methods are:

a) Impact test: The specimen shall drop onto the target from a height of 9 m. The target shall be as defined in 6.4.14;

b) Percussion test: The specimen shall be placed on a sheet of lead which is supported by a smooth solid surface and struck by the flat face of a mild steel bar so as to cause an impact equivalent to that resulting from a free drop of 1.4 kg through 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm. The lead, of hardness number 3.5 to 4.5 on the Vickers scale and not more than 25 mm thick, shall cover an area greater than that covered by the specimen. A fresh surface of lead shall be used for each impact. The bar shall strike the specimen so as to cause maximum damage;

c) Bending test: The test shall apply only to long, slender sources with both a minimum length of 10 cm and a length to minimum width ratio of not less than 10. The specimen shall be rigidly clamped in a horizontal position so that one half of its length protrudes from the face of the clamp. The orientation of the specimen shall be such that the specimen will suffer maximum damage when its free end is struck by the flat face of a steel bar. The bar shall strike the specimen so as to cause an impact equivalent to that resulting from a free vertical drop of 1.4 kg through 1 m. The lower part of the bar shall be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm;

d) Heat test: The specimen shall be heated in air to a temperature of 800 °C and held at that temperature for a period of 10 minutes and shall then be allowed to cool.

2.2.7.2.3.3.6 Specimens that comprise or simulate radioactive material enclosed in a sealed capsule may be excepted from:

a) The tests prescribed in 2.2.7.2.3.3.5 (a) and (b) provided that the specimens are alternatively subjected to the impact test prescribed in ISO 2919:2012 "Radiation Protection – Sealed Radioactive Sources – General requirements and classification":

1) The Class 4 impact test if the mass of the special form radioactive material is equal to or less than 200 g;

2) The Class 5 impact test if the mass of the special form radioactive material is equal to or more than 200 g but is less than 500 g

b) The test prescribed in 2.2.7.2.3.3.5 (d) provided they are alternatively subjected to the Class 6 tempera- ture test specified in ISO 2919:2012 "Radiation protection – Sealed radioactive sources – General re- quirements and classification".

2.2.7.2.3.3.7 For specimens which comprise or simulate indispersible solid material, a leaching assessment shall be performed as follows:

a) The specimen shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7 day test period the free volume of the unabsorbed and unreacted water remaining shall be at least 10% of the volume of the solid test sample itself. The water shall have an initial pH of 6–8 and a maximum conductivity of 1 mS/m at 20 °C;

b) The water and the specimen shall then be heated to a temperature of (50 ± 5) °C and maintained at this temperature for 4 hours;

c) The activity of the water shall then be determined;

d) The specimen shall then be kept for at least 7 days in still air at not less than 30 °C and relative humidity not less than 90%;

e) The specimen shall then be immersed in water of the same specification as in (a) above and the water and the specimen heated to (50 ± 5) °C and maintained at this temperature for 4 hours;

f) The activity of the water shall then be determined.

2.2.7.2.3.3.8 For specimens which comprise or simulate radioactive material enclosed in a sealed capsule, either a leaching assessment or a volumetric leakage assessment shall be performed as follows:

a) The leaching assessment shall consist of the following steps:

1) the specimen shall be immersed in water at ambient temperature. The water shall have an initial pH of 6–8 with a maximum conductivity of 1 mS/m at 20 °C;

2) the water and specimen shall then be heated to a temperature of (50 ± 5) °C and maintained at this tem- perature for 4 hours;

3) the activity of the water shall then be determined;

4) specimen shall then be kept for at least 7 days in still air at not less than 30 °C and relative humidity of not less than 90%;

5) the process in (1), (2) and (3) shall be repeated;

b) The alternative volumetric leakage assessment shall comprise any of the tests prescribed in ISO 9978:1992 "Radiation Protection – Sealed radioactive sources – Leakage test methods", provided that they are acceptable to the competent authority.

2.2.7.2.3.4 Low dispersible radioactive material

2.2.7.2.3.4.1 The design for low dispersible radioactive material shall require multilateral approval. Low dispersible radioactive material shall be such that the total amount of this radioactive material in a package, taking into account the provisions of 6.4.8.14, shall meet the following requirements:

a) The dose rate at 3 m from the unshielded radioactive material does not exceed 10 mSv/h;

b) If subjected to the tests specified in 6.4.20.3 and 6.4.20.4, the airborne release in gaseous and particu- late forms of up to 100 μm aerodynamic equivalent diameter would not exceed 100 A2. A separate specimen may be used for each test; and

c) If subjected to the test specified in 2.2.7.2.3.4.3 the activity in the water would not exceed 100 A2. In the application of this test, the damaging effects of the tests specified in (b) above shall be taken into account.

2.2.7.2.3.4.2 Low dispersible radioactive material shall be tested as follows:

A specimen that comprises or simulates low dispersible radioactive material shall be subjected to the enhanced thermal test specified in 6.4.20.3 and the impact test specified in 6.4.20.4. A different specimen may be used for each of the tests. Following each test, the specimen shall be subjected to the leach test specified in 2.2.7.2.3.4.3. After each test it shall be determined if the applicable requirements of 2.2.7.2.3.4.1 have been met.

2.2.7.2.3.4.3 A solid material sample representing the entire contents of the package shall be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test shall be sufficient to ensure that at the end of the 7-day test period the free volume of the unabsorbed and unreacted water remaining shall be at least 10 % of the volume of the solid test sample itself. The water shall have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20 °C. The total activity of the free volume of water shall be measured following the 7-day immersion of the test sample.

2.2.7.2.3.4.4 Demonstration of compliance with the performance standards in 2.2.7.2.3.4.1, 2.2.7.2.3.4.2 and 2.2.7.2.3.4.3 shall be in accordance with 6.4.12.1 and 6.4.12.2.

2.2.7.2.3.5 Fissile material

Fissile material and packages containing fissile material shall be classified under the relevant entry as "FISSILE" in accordance with Table 2.2.7.2.1.1 unless excepted by one of the provisions of paragraphs (a) to (f) below and carried subject to the requirements of 7.5.11 CW 33 (4.3). All provisions apply only to ma- terial in packages that meets the requirements of 6.4.7.2 unless unpackaged material is specifically allowed in the provision.

a) Uranium enriched in uranium-235 to a maximum of 1% by mass, and with a total plutonium and uranium-233 content not exceeding 1% of the mass of uranium-235, provided that the fissile nuclides are distributed essentially homogeneously throughout the material. In addition, if uranium-235 is present in metallic, oxide or carbide forms, it shall not form a lattice arrangement;

b) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2% by mass, with a total plu tonium and uranium-233 content not exceeding 0.002% of the mass of uranium, and with a minimum ni- trogen to uranium atomic ratio (N/U) of 2;

c) Uranium with a maximum uranium enrichment of 5% by mass uranium-235 provided:

1) There is no more than 3.5 g of uranium-235 per package;

2) The total plutonium and uranium-233 content does not exceed 1% of the mass of uranium-235 per package;

3) Carriage of the package is subject to the consignment limit provided in 7.5.11 CW 33 (4.3) (c);

d) Fissile nuclides with a total mass not greater than 2.0 g per package provided the package is carried subject to the consignment limit provided in 7.5.11 CW 33 (4.3) (d);

e) Fissile nuclides with a total mass not greater than 45 g either packaged or unpackaged subject to the requirements of 7.5.11 CW 33 (4.3) (e);

f) A fissile material that meets the requirements of 7.5.11 CW 33 (4.3) (b), 2.2.7.2.3.6 and 5.1.5.2.1.

2.2.7.2.3.6 A fissile material excepted from classification as "FISSILE" under 2.2.7.2.3.5 (f) shall be subcritical without the need for accumulation control under the following conditions:

a) The conditions of 6.4.11.1 (a);

b) The conditions consistent with the assessment provisions stated in 6.4.11.12 (b) and 6.4.11.13 (b) for packages.

2.2.7.2.4 Classification of packages or unpacked material

The quantity of radioactive material in a package shall not exceed the relevant limits for the package type as specified below.

2.2.7.2.4.1 ***Classification as excepted package***

2.2.7.2.4.1.1 A package may be classified as an excepted package if it meets one of the following conditions:

a) It is an empty package having contained radioactive material;

b) It contains instruments or articles not exceeding the activity limits specified in columns (2) and (3) of Table 2.2.7.2.4.1.2;

c) It contains articles manufactured of natural uranium, depleted uranium or natural thorium;

d) It contains radioactive material not exceeding the activity limits specified in column (4) of Table 2.2.7.2.4.1.2; or

e) It contains less than 0.1 kg of uranium hexafluoride not exceeding the activity limits specified in column (4) of Table 2.2.7.2.4.1.2.

2.2.7.2.4.1.2 A package containing radioactive material may be classified as an excepted package, provided that the dose rate at any point on its external surface does not exceed 5 μSv/h.

Table 2.2.7.2.4.1.2: Activity limits for excepted packages

Physical state of contents	Instruments or articles		Materials
	Item limits[a]	Package limits[a]	Package limits[a]
(1)	(2)	(3)	(4)
Solids			
special form	10^{-2} A_1	A_1	10^{-3} A_1
other forms	10^{-2} A_2	A_2	10^{-3} A_2
Liquids	10^{-3} A_2	10^{-1} A_2	10^{-4} A_2
Gases			
Tritium	2×10^{-2} A_2	2×10^{-1} A_2	2×10^{-2} A_2
special form	10^{-3} A_1	10^{-2} A_1	10^{-3} A_1
other form	10^{-3} A_2	10^{-2} A_2	10^{-3} A_2

[a] *For mixtures of radionuclides, see 2.2.7.2.2.4 to 2.2.7.2.2.6*

2.2.7.2.4.1.3 Radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article may be classified under UN No. 2911 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – INSTRUMENTS or ARTICLES, provided that:

a) The dose rate at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1 mSv/h;

b) Each instrument or manufactured article bears the mark "RADIOACTIVE" on its external surface except for the following:

1) radioluminescent time-pieces or devices;

2) consumer products that have either received regulatory approval in accordance with 1.7.1.4 (e) or do not individually exceed the activity limit for an exempt consignment in Table 2.2.7.2.2.1 (column 5), provided such products are transported in a package that

bears the mark "RADIOACTIVE" on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; and

3) other instruments or articles too small to bear the mark "RADIOACTIVE", provided that they are transported in a package that bears the marking "RADIOACTIVE" on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package;

c) The active material is completely enclosed by non-active components (a device performing the sole function of containing radioactive material shall not be considered to be an instrument or manufactured article);

d) The limits specified in columns 2 and 3 of Table 2.2.7.2.4.1.2 are met for each individual item and each package, respectively;

e) Reserved

f) If the package contains fissile material, one of the provisions of 2.2.7.2.3.5 (a) to (f) applies.

2.2.7.2.4.1.4 Radioactive material in forms other than as specified in 2.2.7.2.4.1.3 and with an activity not exceeding the limits specified in column 4 of Table 2.2.7.2.4.1.2, may be classified under UN No. 2910 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – LIMITED QUANTITY OF MATERIAL, provided that:

a) The package retains its radioactive contents under routine conditions of carriage;

b) The package bears the mark "RADIOACTIVE" on either:

1) An internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; or

2) The outside of the package, where it is impractical to mark an internal surface; and

c) If the package contains fissile material, one of the provisions of 2.2.7.2.3.5 (a) to (f) applies.

2.2.7.2.4.1.5 Uranium hexafluoride not exceeding the limits specified in Column 4 of Table 2.2.7.2.4.1.2 may be classi- fied under UN 3507 URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile-excepted provided that:

a) The mass of uranium hexafluoride in the package is less than 0.1 kg;

b) The conditions of 2.2.7.2.4.5.2 and 2.2.7.2.4.1.4 (a) and (b) are met

2.2.7.2.4.1.6 Articles manufactured of natural uranium, depleted uranium or natural thorium and articles in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be classified under UN No. 2909 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – ARTICLES MANUFACTURED FROM NATURAL URANIUM or DEPLETED URANIUM or NATURAL THORIUM, provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

2.2.7.2.4.1.7 An empty packaging which had previously contained radioactive material may be classified under UN No. 2908 RADIOACTIVE MATERIAL, EXCEPTED PACKAGE – EMPTY PACKAGING, provided that:

a) It is in a well-maintained condition and securely closed;

b) The outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material;

c) The level of internal non-fixed contamination, when averaged over any 300 cm^2, does not exceed:

1) 400 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters; and

2) 40 Bq/cm^2 for all other alpha emitters; and

d) Any labels which may have been displayed on it in conformity with 5.2.2.1.11.1 will be removed or no longer visible; and

e) If the packaging has contained fissile material, one of the provisions of 2.2.7.2.3.5 (a) to (f) or one of the provisions for exclusion in 2.2.7.1.3 applies.

2.2.7.2.4.2 ***Classification as Low specific activity (LSA) material***

Radioactive material may only be classified as LSA material if the definition of LSA in 2.2.7.1.3 and the conditions of 2.2.7.2.3.1, 4.1.9.2 and 7.5.11 CW 33 (2) are met.

2.2.7.2.4.3 ***Classification as Surface contaminated object (SCO)***

Radioactive material may be classified as SCO if the definition of SCO in 2.2.7.1.3 and the conditions of 2.2.7.2.3.2, 4.1.9.2 and 7.5.11 CW 33 (2) are met.

2.2.7.2.4.4 ***Classification as Type A package***

Packages containing radioactive material may be classified as Type A packages, provided that the following conditions are met:

Type A packages shall not contain activities greater than either of the following:

a) For special form radioactive material: A1;

b) For all other radioactive material: A2.

For mixtures of radionuclides whose identities and respective activities are known, the followingcondition shall apply to the radioactive contents of a Type A package:

$$\sum_i \frac{B(i)}{A_1(i)} + \sum_j \frac{C(j)}{A_2(j)} \leq 1,$$

where:

B(i) is the activity of radionuclide i as special form radioactive material;

$A_1(i)$ is the A1 value for radionuclide i;

*C(j)*is the activity of radionuclide j as other than special form radioactive material;

$A_2(j)$ is the A2 value for radionuclide j.

2.2.7.2.4.5 ***Classification of uranium hexafluoride***

2.2.7.2.4.5.1 Uranium hexafluoride shall only be assigned to:

a) UN No. 2977, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE;

b) UN No. 2978, RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, non-fissile or fissile-excepted; or

c) UN No. 3507, URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE less than 0.1 kg per package, non-fissile or fissile-excepted.

2.2.7.2.4.5.2 The contents of a package containing uranium hexafluoride shall comply with the following requirements

a) For UN Nos. 2977 and 2978, the mass of uranium hexafluoride shall not be different from that allowed for the package design, and for UN No. 3507, the mass of uranium hexafluoride shall be less than 0.1 kg;

b) The mass of uranium hexafluoride shall not be greater than a value that would lead to an ullage smaller than 5% at the maximum temperature of the package as specified for the plant systems where the package shall be used; and

c) The uranium hexafluoride shall be in solid form and the internal pressure shall not be above atmospheric pressure when presented for carriage.

2.2.7.2.4.6 ***Classification as Type B(U), Type B(M) or Type C packages***

2.2.7.2.4.6.1 Packages not otherwise classified in 2.2.7.2.4 (2.2.7.2.4.1 to 2.2.7.2.4.5) shall be classified in accordance with the competent authority certificate of approval for the package issued by the country of origin of design.

2.2.7.2.4.6.2 The contents of a Type B(U), Type B(M) or Type C package shall be as specified in the certificate of approval

2.2.7.2.4.6.3 (Reserved).

2.2.7.2.4.6.4 (Reserved).

2.2.7.2.5 ***Special arrangements***

Radioactive material shall be classified as transported under special arrangement when it is intended to be carried in accordance with 1.7.4.

2.2.8 CLASS 8 CAUSTIC (CORROSIVE) SUBSTANCES

2.2.8.1 Definition and criteria

2.2.8.1.1 Caustic (corrosive) substances are substances which, by chemical action, will cause irreversible damage to the skin, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport. The heading of this class also covers other substances which form a corrosive liquid only in the presence of water, or which produce corrosive vapour or mist in the presence of natural moisture of the air.

2.2.8.1.2 For substances and mixtures that are corrosive to skin, general classification provisions are provided in 2.2.8.1.4. Skin corrosion refers to the production of irreversible damage to the skin, namely, visible necrosis through the epidermis and into the dermis occurring after exposure to a substance or mixture.

2.2.8.1.3 Liquids and solids which may become liquid during carriage, which are judged not to be skin corrosive shall still be considered for their potential to cause corrosion to certain metal surfaces in accordance with the criteria in 2.2.8.1.5.3 (c) (2).

2.2.8.1.4 General classification provisions

2.28.1.4.1 Substances and articles of Class 8 are subdivided as follows:

C1–C11 Corrosive substances without subsidiary risk and articles containing such substances

C1–C4 Acid substances:

C1 Inorganic, liquid;

C2 Inorganic, solid;

C3 Organic, liquid;

C4 Organic, solid;

C5–C8 Basic substances:

C5 Inorganic, liquid;

C6 Inorganic, solid;

C7 Organic, liquid;

C8 Organic, solid;

C9–C10 Other corrosive substances:

C9 Liquid;

C10 Solid;

C11 Articles

CF Corrosive substances, flammable:

CF1 Liquid

CF2 Solid

CS Corrosive substances, self-heating:

CS1 Liquid

CS2 Solid

CW Corrosive substances which, in contact with water, emit flammable gases:

CW1 Liquid

CW2 Solid

CO Corrosive substances, oxidizing:

CO1 Liquid

CO2 Solid

CT Corrosive substances, toxic and articles containing such substances:

CT1 Liquid

CT2 Solid

CT3 Articles

CFT Corrosive substances, flammable, liquid, toxic;

COT Corrosive substances, oxidizing, toxic.

2.2.8.1.4.2 Substances and mixtures of Class 8 are divided among the three packing groups according to their degree of danger in carriage:

(a) *Packing group I:* very dangerous substances and mixtures;

(b) *Packing group II:* substances and mixtures presenting medium danger;

(c) *Packing group III:* substances and mixtures that present minor danger.

2.2.8.1.4.3 Allocation of substances listed in Table A of Chapter 3.2 to the packing groups in Class 8 has been made on the basis of experience taking into account such additional factors as inhalation risk (see 2.2.8.1.4.5) and reactivity with water (including the formation of dangerous decomposition products).

2.2.8.1.4.4 New substances and mixtures can be assigned to packing groups on the basis of the length of time of contact necessary to produce irreversible damage of intact skin tissue in accordance with the criteria in 2.2.8.1.5. Alternatively, for mixtures, the criteria in 2.2.8.1.6 can be used.

2.2.8.1.4.5 A substance or mixture meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC50) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to Class 8 (see 2.2.61.1.7.2).

2.2.8.1.5 Packing group assignment for substances and mixtures

2.2.8.1.5.1 Existing human and animal data including information from single or repeated exposure shall be the first line of evaluation, as they give information directly relevant to effects on the skin.

2.2.8.1.5.2 In assigning the packing group in accordance with 2.2.8.1.4.4, account shall be taken of human experience in instances of accidental exposure. In the absence of human experience classification shall be based on data obtained from experiments in accordance with OECD Test Guidelines Nos. 404[13], 435[14], 431[15] or 430[16]. A substance or mixture which is determined not to be corrosive in accordance with one of these or non-classified in accordance with OECD Test Guideline No. 439[17], may be considered not to be corrosive to skin for the purposes of Annex 2 to SMGS without further testing. If the test results indicate that the substance or mixture is corrosive and not assigned to packing group I, but the test method does not allow discrimination between packing groups II and III, it shall be considered to be packing group II. If the test results indicate that the substance or mixture is corrosive, but the test method does not allow discrimination between packing groups, it shall be assigned to packing group I if no other test results indicate a different packing group.

2.2.8.1.5.3 Packing groups are assigned to corrosive substances in accordance with the following criteria (see Table 2.2.8.1.5.3):

a) Packing group I is assigned to substances that cause irreversible damage of intact skin tissue within an observation period up to 60 minutes starting after the exposure time of 3 minutes or less.

[13] OECD Guideline for the testing of chemicals No. 404 "Acute Dermal Irritation/Corrosion" 2015.

[14] OECD Guideline for the testing of chemicals No. 435 "In Vitro Membrane Barrier Test Method for Skin Corrosion" 2015.

[15] OECD Guideline for the testing of chemicals No. 431 "In vitro skin corrosion: reconstructed human epidermis (RHE) test method" 2016.

[16] OECD Guideline for the testing of chemicals No. 430 "In Vitro Skin Corrosion: Transcutaneous Electrical Resistance Test Method (TER)" 2015.

[17] OECD Guideline for the testing of chemicals No. 439 "In Vitro Skin Irritation: Reconstructed Human Epidermis Test Method" 2015.

b) Packing group II is assigned to substances that cause irreversible damage of intact skin tissue within an observation period up to 14 days starting after the exposure time of more than 3 minutes but not more than 60 minutes.

c) Packing group III is assigned to substances that:

1) Cause irreversible damage of intact skin tissue within an observation period up to 14 days starting after the exposure time of more than 60 minutes but not more than 4 hours; or

2) Are judged not to cause irreversible damage of intact skin tissue but which exhibit a corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55 °C when tested on both materials. For the purposes of testing steel, type S235JR+CR (1.0037 resp. St 37-2), S275J2G3+CR (1.0144 resp. St 44-3), ISO 3574 or Unified Numbering System (UNS) G10200 or a similar type or SAE 1020, and for testing aluminium, non-clad, types 7075–T6 or AZ5GU-T6 shall be used. An acceptable test is prescribed in the Manual of Tests and Criteria, Part III, Section 37.

Note: *Where an initial test on either steel or aluminium indicates the substance being tested is corrosive the follow up test on the other metal is not required.*

Table 2.2.8.1.5.3: Table summarizing the criteria in 2.2.8.1.5.3

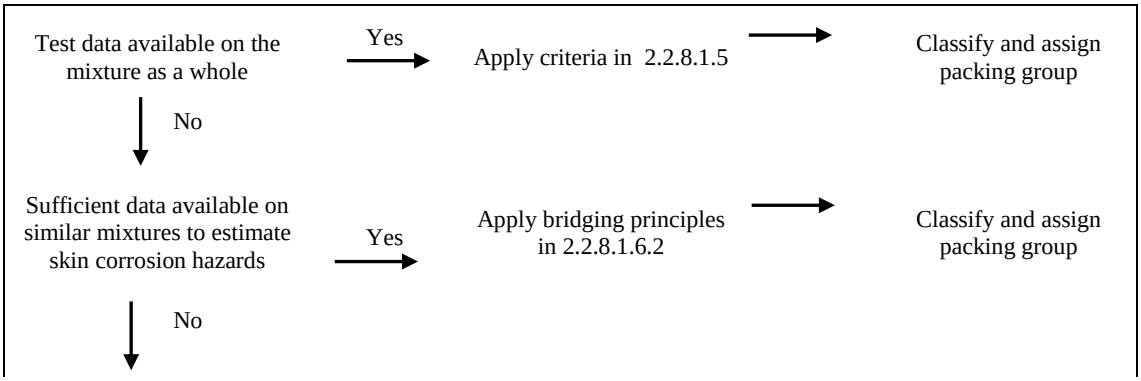
Packing	Exposure	Observation period	Effect
I	≤ 3 min	≤ 60 min	Irreversible damage of intact skin
II	> 3 min. ≤ 1 h	≤ 14 days	Irreversible damage of intact skin
III	> 1 h ≤ 4 h	≤ 14 days	Irreversible damage of intact skin
III	-	-	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55 ºC when tested on both materia

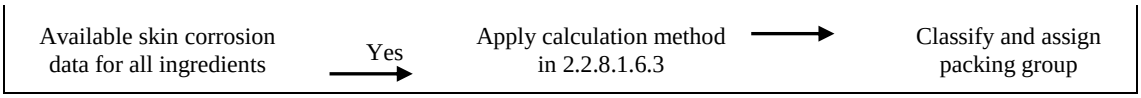
2.2.8.1.6 Alternative packing group assignment methods for mixtures: Step-wise approach

2.2.8.1.6.1 *General provisions*

For mixtures it is necessary to obtain or derive information that allows the criteria to be applied to the mixture for the purpose of classification and assignment of packing groups. The approach to classification and assignment of packing groups is tiered, and is dependent upon the amount of information available for the mixture itself, for similar mixtures and/or for its ingredients. The flow chart of Figure 2.2.8.1.6.1 below outlines the process to be followed.

Figure 2.2.8.1.6.1: Step-wise approach to classify and assign packing group of corrosive mixtures





2.2.8.1.6.2 *Bridging principles*

Where a mixture has not been tested to determine its skin corrosion potential, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately classify and assign a packing group for the mixture, these data will be used in accordance with the following bridging principles. This en-sures that the classification process uses the available data to the greatest extent possible in characterizing the hazards of the mixture.

(a) Dilution: If a tested mixture is diluted with a diluent which does not meet the criteria for Class 8 and does not affect the packing group of other ingredients, then the new diluted mixture may be assigned to the same packing group as the original tested mixture.

***Note*:** *In certain cases, diluting a mixture or substance may lead to an increase in the corrosive properties. If this is the case, this bridging principle cannot be used.*

(b) Batching: The skin corrosion potential of a tested production batch of a mixture can be assumed to be substantially equivalent to that of another untested production batch of the same commercial product when produced by or under the control of the same manufacturer, unless there is reason to believe there is significant variation such that the skin corrosion potential of the untested batch has changed. If the latter occurs, a new classification is necessary.

(c) Concentration of mixtures of packing group I: If a tested mixture meeting the criteria for inclusion in packing group I is concentrated, the more concentrated untested mixture may be assigned to packing group I without additional testing.

(d) Interpolation within one packing group: For three mixtures (A, B and C) with identical ingredients, where mixtures A and B have been tested and are in the same skin corrosion packing group, and where untested mixture C has the same Class 8 ingredients as mixtures A and B but has concentrations of Class 8 ingredients intermediate to the concentrations in mixtures A and B, then mixture C is assumed to be in the same skin corrosion packing group as A and B.

(e) Substantially similar mixtures: Given the following:

1) Two mixtures: (A+B) and (C+B);

2) The concentration of ingredient B is the same in both mixtures;

3) The concentration of ingredient A in mixture (A+B) equals the concentration of ingredient C in mixture (C+B);

4) Data on skin corrosion for ingredients A and C are available and substantially equivalent, i.e. they are the same skin corrosion packing group and do not affect the skin corrosion potential of B.

If mixture (A+B) or (C+B) is already classified based on test data, then the other mixture may be assigned to the same packing group.

2.2.8.1.6.3 Calculation method based on the classification of the substances

2.2.8.1.6.3.1 Where a mixture has not been tested to determine its skin corrosion potential, nor is sufficient data available on similar mixtures, the corrosive properties of the substances in the mixture shall be considered to classify and assign a packing group.

Applying the calculation method is only allowed if there are no synergistic effects that make the mixture more corrosive than the sum of its substances. This restriction applies only if packing group II or III would be assigned to the mixture.

2.2.8.1.6.3.2 When using the calculation method, all Class 8 ingredients present at a concentration of ≥ 1% shall be taken into account, or < 1% if these ingredients are still relevant for classifying the mixture to be corrosive to skin.

2.2.8.1.6.3.3 To determine whether a mixture containing corrosive substances shall be considered a corrosive mixture and to assign a packing group, the calculation method in the flow chart in Figure 2.2.8.1.6.3 shall be applied. For this calculation method, generic concentration limits apply where 1% is used in the first step for the assessment of the packing group I substances, and where 5% is used for the other steps respective

2.2.8.1.6.3.4 When a specific concentration limit (SCL) is assigned to a substance following its entry in Table A of Chapter 3.2 or in a special provision, this limit shall be used instead of the generic concentration limits (GCL).

2.2.8.1.6.3.5 For this purpose, the summation formula for each step of the calculation method shall be adapted. This means that, where applicable, the generic concentration limit shall be substituted by the specific concentration limit assigned to the substance(s) (SCLi), and the adapted formula is a weighted average of the different concentration limits assigned to the different substances in the mixture:

$$\frac{PGx1}{GCL} + \frac{PGx2}{SCL2} + \cdots + \frac{PGxi}{SCLi} \geq 1$$

where:

PG xi = concentration of substance 1, 2 … i in the mixture, assigned to packing group x (I, II or III)

GCL = generic concentration limit

SCLi = specific concentration limit assigned to substance i

The criterion for a packing group is fulfilled when the result of the calculation is ≥ 1. The generic concentration limits to be used for the evaluation in each step of the calculation method are those found in Figure 2.2.8.1.6.3.

Examples for the application of the above formula can be found in the note below.

Note: Examples for the application of the above formula

Example 1: A mixture contains one corrosive substance in a concentration of 5% assigned to packing group I without a specific concentration limit:

Calculation for packing group I: $\frac{5}{5\,(GCL)} = 1$

→assign to Class 8, packing group I.

Example 2: A mixture contains three substances corrosive to skin; two of them (A and B) have specific concentration limits; for the third one (C) the generic concentration limit applies. The rest of the mixture needs not to be taken into consideration:

Substance X in the mixture and its packing group assignment within Class 8	Concentration (conc) in the mixture in %	Specific con-centration limit (SCL) for packing group I	Specific con-centration limit (SCL) for packing group II	Specific con-centration limit (SCL) for packing group III
A, assigned to packing group I	3	30%	None	None
B, assigned to packing group II	2	20%	10%	None
C, assigned to packing group III	10	None	None	None

Calculation for packing group I: $\frac{3\,(conc\,A)}{30\,(SCL\,PGI)} + \frac{2\,(conc\,B)}{20\,(SCL\,PGI)} = 0{,}2 < 1$

The criterion for packing group I is not fulfilled.

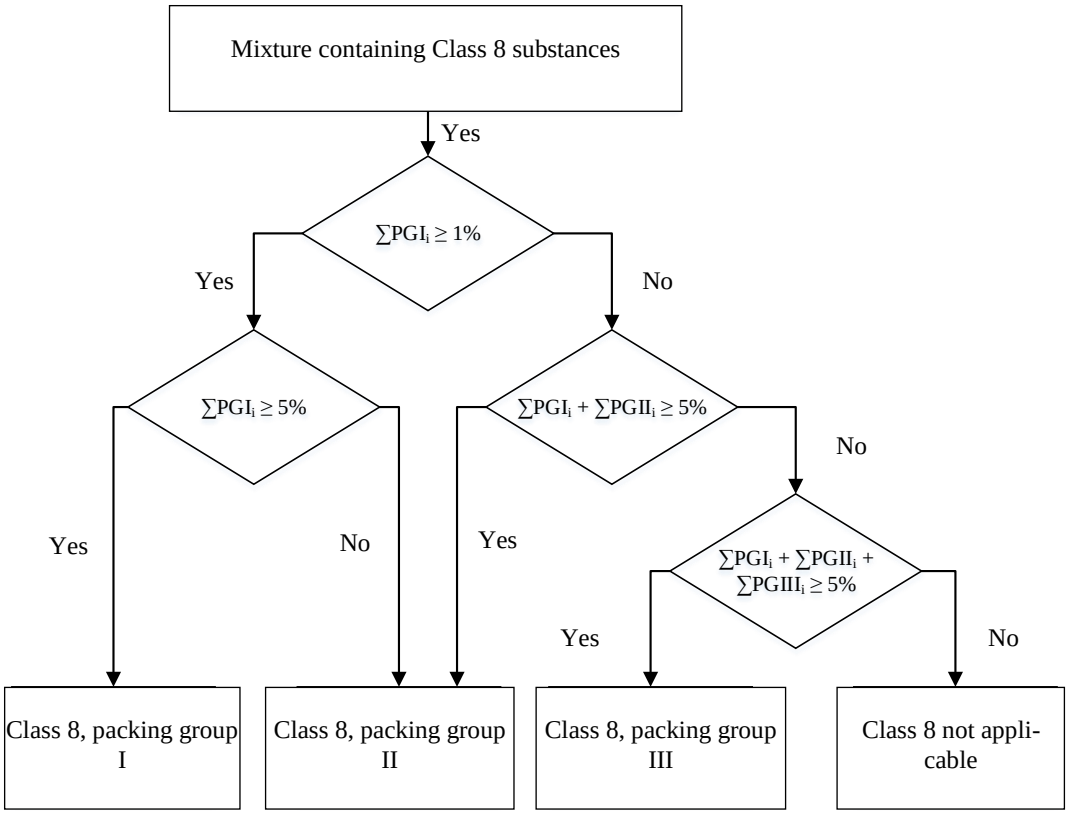
Calculation for packing group II: $\frac{3\,(conc\,A)}{5\,(GCL\ PG\,II)} + \frac{2\,(conc\,B)}{10\,(SCL\ PG\,II)} = 0{,}8 < 1$

The criterion for packing group II is not fulfilled.

Calculation for packing group III: $\frac{3\ (conc\ A)}{5\ (GCL\ PGIII)} + \frac{2\ (conc\ B)}{5\ (GCL\ PG\ III)} + \frac{10\ (conc\ C)}{5\ GCL\ PG\ III)} = 3 \geq 1$

The criterion for packing group III is fulfilled, the mixture shal be assigned to Class 8, packing group III.

Figure 2.2.8.1.6.3: Calculation method



2.2.8.1.7 If substances of Class 8, as a result of admixtures, come into categories of risk different from those to which the substances mentioned by name in Table A of Chapter 3.2 belong, these mixtures or solutions shall be assigned to the entries to which they belong, on the basis of their actual degree of danger.

Note: *For the classification of solutions and mixtures (such as preparations and wastes), see also 2.1.3.*

2.2.8.1.8 On the basis of the criteria set out in paragraph 2.2.8.1.6, it may also be determined whether the nature of a solution or mixture mentioned by name or containing a substance mentioned by name is such that the solu-tion or mixture is not subject to the provisions for this class.

Note: *UN No. 1910 CALCIUM OXIDE and UN No. 2812 SODIUM ALUMINATE, listed in the UN Model Regulations, are not subject to the provisions of Annex 2 to SMGS.*

2.2.8.2 ***Substances not accepted for carriage***

2.2.8.2.1 Chemically unstable substances of Class 8 shall not be accepted for carriage unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of carriage. For the precautions necessary to prevent polymerization, see special provision 386 of Chapter 3.3. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions. If temperature control is required to prevent polymerization of a substance the substance shall not be accepted for carriage:

- in a packaging or IBC with an SAPT of 50 °C or less,

- or in a tank with an SAPT of 45 °C or less.

2.2.8.2.2 The following substances shall not be accepted for carriage:

– UN No. 1798 NITROHYDROCHLORIC ACID;

– Chemically unstable mixtures of spent sulphuric acid

– Chemically unstable mixtures of nitrating acid or mixtures of residual sulphuric and nitric acids, not denitrated;

- Perchloric acid aqueous solution with more than 72% pure acid, by mass, or mixtures of perchloric acid with any liquid other than water.

The following substance shall not be accepted for carriage by rail:

- Sulphur trioxide, at least 99.95% pure, without inhibitor (non-stabilized).

2.2.8.3 List of collective entries

Subsidiary risk			Classification code	UN No.	Name of the substance or article
Corrosive substances without subsidiary risk and articles containing such substances					
Acid	**Inorganic**	**Liquid**	**C1**	2584	ALKYLSULPHONIC ACIDS, LIQUID with more than 5% free sulphuric acid or
				2584	ARYLSULPHONIC ACIDS, LIQUID with more than 5% free sulphuric acid
				2693	BISULPHITES, AQUEOUS SOLUTION, N.O.S.
				2837	BISULPHATES, AQUEOUS SOLUTION
				3264	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
		Solid	**C2**	1740	HYDROGENDIFLUORIDES, SOLID, N.O.S.
				2583	ALKYLSULPHONIC ACIDS, SOLID with more than 5% free sulphuric acid or
				2583	ARYLSULPHONIC ACIDS, SOLID with more than 5% free sulphuric acid
				3260	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.
	Organic	**Liquid**	**C3**	2586	ALKYLSULPHONIC ACIDS, LIQUID with not more than 5% free sulphuric acid or
				2586	ARYLSULPHONIC ACIDS, LIQUID with not more than 5% free sulphuric acid
				2987	CHLOROSILANES, CORROSIVE, N.O.S.
				3145	ALKYLPHENOLS, LIQUID, N.O.S. (including C2-C12 homologues)
				3265	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.
		Solid	**C4**	2430	ALKYLPHENOLS, SOLID, N.O.S. (including C2-C12 homologues)
				2585	ALKYLSULPHONIC ACIDS, SOLID with not more than 5% free sulphuric acid or
				2585	ARYLSULPHONIC ACIDS, SOLID with not more than 5% free sulphuric acid
				3261	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.
Basic substances	**Inorganic**	**Liquid**	**C5**	1719	CAUSTIC ALKALI LIQUID, N.O.S..
				2797	BATTERY FLUID, ALKALI
				3266	CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S.
		Solid	**C6**	3262	CORROSIVE SOLID, BASIC, INORGANIC, N.O.S.
	Organic	**Liquid**	**C7**	2735	AMINES, LIQUID, CORROSIVE, N.O.S. or
				2735	POLYAMINES, SOLID, CORROSIVE, N.O.S
				3267	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S.
		Solid	**C8**	3259	AMINES, LIQUID, CORROSIVE, N.O.S. or
				3259	POLYAMINES, LIQUID, CORROSIVE, N.O.S.
				3263	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S
Other corrosive substances		**Liquid**	**C9**	1903	DISINFECTANT, LIQUID, CORROSIVE, N.O.S.
				2801	DYE, LIQUID, CORROSIVE, N.O.S. or
				2801	DYE INTERMEDIATE, LIQUID, CORROSIVE, N.O.S.
				3066	PAINT (including paint, enamel, stain, shellac, varnish, polish, liquid filler and lacquer base) or
				3066	PAINT RELATED MATERIAL (including paint thinning or reducing compound)
				1760	CORROSIVE LIQUID, N.O.S

			3147	DYE, SOLID, CORROSIVE, N.O.S. or
			3147	DYE INTERMEDIATE, SOLID, CORROSIVE, N.O.S..
			3244	SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.
	Solid[a]	**C10**	1759	CORROSIVE SOLID, N.O.S
			1774	FIRE EXTINGUISHER CHARGES, corrosive liquid
			2028	BOMBS, SMOKE, NON-EXPLOSIVE with corrosive, liquid, without initiating device
			2794	BATTERIES, WET, FILLED WITH ACID, electric storage
			2795	BATTERIES, WET, FILLED WITH ALKALI, electric storage
			2800	BATTERIES, WET, NON-SPILLABLE, electric storage
Articles		**C11**	3028	BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE SOLID, electric storage
			3477	FUEL CELL CARTRIDGES containing corrosive substances, or
			3477	FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT, containing corrosive substances, or
			3477	FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing corrosive substances
			3547	ARTICLE CONTAINING CORROSIVE SUBSTANCE, N.O.S.
Corrosive substances with subsidiary risk and articles containing such substances				
	Liquid [b]	**CF1**	3470	PAINT, CORROSIVE, FLAMMABLE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or
			3470	PAINT RELATED MATERIAL, CORROSIVE, FLAMMABLE (including paint thinning and reducing compound)
			2734	AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S or
			2734	POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE , N.O.S.
			2986	CHLOROSILANES, CORROSIVE, FLAMMABLE, N.O.S.
Flammable [6]			2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S
CF	**Solid**	**CF2**	2921	CORROSIVE SOLID, FLAMMABLE, N.O.S
	Liquid	**CS1**	3301	CORROSIVE LIQUID, SELF-HEATING, N.O.S.
Self-heating				
CS	**Solid**	**CS2**	3095	CORROSIVE SOLID, SELF-HEATING, N.O.S.
	Liquid[d]	**CW1**	3094	CORROSIVE LIQUID, WATER-REACTIVE, N.O.S.
Water-reactive				
CW	**Solid**	**CW2**	3096	CORROSIVE SOLID, WATER-REACTIVE, N.O.S.
	Liquid	**CO1**	3093	CORROSIVE LIQUID, OXIDIZING, N.O.S.
Oxidizing				
CO	**Solid**	**CO2**	3084	CORROSIVE SOLID, OXIDIZING, N.O.S.
	Liquid [c]	**CT1**	3471	HYDROGENDIFLUORIDES SOLUTION, N.O.S..
Toxic [d]			2922	CORROSIVE LIQUID, TOXIC, N.O.S.
CT	**Solid** [e]	**CT2**	2923	CORROSIVE SOLID, TOXIC, N.O.S.
	Articles	**CT3**	3506	MERCURY CONTAINED IN MANUFACTURED ARTICLES
Flammable, liquid, toxic [d]		**CFT**	(No collective entry with this classification code available, if need be, classification code under collective entry with a classification code to be determined according to table of precedence of hazard in 2.1.3.10)	
Oxidizing, toxic [d,e]		**COT**	(No collective entry with this classification code available, if need be, classification code under collective entry with a classification code to be determined according to table of precedence of hazard in 2.1.3.10)	

a) Mixtures of solids which are not subject to the provisions of Annex 2 to SMGS and of corrosive liquids may be carried under UN No. 3244 without being subject to the classification criteria of Class 8, provided there is no free liquid visible at the time the substance is loaded or at the time the packaging, wagon or container is closed. Each packaging shall correspond to a design type which has passed the leakproofness test for Packing group II level.

b) Chlorosilanes which, in contact with water or moist air, emit flammable gases, are substances of Class 4.3.

c) Chloroformates having predominantly toxic properties are substances of Class 6.1.

d) Corrosive substances which are highly toxic by inhalation, as defined in 2.2.61.1.4 to 2.2.61.1.9 are substances of Class 6.1.

e) UN No. 1690 SODIUM FLUORIDE, SOLID, UN No. 1812 POTASSIUM FLUORIDE, SOLID, UN No. 2505 AMMONIUM FLUORIDE, UN No. 2674 SODIUM FLUOROSILICATE, UN No. 2856 FLUOROSILICATES, N.O.S., UN No. 3415 SODIUM FLUORIDE SOLUTION and UN No. 3422 POTASSIUM FLUORIDE SOLUTION are substances of Class 6.1.

2.2.9 CLASS 9 MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

2.2.9.1 *Criteria*

2.2.9.1.1 The heading of Class 9 covers substances and articles which, during carriage, present a danger not covered by the heading of other classes.

2.2.9.1.2 The substances and articles of Class 9 are subdivided as follows:

M1 Substances which, on inhalation as fine dust, may endanger health;

M2 Substances and articles which, in the event of fire, may form dioxins;

M3 Substances evolving flammable vapour;

M4 Lithium batteries;

M5 Life-saving appliances;

M6–M8 Environmentally hazardous substances:

- **M6** Pollutant to the aquatic environment, liquid;
- **M7** Pollutant to the aquatic environment, solid;
- **M8** Genetically modified microorganisms and organisms;

M9–M10 Elevated temperature substances:

- **M9** Liquid;
- **M10** Solid;

M11 Other substances and articles presenting a danger during carriage, but not meeting the definitions of another class.

Definitions and classification

2.2.9.1.3 Substances and articles classified in Class 9 are listed in Table A of Chapter 3.2. The assignment of substances and articles not mentioned by name in Table A of Chapter 3.2 to the relevant entry of that Table or of 2.2.9.3 shall be done in accordance with 2.2.9.1.4 to 2.2.9.1.8, 2.2.9.1.10, 2.2.9.1.11, 2.2.9.1.13 and 2.2.9.1.14 below.

Substances which, on inhalation as fine dust, may endanger health

2.2.9.1.4 Substances which, on inhalation as fine dust, may endanger health include asbestos and mixtures containing asbestos.

Substances and apparatus which, in the event of fire, may form dioxins

2.2.9.1.5 Substances and articles which, in the event of fire, may form dioxins include polychlorinated biphenyls (PCBs) and terphenyls (PCTs) and polyhalogenated biphenyls and terphenyls and mixtures containing these substances, as well as articles such as transformers, condensers and apparatus containing those substances or mixtures.

Note: *Mixtures with a PCB or PCT content of not more than 50 mg/kg are not subject to the provisions of Annex 2 to SMGS.*

Substances evolving flammable vapour

2.2.9.1.6 Substances evolving flammable vapour include polymers containing flammable liquids with a flash-point not exceeding 55 °C.

Lithium batteries

2.2.9.1.7 Lithium batteries shall meet the following requirements, except when otherwise provided for in Annex 2 to SMGS (e.g. for prototype batteries and small production runs under special provision 310 or damaged batteries under special provision 376).

Note: *For UN 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT, see special provi-sion 389 in Chapter 3.3.*

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form shall be assigned to UN Nos. 3090, 3091, 3480 or 3481 as appropriate. They may be carried under these entries if they meet the following provisions:

a) Each cell or battery is of the type proved to meet the requirements of each test of the Manual of Tests and Criteria, Part III, sub-section 38.3;

Note: *Batteries shall be of a type proved to meet the testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3, irrespective of whether the cells of which they are composed are of a tested type.*

b) Each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under normal conditions of carriage;

c) Each cell and battery is equipped with an effective means of preventing external short circuits;

d) Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);

e) Cells and batteries shall be manufactured under a quality management programme that includes:

I) A description of the organizational structure and responsibilities of personnel with regard to de- sign and product quality;

II) The relevant inspection and test, quality control, quality assurance, and process operation instruc- tions that will be used;

III) Process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;

IV) Quality records, such as inspection reports, test data, calibration data and certificates. Test data shall be kept and made available to the competent authority upon request;

V) Management reviews to ensure the effective operation of the quality management programme;

VI) A process for control of documents and their revision;

VII) A means for control of cells or batteries that are not conforming to the type tested as mentioned in (a) above;

VIII) Training programmes and qualification procedures for relevant personnel; and

IX) Procedures to ensure that there is no damage to the final product.

Note: *In-house quality management programmes may be accepted. Third party certification is not required, but the procedures listed in (i) to (ix) above shall be properly recorded and traceable. A copy of the quality management programme shall be made available to the competent authority upon request.*

f) Lithium batteries, containing both primary lithium metal cells and rechargeable lithium ion cells, that are not designed to be externally charged (see special provision 387 of Chapter 3.3) shall meet the following conditions:

1) The rechargeable lithium ion cells can only be charged from the primary lithium metal cells;

2) Overcharge of the rechargeable lithium ion cells is precluded by design;

3) The battery has been tested as a lithium primary battery;

4) Component cells of the battery shall be of a type proved to meet the respective testing requirements of the Manual of Tests and Criteria, part III, sub-section 38.3;

g) Except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of cells or batteries manufactured after 30 June 2003 shall make available the test summary as specified in the Manual of Tests and Criteria, Part III, sub-section 38.3, paragraph 38.3.5.

Lithium batteries are not subject to the provisions of Annex 2 to SMGS if they meet the requirements of special provision 188 of Chapter 3.3.

Life-saving appliances

2.2.9.1.8 Life-saving appliances include life-saving appliances and motor vehicle components which meet the descriptions of special provisions 235 or 296 of Chapter 3.3.

Environmentally hazardous substances

2.2.9.1.9 (Reserved)

2.2.9.1.10 Environmentally hazardous substances (aquatic environment)

2.2.9.1.10.1 *General definitions*

2.2.9.1.10.1.1 Environmentally hazardous substances include, inter alia, liquid or solid substances pollutant to the aquatic environment and solutions and mixtures of such substances (such as preparations and wastes).

For the purposes of 2.2.9.1.10,

«Substance» means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

«*Ecotoxicity»* means quality of some chemical substances and compounds or natural substanvces to endanger the aquatic environment.

2.2.9.1.10.1.2 The aquatic environment may be considered in terms of the aquatic organisms that live in the water, and the aquatic ecosystem of which they are part[18].The basis, therefore, of the identification of hazard is the aquatic toxicity of the substance or mixture, although this may be modified by further information on the degradation and bioaccumulation behavior

2.2.9.1.10.1.3 While the following classification procedure is intended to apply to all substances and mixtures, it is recognised that in some cases, e.g. metals or poorly soluble inorganic compounds, special guidance will be necessary[19].

2.2.9.1.10.1.4 The following definitions apply for acronyms or terms used in this section:

- BCF: Bioconcentration Factor;
- BOD: Biochemical Oxygen Demand;
- COD: Chemical Oxygen Demand;
- GLP: Good Laboratory Practices
- EC_x: the concentration associated with x% response;
- EC_{50}: the effective concentration of substance that causes 50% of the maximum response;
- ErC_{50}: EC50 in terms of reduction of growth;
- K_{ow}: octanol/water partition coefficient;
- LC_{50}: the concentration of a substance in water which causes the death of 50% (one half) in a group of test animals;
- $L(E)C_{50}$: LC_{50} or EC_{50};
- NOEC (No Observed Effect Concentration): the test concentration immediately below the lowest tested concentration with statistically significant adverse effect. The NOEC has no statistically significant adverse effect compared to the control;
- OECD Test Guidelines:

[18] *This does not address aquatic pollutants for which there may be a need to consider effects beyond the aquatic environment such as the impacts on human health etc.*

[19] *This can be found in Annex 10 of the GHS.*

Test guidelines published by the Organization for Economic Cooperation and Development (OECD).

2.2.9.1.10.2 ***Definitions and data requirements***

2.2.9.1.10.2.1 The basic elements for classification of environmentally hazardous substances (aquatic environment) are:

a) Acute aquatic ecotoxicity;

b) Chronic aquatic ecotoxicity;

c) Potential for or actual bioaccumulation

d) Degradation (biotic or abiotic) for organic chemicals.

2.2.9.1.10.2.2 While data from internationally harmonised test methods are preferred, in practice, data from national methods may also be used where they are considered as equivalent. In general, it has been agreed that freshwater and marine species ecotoxicity data can be considered as equivalent data and are preferably to be derived using OECD Test Guidelines or equivalent according to the principles of Good Laboratory Practices (GLP). Where such data are not available, classification shall be based on the best available data.

2.2.9.1.10.2.3 **Acute aquatic ecotoxicity** means the intrinsic property of a substance to be injurious to an organism in a short-term aquatic exposure to that substance.

Acute (short-term) hazard, for classification purposes, means the hazard of a chemical caused by its acute ecotoxicity to an organism during short-term aquatic exposure to that chemical.

Acute aquatic ecotoxicity shall normally be determined using a fish 96 hour LC50 (OECD Test Guideline 203 or equivalent), a crustacea species 48 hour EC50 (OECD Test Guideline 202 or equivalent) and/or an algal species 72 or 96 hour EC50 (OECD Test Guideline 201 or equivalent). These species are considered as surrogate for all aquatic organisms and data on other species such as Lemna may also be considered if the test methodology is suitable.

2.2.9.1.10.2.4 **Chronic aquatic ecotoxicity** means the intrinsic property of a substance to cause adverse effects to aquatic organisms during aquatic exposures which are determined in relation to the life-cycle of the organism.

Long-term hazard, for classification purposes, means the hazard of a chemical caused by its chronic toxicity following long-term exposure in the aquatic environment.

Chronic ecotoxicity data are less available than acute data and the range of testing procedures less standardised. Data generated according to the OECD Test Guidelines 210 (Fish Early Life Stage) or 211 (Daphnia Reproduction) and 201 (Algal Growth Inhibition) may be accepted. Other validated and internationally accepted tests may also be used. The NOECs or other equivalent ECx shall be used.

2.2.9.1.10.2.5 **Bioaccumulation** means net result of uptake, transformation and elimination of a substance in an organism due to all routes of exposure (i.e. air, water, sediment/soil and food).

The potential for bioaccumulation shall normally be determined by using the octanol/water partition coefficient, usually reported as a log Kow determined according to OECD Test Guideline 107, 117 or 123. While this represents a potential to bioaccumulate, an experimentally determined Bioconcentration Factor (BCF) provides a better measure and shall be used in preference when available. A BCF shall be determined according to OECD Test Guideline 305.

2.2.9.1.10.2.6 **Degradation** means the decomposition of organic molecules to smaller molecules and eventually to carbon dioxide, water and salts.

Environmental degradation may be biotic or abiotic (e.g. hydrolysis) and the criteria used reflect this fact. Ready biodegradation is most easily defined using the biodegradability tests (A-F) of OECD Test Guideline 301. A pass level in these tests may be considered as indicative of rapid degradation in most environments. These are freshwater tests and thus the use of the results from OECD Test Guideline 306, which is more suitable for marine

environments, has also been included. Where such data are not available, a BOD5 (5 days)/COD ratio ≥ 0.5 is considered as indicative of rapid degradation.

Abiotic degradation such as hydrolysis, primary degradation, both abiotic and biotic, degradation in non-aquatic media and proven rapid degradation in the environment may all be considered in defining rapid degradibility[20].

Substances are considered rapidly degradable in the environment if the following criteria are met:

a) In 28-day ready biodegradation studies, the following levels of degradation are achieved:

1) Tests based on dissolved organic carbon: 70%;

2) Tests based on oxygen depletion or carbon dioxide generation: 60% of theoretical maxima;

These levels of biodegradation shall be achieved within 10 days of the start of degradation which point is taken as the time when 10% of the substance has been degraded, unless the substance is identified as a complex, multi-component substance with structurally similar constituents. In this case, and where there is sufficient justification, the 10-day window condition may be waived and the pass level applied at 28 days[21] ;

or

b) In those cases where only BOD and COD data are available, when the ratio of BOD5/COD is ≥ 0.5; or

c) If other convincing scientific evidence is available to demonstrate that the substance can be degraded (biotically and/or abiotically) in the aquatic environment to a level above 70% within a 28 day period.

2.2.9.1.10.3 *Substance classification categories and criteria*

Substances shall be classified as "environmentally hazardous substances (aquatic environment)", if they satisfy the criteria for Acute 1, Chronic 1 or Chronic 2, according to Table 2.2.9.1.10.3.1. These criteria describe in detail the classification categories. They are diagrammatically summarized in Table 2.2.9.1.10.3.2.

Table 2.2.9.1.10.3.1: Categories for substances hazardous to the aquatic environment (see Note 1)

a) Acute (short-term) aquatic hazard

Category Acute 1: *(see Note 2)*	
96 hr LC_{50} (for fish)	≤ 1 mg/l and/or
48 hr EC_{50} (for crustacea)	≤ 1 mg/l and/or
72 or 96hr ErC50 (for algae or other aquatic plants)	≤ 1 mg/l (see Note 3)

b) **Long-term aquatic hazard** *(see also Figure 2.2.9.1.10.3.1)*	
1) Non-rapidly degradable substances (see Note 4) for which there are adequate chronic ecotoxicity data available	
Category Chronic 1: *(see Note 2)*	
Chronic NOEC or EC_x (for fish)	≤ 0,1 mg/l and/or
Chronic NOEC or ECx (for crustacea)	≤ 0,1 mg/l and/or
Chronic NOEC or ECx (for algae or other aquatic plants)	≤ 0,1 mg/l
Category Chronic 2:	

[20] *Special guidance on data interpretation is provided in Chapter 4.1 and Annex 9 of the GHS.*
[21] *See Chapter 4.1 and Annex 9, paragraph A9.4.2.2.3 of the GHS.*

Chronic NOEC or ECx (for fish)	≤ 1 mg/l and/or
Chronic NOEC or ECx (for crustacea)	≤ 1 mg/l and/or
Chronic NOEC or ECx (for algae or other aquatic plants)	≤ 1 mg/l

2) Rapidly degradable substances for which there are adequate chronic ecotoxicity data available

Category Chronic 1: *(see Note 2)*	
Chronic NOEC or ECx (for fish)	≤ 0,01 mg/l and/or
Chronic NOEC or ECx (for crustacea)	≤ 0,01 mg/l and/or
Chronic NOEC or ECx (for algae or other aquatic plants)	≤ 0,01 mg/l
Category Chronic 2:	
Chronic NOEC or ECx (for fish)	≤ 0,1 mg/l and/or
Chronic NOEC or ECx (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or ECx (for algae or other aquatic plants)	≤ 0,1 mg/l

3) Substances for which adequate chronic ecotoxicity data are not available

Category Chronic 1: *(see Note 2)*	
96 hr LC_{50} (for fish)	≤ 1 mg/l and/or
48 hr EC_{50} (for crustacea)	≤ 1 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	≤ 1 mg/l (see Note 3)
and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥500 (or, if absent the log Kow ≥4) (see Notes 4 and 5).	

Category Chronic 2:	
96 hr LC_{50} (for fish)	>1, but ≤ 10 mg/l and/or
48 hr EC_{50} (for crustacea)	>1, but ≤ 10 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	>1, but ≤ 10 mg/l *(see Note 3)*
and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent the log Kow ≥4 (see Notes 4 and 5).	

Note 1: *The organisms fish, crustacea and algae are tested as surrogate species covering a range of trophic levels and taxa, and the test methods are highly standardized. Data on other organisms may also be considered, however, provided they represent equivalent species and test end-points.*

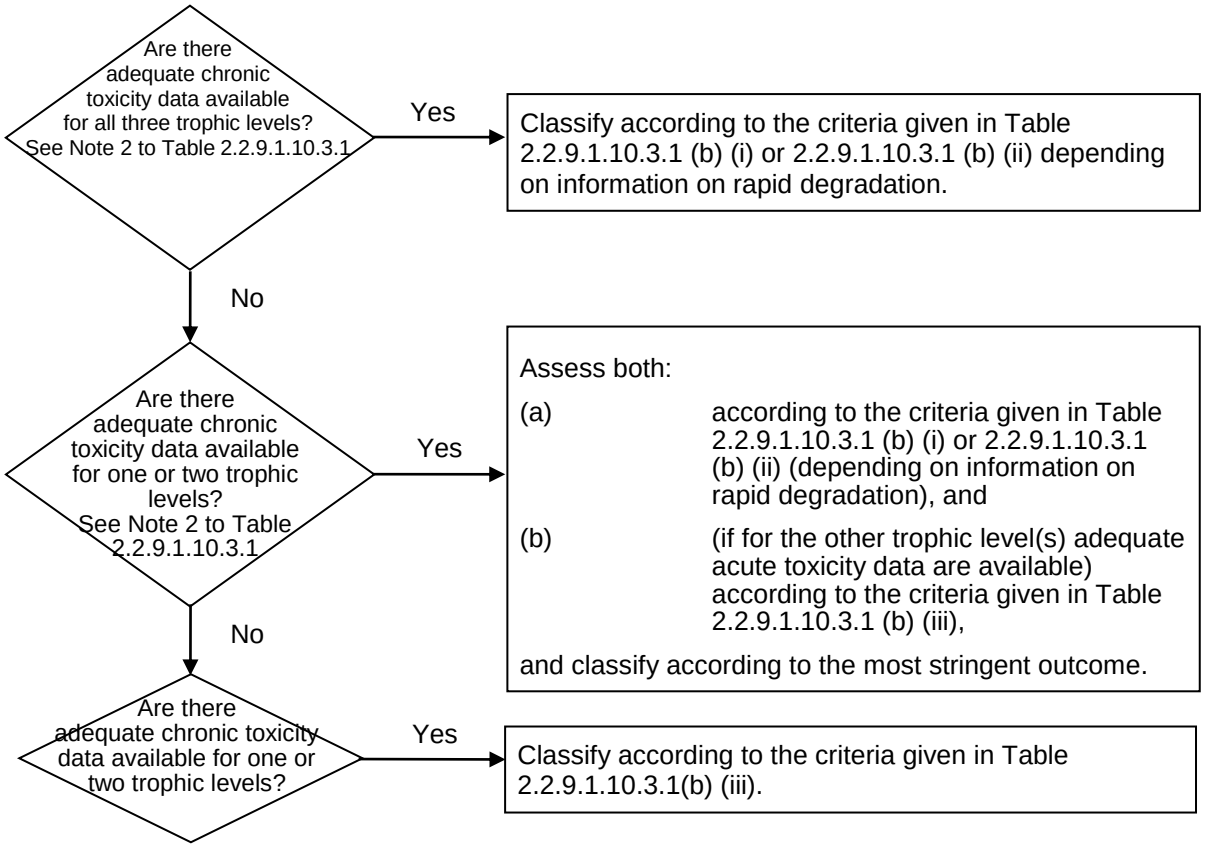
Note 2: *When classifying substances as Acute 1 and/or Chronic 1 it is necessary at the same time to in dicate an appropriate M factor (see 2.2.9.1.10.4.6.4) to apply the summation method.*

Note 3: *Where the algal ecotoxicity ErC_{50} (= EC_{50} (growth rate)) falls more than 100 times below the next most sensitive species and results in a classification based solely on this effect, consideration shall be given to whether this ecotoxicity is representative of the toxicity to aquatic plants. Where it can be shown that this is not the case, professional judgment shall be used in deciding if classification shall be applied. Classification shall be based on the ErC_{50}. In circumstances where the basis of the EC_{50} is not specified and no ErC_{50} is recorded, classification shall be based on the lowest EC_{50} available.*

Note 4: *Lack of rapid degradability is based on either a lack of ready biodegradability or other evidence of lack of rapid degradation. When no useful data on degradability are available, either experimentally determined or estimated data, the substance shall be regarded as not rapidly degradable.*

Note 5: *Potential to bioaccumulate, based on an experimentally derived BCF ≥ 500 or, if absent, a log K_{ow} ≥4 provided log K_{ow} is an appropriate descriptor for the bioaccumulation potential of the substance. Measured log K_{ow} values take precedence over estimated values and measured BCF values take precedence over log K_{ow} values.*

Figure 2.2.9.1.10.3.1: Categories for substances long-term hazardous to the aquatic environmet



2.2.9.1.10.3.2 The classification scheme in Table 2.2.9.1.10.3.2 below summarizes the classification criteria for substances.

Table 2.2.9.1.10.3.2: Classification scheme for substances hazardous to the aquatic environment

Classification categories			
Acute hazard (see Note 1)	**Long-term hazard** (see Note 2)		
	Adequate chronic ecotoxicity data available		**Adequate chronic ecotoxicity data not available** (see Note 1)
	Non-rapidly degradable substances (see Note 3)	**Rapidly degradable substances** (see Note 3)	
Category: Acute 1	**Category: Chronic 1**	**Category: Chronic 1**	**Category: Chronic 1**
$L(E)C_{50} \leq 1,00$	NOEC or $EC_x \leq 0,1$	NOEC or $EC_x \leq 0,01$	$L(E)C_{50} \leq 1,00$ and lack of rapid degradability and/or BCF ≥500 or, if absent log $K_{ow} \geq 4$
	Category: Chronic 2	**Category: Chronic 2**	**Category: Chronic 2**
	$0,1 < NOEC$ or $EC_x \leq 1$	$0,01 < NOEC$ or $EC_x \leq 0,1$	$1.00 < L(E)C_{50} \leq 10.0$ and lack of rapid degradability and/or BCF ≥ 500 or, if absent log $K_{ow} \geq 4$

Note 1: *Acute toxicity band based on L(E)C50 values in mg/l for fish, crustacea and/or algae or other aquatic plants (or Quantitative Structure Activity Relationships (QSAR) estimation if no experimental data[22].*

Note 2: *Substances are classified in the various chronic categories unless there are adequate chronic ecotoxicity data available for all three trophic levels above the water solubility or above 1 mg/l. ("Adequate" means that the data sufficiently cover the endpoint of concern. Generally this would mean measured test data, but in order to avoid unnecessary testing it can on a case by case basis also be estimated data, e.g. (Q)SAR, or for obvious cases expert judgment).*

Note 3: *Chronic ecotoxicity band based on NOEC or equivalent ECx values in mg/l for fish or crustacea or other recognized measures for chronic ecotoxicity.*

2.2.9.1.10.4 ***Mixtures classification categories and criteria***

2.2.9.1.10.4.1 The classification system for mixtures covers the classification categories which are used for substances, meaning categories Acute 1 and Chronic 1 and 2. In order to make use of all available data for purposes of classifying the aquatic environmental hazards of the mixture, the following assumption is made and is applied where appropriate:

The "relevant ingredients" of a mixture are those which are present in a concentration equal to or greater than 0.1% (by mass) for ingredients classified as Acute and/or Chronic 1 and equal to or greater than 1% for other ingredients, unless there is a presumption (e.g. in the case of highly toxic ingredients) that an ingredient present at less than 0.1% can still be relevant for classifying the mixture for aquatic environmental hazards.

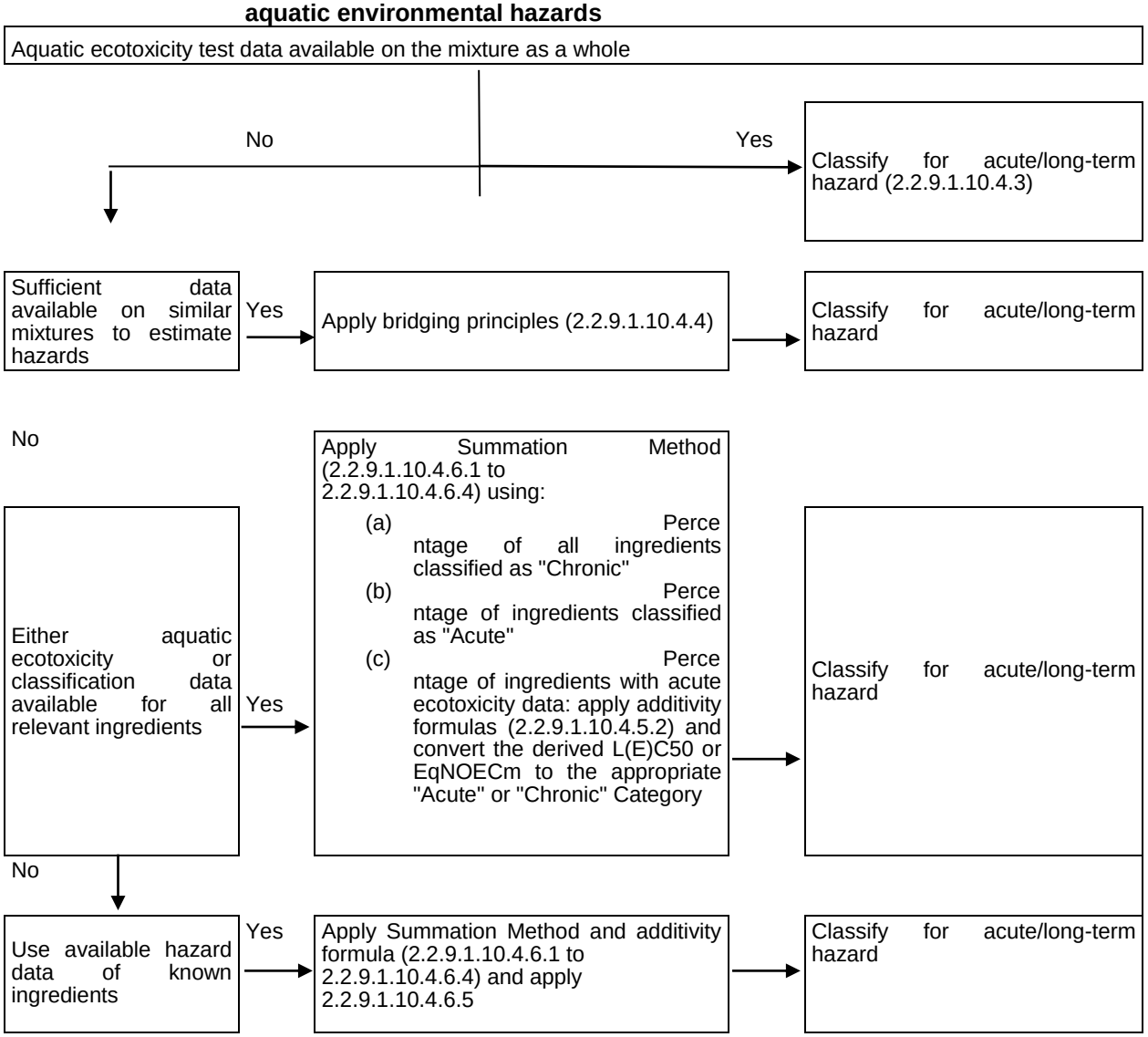
2.2.9.1.10.4.2 The approach for classification of aquatic environmental hazards is tiered, and is dependent upon the type of information available for the mixture itself and for its ingredients. Elements of the tiered approach include:

a) Classification based on tested mixtures;
b) Classification based on bridging principles;
c) The use of "summation of classified ingredients" and/or an "additivity formula".

Figure 2.2.9.1.10.4.2 below outlines the process to be followed.

[22] *Special guidance is provided in Chapter 4.1, paragraph 4.1.2.13 and Annex 9, Section A9.6 of the GHS.*

Figure 2.2.9.1.10.4.2: Tiered approach to classification of mixtures for acute and long-term aquatic environmental hazards



2.2.9.1.10.4.3 ***Classification of mixtures when ecotoxicity data are available for the complete mixture***

2.2.9.1.10.4.3.1 When the mixture as a whole has been tested to determine its aquatic ecotoxicity, this information shall be used for classifying the mixture according to the criteria that have been agreed for substances. The classification is normally based on the data for fish, crustacea and algae/plants (see 2.2.9.1.10.2.3 and 2.2.9.1.10.2.4). When adequate acute or chronic data for the mixture as a whole are lacking, "bridging principles" or "summation method" shall be applied (see 2.2.9.1.10.4.4 to 2.2.9.1.10.4.6).

2.2.9.1.10.4.3.2 The long-term hazard classification of mixtures requires additional information on degradability and in certain cases bioaccumulation. There are no degradability and bioaccumulation data for mixtures as a whole. Degradability and bioaccumulation tests for mixtures are not used as they are usually difficult to interpret, and such tests may be meaningful only for single substances.

2.2.9.1.10.4.3.3 Classification for category Acute 1

a) When there are adequate acute ecotoxicity test data (LC_{50} or EC_{50}) available for the mixture as a whole showing $L(E)C_{50} \leq 1$ mg/l:

Classify the mixture as Acute 1 in accordance with Table 2.2.9.1.10.3.1 (a);

b) When there are acute ecotoxicity test data ($LC_{50(s)}$ or $EC_{50}(s)$ available for the mixture as a whole showing $L(E)C_{50}(s) > 1$ mg/l, or above the water solubility:

No need to classify for acute hazard under Annex 2 to SMGS.

2.2.9.1.10.4.3.4 Classification for categories Chronic 1 and 2

a) When there are adequate chronic ecotoxicity data (ECx or NOEC) available for the mixture as a whole showing ECx or NOEC of the tested mixture ≤ 1mg/l:

1) classify the mixture as Chronic 1 or 2 in accordance with Table 2.2.9.1.10.3.1 (b) (ii) (rapidly degradable) if the available information allows the conclusion that all relevant ingredients of the mixture are rapidly degradable;

Note: *In this situation, when ECx or NOEC of the tested mixture > 0.1 mg/l, there is no need to classify for long-term hazard under Annex 2 to SMGS.*

2) classify the mixture as Chronic 1 or 2 in all other cases in accordance with Table 2.2.9.1.10.3.1 (b) (i) (non-rapidly degradable);

b) When there are adequate chronic ecotoxicity data (ECx or NOEC) available for the mixture as a whole showing ECx(s) or NOEC(s) of the tested mixture > 1mg/l or above the water solubility:

No need to classify for long-term hazard under Annex 2 to SMGS.

2.2.9.1.10.4.4 ***Classification of mixtures when ecotoxicity data are not available for the complete mixture: bridging principles***

2.2.9.1.10.4.4.1 Where the mixture itself has not been tested to determine its aquatic environmental hazard, but there are sufficient data on the individual ingredients and similar tested mixtures to adequately characterise the hazards of the mixture, these data shall be used in accordance with the following agreed bridging rules. This ensures that the classification process uses the available data to the greatest extent possible in characterising the hazards of the mixture without the necessity for additional testing in animals.

2.2.9.1.10.4.4.2 Dilution

Where a new mixture is formed by diluting a tested mixture or a substance with a diluent which has an equivalent or lower aquatic hazard classification than the least toxic original ingredient and which is not expected to affect the aquatic hazards of other ingredients, then the resulting mixture shall be classified as equivalent to the original tested mixture or substance. Alternatively, the method explained in 2.2.9.1.10.4.5 may be applied.

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.**2.2.9.1.10.4.4.3** Batching

The aquatic hazard classification of a tested production batch of a mixture shall be assumed to be substantially equivalent to that of another untested production batch of the same commercial product when produced by or under the control of the same manufacturer, unless there is reason to believe there is significant variation such that the aquatic hazard classification of the untested batch has changed. If the latter occurs, new classification is necessary.

2.2.9.1.10.4.4.4 Concentration of mixtures which are classified with the most severe classification categories (Chronic 1 and Acute 1)

If a tested mixture is classified as Chronic 1 and/or Acute 1, and the ingredients of the mixture which are classified as Chronic 1 and/or Acute 1 are further concentrated, the more concentrated untested mixture shall be classified with the same classification category as the original tested mixture without additional testing.

2.2.9.1.10.4.4.5 Interpolation within one toxicity category

For three mixtures (A, B and C) with identical ingredients, where mixtures A and B have been tested and are in the same ecotoxicity category, and where untested mixture C has the same toxicologically active ingredients as mixtures A and B but has concentrations of toxicologically active ingredients intermediate to the concentrations in mixtures A and B, then mixture C is assumed to be in the same category as A and B.

2.2.9.1.10.4.4.6 Substantially similar mixtures

Given the following:

a) two mixtures:

1) A + B;

2) C + B;

b) the concentration of ingredient B is essentially the same in both mixtures;

c) the concentration of ingredient A in mixture (1) equals that of ingredient C in mixture (2)

d) data on aquatic hazards for A and C are available and are substantially equivalent, i.e. they are in the same hazard category and are not expected to affect the aquatic toxicity of B,

If mixture (i) or (ii) is already classified based on test data, then the other mixture can be assigned the same hazard category.

2.2.9.1.10.4.5 ***Classification of mixtures when ecotoxicity data are available for all ingredients or only for some ingredients of the mixture***

2.2.9.1.10.4.5.1 The classification of a mixture shall be based on summation of the concentrations of its classified ingredients. The percentage of ingredients classified as "Acute" or "Chronic" will feed straight into the summation method. Details of the summation method are described in 2.2.9.1.10.4.6.1 to 2.2.9.1.10.4.6.4.

2.2.9.1.10.4.5.2 Mixtures may be made of a combination of both ingredients that are classified (as Acute 1 and/or Chronic 1, 2) and those for which adequate toxicity test data are available. When adequate ecotoxicity data are available for more than one ingredient in the mixture, the combined ecotoxicity of those ingredients shall be calculated using the following additivity formulas (a) or (b), depending on the nature of the ecotoxicity data:

a) Based on acute aquatic toxicity:

$$\frac{\sum C_i}{L(E)C_{50m}} = \sum_n \frac{C_i}{L(E)C_{50i}},$$

where:

C_i - concentration of ingredient i (mass percentage);

$L(E)C_{50i}$ - LC_{50} or EC_{50} for ingredient i (mg/l);

n - number of ingredients, and i is running from 1 to n;

$L(E)C_{50m}$ - *L(E)C50 of the part of the mixture with test data;*

The calculated ecotoxicity shall be used to assign that portion of the mixture an acute hazard category which is then subsequently used in applying the summation method;

b) Based on chronic aquatic ecotoxicity:

$$\frac{\sum C_i + \sum C_j}{EqNOEC_m} = \sum_n \frac{C_i}{NOEC_i} + \sum_n \frac{C_j}{0{,}1 \times NOEC_j}$$

where:

C_i - concentration of ingredient i (mass percentage) covering the rapidly degradable ingredients;
C_j - concentration of ingredient j (mass percentage) covering the non-rapidly degradable ingredients;
NOECi - NOEC (or other recognized measures for chronic ecotoxicity) for ingredient i covering the rapidly degradable ingredients, in mg/l;
NOECj - NOEC (or other recognized measures for chronic toxicity) for ingredient j covering the non-rapidly degradable ingredients, in mg/l;
n - number of ingredients, and i and j are running from 1 to n;
EqNOECm- equivalent NOEC of the part of the mixture with test data;

The equivalent ecotoxicity thus reflects the fact that non-rapidly degradable substances are classified one hazard category level more "severe" than rapidly degradable substances.

The calculated equivalent ecotoxicity shall be used to assign that portion of the mixture a long-term hazard category, in accordance with the criteria for rapidly degradable substances (Table 2.2.9.1.10.3.1 (b) (2)), which is then subsequently used in applying the summation method.

2.2.9.1.10.4.5.3 When applying the additivity formula for part of the mixture, it is preferable to calculate the ecotoxicity of this part of the mixture using for each ingredient ecotoxicity values that relate to the same taxonomic group (i.e. fish, crustacea or algae) and then to use the highest ecotoxicity (lowest value) obtained (i.e. use the most sensitive of the three groups). However, when ecotoxicity data for each ingredient are not available in the same taxonomic group, the ecotoxicity value of each ingredient shall be selected in the same manner that ecotoxicity values are selected for the classification of substances, i.e. the higher ecotoxicity (from the most sensitive test organism) is used. The calculated acute and chronic ecotoxicity shall then be used to classify this part of the mixture as Acute 1 and/or Chronic 1 or 2 using the same criteria described for substances.

2.2.9.1.10.4.5.4 If a mixture is classified in more than one way, the method yielding the more conservative result shall be used.

2.2.9.1.10.4.6 ***Summation method***

2.2.9.1.10.4.6.1 Classification procedure

In general a more severe classification for mixtures overrides a less severe classification, e.g. a classification with Chronic 1 overrides a classification with Chronic 2. As a consequence the classification procedure is already completed if the result of the classification is Chronic 1. A more severe classification than Chronic 1 is not possible; therefore, it is not necessary to pursue the classification procedure further.

2.2.9.1.10.4.6.2 Classification for category Acute 1

2.2.9.1.10.4.6.2.1 First, all ingredients classified as Acute 1 are considered. If the sum of the concentrations (in %) of these ingredients is greater than or equal to 25% the whole mixture shall be classified as Acute 1. If the result of the calculation is a classification of the mixture as Acute 1, the classification process is completed.

2.2.9.1.10.4.6.2.2 The classification of mixtures for acute hazards based on this summation of the concentrations of classified ingredients is summarized in Table 2.2.9.1.10.4.6.2.2 below.

Table 2.2.9.1.10.4.6.2.2: Classification of a mixture for acute hazards based on summation of the concentrations of classified ingredients

Sum of the concentrations (in %) of ingredients classified as:	**Mixture classified as:**

Acute 1 ×Ma ≥ 25%	Acute 1

[a] *For explanation of the M factor, see 2.2.9.1.10.4.6.4.*

2.2.9.1.10.4.6.3 Classification for categories Chronic 1 and 2

2.2.9.1.10.4.6.3.1 First, all ingredients classified as Chronic 1 are considered. If the sum of the concentrations (in %) of these ingredients is greater than or equal to 25% the mixture shall be classified as Chronic 1. If the result of the calculation is a classification of the mixture as Chronic 1 the classification procedure is completed.

2.2.9.1.10.4.6.3.2 In cases where the mixture is not classified as Chronic 1, classification of the mixture as Chronic 2 is considered. A mixture shall be classified as Chronic 2 if 10 times the sum of the concentrations (in %) of all ingredients classified as Chronic 1 plus the sum of the concentrations (in %) of all ingredients classified as Chronic 2 is greater than or equal to 25%. If the result of the calculation is classification of the mixture as Chronic 2, the classification process is completed.

2.2.9.1.10.4.6.3.3 The classification of mixtures for long-term hazards based on this summation of the concentrations of classified ingredients is summarized in Table 2.2.9.1.10.4.6.3.3 below.

Table 2.2.9.1.10.4.6.3.3: Classification of a mixture for long-term hazards based on summation of the concentrations of classified ingredients

Sum of the concentrations (in %) of ingredients classified as:	**Mixture classified as:**
Chronic 1 ×Ma ≥ 25 %	Chronic 1
((M ×10 ×Chronic 1) + Chronic 2 ≥ 25 %	Chronic 2

[a] *For explanation of the M factor, see 2.2.9.1.10.4.6.4.*

2.2.9.1.10.4.6.4 Mixtures with highly toxic ingredients

Acute 1 or Chronic 1 ingredients with acute ecotoxicities well below 1 mg/l and/or chronic toxicities well below 0.1 mg/l (if non-rapidly degradable) and 0.01 mg/l (if rapidly degradable) may influence the ecotoxicity of the mixture and are given increased weight in applying the summation method. When a mix ture contains ingredients classified as Acute 1 or Chronic 1, the tiered approach described in 2.2.9.1.10.4.6.2 and 2.2.9.1.10.4.6.3 shall be applied using a weighted sum by multiplying the concentrations of Acute 1 and Chronic 1 ingredients by a factor, instead of merely adding up the percentages. This means that the concentration of "Acute 1" in the left column of Table 2.2.9.1.10.4.6.2.2 and the concentration of "Chronic 1" in the left column of Table 2.2.9.1.10.4.6.3.3 are multiplied by the appropriate multiplying factor.

The multiplying factors to be applied to these in- gredients are defined using the ecotoxicity value, as summarised in Table 2.2.9.1.10.4.6.4 below. Therefore, in order to classify a mixture containing Acute 1 and/or Chronic 1 ingredients, the classifier needs to be informed of the value of the M factor in order to apply the summation method. Alternatively, the additivity formula (see 2.2.9.1.10.4.5.2) may be used when ecotoxicity data are available for all highly toxic ingredients in the mixture and there is convincing evidence that all other ingredients, including those for which specific and/or chronic acute toxicity data are not available, are of low or no ecotoxicity and do not significantly contribute to the environmental hazard of the mixture.

Table 2.2.9.1.10.4.6.4: Multiplying factors for highly toxic ingredients of mixtures

Acute ecotoxicity	**M factor**	**Chronic Toxicity**	**M factor**	
L(E)C_{50} value		**NOEC value**	**NRD[a]**	**RD[b]**
0,1 < L(E)C_{50} ≤ 1	1	0,01 < NOEC ≤ 0,1	1	-
0,01 < L(E)C_{50} ≤ 0,1	10	0,001 < NOEC ≤ 0,01	10	1

$0{,}001 < L(E)C_{50} \leq 0{,}01$	100	$0{,}0001 < NOEC \leq 0{,}001$	100	10
$0{,}0001 < L(E)C_{50} \leq 0{,}001$	1 000	$0{,}00001 < NOEC \leq 0{,}0001$	1 000	100
$0{,}00001 < L(E)C_{50} \leq 0{,}0001$	10 000	$0{,}000001 < NOEC \leq 0{,}00001$	10 000	1 000
(continue in factor 10 intervals)		(continue in factor 10 intervals)		

[a] *Non-rapidly degradable*
[b] *Rapidly degradable*

2.2.9.1.10.4.6.5 Classification of mixtures with ingredients without any useable information

In the event that no useable information on acute and/or chronic aquatic toxicity is available for one or more relevant ingredients, it is concluded that the mixture cannot be attributed (a) definitive hazard category(ies). In this situation the mixture shall be classified based on the known ingredients only.

2.2.9.1.10.5 Substances or mixtures classified as environmentally hazardous substances (aquatic environment) on the basis of GHS or document No. 9 of *the List.*

If data for classification according to the criteria of 2.2.9.1.10.3 and 2.2.9.1.10.4 are not available, a substance or mixture:

a) Shall be classified as an environmentally hazardous substance (aquatic environment) if it has to be assigned category(ies) Aquatic Acute 1, Aquatic Chronic 1 or Aquatic Chronic 2 according to GHS or document No. 9 of *the List*;

b) May be regarded as not being an environmentally hazardous substance (aquatic environment) if it does not have to be assigned such a category according to GHS or document No. 9 of *the List.*

2.2.9.1.10.6 Assignment of substances or mixtures classified as environmentally hazardous substances (aquatic environment) according to the provisions in 2.2.9.1.10.3, 2.2.9.1.10.4 or 2.2.9.1.10.5

Substances or mixtures classified as environmentally hazardous substances (aquatic environment that do not meet the classification criteria of any other class or another substance within Class 9 shall be designated:

UN No. 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.; or

UN No. 3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

They shall be assigned to packing group III.

Genetically modified microorganisms or organisms

2.2.9.1.11 Genetically modified microorganisms (GMMOs) and genetically modified organisms (GMOs) are microorganisms and organisms in which genetic material has been purposely altered through genetic engineering in a way that does not occur naturally. They are assigned to Class 9 (UN No. 3245) if they do not meet the definition of toxic substances or of infectious substances, but are capable of altering animals, plants or microbiological substances in a way not normally the result of natural reproduction.

Note 1: *GMMOs and GMOs which are infectious are substances of Class 6.2, UN Nos. 2814, 2900 or 3373.*

Note 2: *GMMOs or GMOs are not subject to the provisions of Annex 2 to SMGS when authorized for use by the competent authorities of the countries of origin, transit and destination[23].*

Note 3: *Genetically modified live animals which, in accordance with the current state of scientific knowledge, have no known pathogenic effect on humans, animals and plants and are carried in receptacles that are suitable for safely preventing both the escape of the animals and unauthorized access to them, are not subject to the provisions of Annex 2 to SMGS. The provisions specified by the International Air Transport Association (IATA) for air transport "Live Animals Regulations, LAR" can be drawn on as guidelines for suitable receptacles for the transport of live animals.*

[23] *See also the List, documents Nos. 11 and 12.*

Note 4: *Live animals shall not be used to carry genetically modified microorganisms classified in Class 9 unless the substance can be carried no other way. Genetically modified live animals shall be carried under terms and conditions of the competent authorities of the countries of origin and destination.*

2.2.9.1.12 (Reserved)

Elevated temperature substances

2.2.9.1.13 Elevated temperature substances include substances which are carried or handed over for carriage in the liquid state at or above 100 °C and, in the case of those with a flash-point, below their flash-point. They also include solids which are carried or handed over for carriage at or above 240 °C.

Note: *Elevated temperature substances may be assigned to Class 9 only if they do not meet the criteria of any other class.*

Other substances or articles presenting a danger during carriage but not meeting the definitions of another class.

2.2.9.1.14 The following other miscellaneous substances not meeting the definitions of another class are assigned to Class 9:

Solid ammonia compounds having a flash-point below 60 °C;

Low hazard dithionites;

Highly volatile liquids;

Substances emitting noxious fumes;

Substances containing allergens;

Chemical kits and first aid kits;

Electric double layer capacitors (with an energy storage capacity greater than 0.3 Wh);

Vehicles, engines and machinery, internal combustion;

Articles containing miscellaneous dangerous goods.

Note: *The below-mentioned goods listed in UN Model Regulations, are not subject to the provisions of Annex 2 to SMGS:*

UN No. 1845 CARBON DIOXIDE, SOLID (DRY ICE)[24],

UN No. 2216 FISH MEAL (FISH SCRAP), STABILIZED,

UN No. 2807 MAGNETIZED MATERIAL,

UN No. 3334 AVIATION REGULATED LIQUID, N.O.S.,

UN No. 3335 AVIATION REGULATED SOLID, N.O.S.,

,

Assignment of the packing groups

2.2.9.1.15 When indicated in column (4) of Table A of Chapter 3.2, substances and articles of Class 9 are assigned to one of the following packing groups according to their degree of danger:

Packing group II: substances presenting medium danger;

Packing group III: substances presenting low danger.

2.2.9.2 Substances and articles not accepted for carriage

The following substances and articles shall not be accepted for carriage:

– Lithium batteries which do not meet the relevant conditions of special provisions 188, 230, 310, 636 or 670 of Chapter 3.3.

[24] *For UN No. 1845 carbon dioxide, solid (dry ice), see 5.5.3.*

– Uncleaned empty containment vessels for apparatus such as transformers, condensers and hydraulic apparatus containing substances assigned to UN Nos. 2315, 3151, 3152 or 3432.

2.2.9.3 List of entries

Subsidiary risk		Classification code	UN No.	Name of the substance or article
Substances which, on inhalation as fine dust, may endanger health		**M1**		2212 ASBESTOS, AMPHIBOLE (amosite, tremolite, actinolite, anthophyllite, crocidolite) 2590 ASBESTOS, CHRYSOTILE
Substances and articles which, in the event of fire, may form dioxins		**M2**		2315 POLYCHLORINATED BIPHENYLS, LIQUID 3432 POLYCHLORINATED BIPHENYLS, SOLID 3151 POLYHALOGENATED BIPHENYLS, LIQUID or 3151 HALOGENATED MONOMETHYLDIPHENYLMETHANES, LIQUID or 3151 POLYHALOGENATED TERPHENYLS, LIQUID 3152 POLYHALOGENATED BIPHENYLS, SOLID or 3152 HALOGENATED MONOMETHYLDIPHENYLMETHANES, SOLID or 3152 POLYHALOGENATED TERPHENYLS, SOLID
Substances evolving flammable vapour		**M3**		2211 POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour 3314 PLASTICS MOULDING COMPOUND in dough, sheet or extruded rope form evolving flammable vapour
Lithium batteries		**M4**		3090 LITHIUM METAL BATTERIES (including lithium alloy batteries) 3091 LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT (including lithium alloy batteries) 3091 LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT (including lithium alloy batteries) 3480 LITHIUM ION BATTERIES (including lithium ion polymer batteries) 3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT (including lithium ion polymer batteries) or 3481 LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries) 3536 LITHIUM BATTERIES INSTALLED IN CARGO TRANSPOT UNIT lithium ion batteries or lithium metal batteries
Live-saving appliances		**M5**		2990 LIFE-SAVING APPLIANCES, SELF-INFLATING 3072 LIFE-SAVING APPLIANCES NOT SELF-INFLATING containing dangerous goods as equipment 3268 SAFETY DEVICES, electrically initiated
Environmentally hazardous substance	**pollutant to the aquatic environment liquid**	**M6**		3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
	pollutant to the aquatic environment solid	**M7**		3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
	genetically modi microorganisms organisms	**M8**		3245 GENETICALLY MODIFIED MICROORGANISMS or 3245 GENETICALLY MODIFIED ORGANISMS
Elevated temperat substances	**liquid**	**M9**		3257 ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100 °C and below its flash-point (including molten metal, molten salts, etc.)
	solid	**M10**		3258 ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C
Other substances and articles presenting a danger during carriage, but not meeting the definitions of another class		**M11**		Only substances and articles listed in Table A of Chapter 3.2 are subject to the provisions Class 9 under this classification code, as follows:

1841 ACETALDEHYDE AMMONIA
1931 ZINC DITHIONITE (ZINC HYDROSULPHITE)
1941 DIBROMODIFLUOROMETHANE
1990 BENZALDEHYDE
2071 AMMONIUM NITRATE BASED FERTILIZER
2969 CASTOR BEANS or
2969 CASTOR MEAL or
2969 CASTOR POMACE or
2969 CASTOR FLAKE
3166 VEHICLE, FLAMMABLE GAS POWERED or
3166 VEHICLE, FLAMMABLE LIQUID POWERED or
3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or
3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED
3171 BATTERY POWERED VEHICLE or
3171 BATTERY POWERED EQUIPMENT
3316 CHEMICAL KIT or
3316 FIRST AID KIT
3359 FUMIGATED CARGO TRANSPORT UNIT
3363 DANGEROUS GOODS IN MACHINERY or
3363 DANGEROUS GOODS IN APPARATUS
3499 CAPACITOR, ELECTRIC DOUBLE LAYER
(with an energy storage capacity greater than 0.3Wh)
3508 CAPACITOR, ASYMMETRIC (with an energy storage capacity greater than 0.3Wh)
3509 PACKAGINGS, DISCARDED, EMPTY, UNCLEANED
3363 DANGEROUS GOODS IN ARTICLES or
3363 DANGEROUS GOODS IN MACHINERY or
3363 DANGEROUS GOODS IN APPARATUS
3530 ENGINE, INTERNAL COMBUSTION or
3530 MACHINERY, INTERNAL COMBUSTION
3548 ARTICLES CONTAINING MISCELLANEOUS DAN-GEROUS GOODS N.O.S.

CHAPTER 2.3
TEST METHODS

2.3.0 GENERAL PROVISIONS

Unless otherwise provided for in Chapter 2.2 or in this Chapter, the test methods to be used for the classification of dangerous goods are those described in the Manual of Tests and Criteria.

2.3.1 EXUDATION TEST FOR BLASTING EXPLOSIVES OF TYPE A

2.3.1.1 Blasting explosives of type A (UN No. 0081) shall, if they contain more than 40% liquid nitric ester, in addition to the testing specified in the Manual of Tests and Criteria, satisfy the following exudation test.

2.3.1.2 The apparatus for testing blasting explosive for exudation (figs. 1 to 3) consists of a hollow bronze cylinder. This cylinder, which is closed at one end by a plate of the same metal, has an internal diameter of 15.7 mm and a depth of 40 mm. It is pierced by 20 holes 0.5 mm in diameter (four sets of five holes) on the circumference. A bronze piston, cylindrically fashioned over a length of 48 mm and having a total length of 52 mm, slides into the vertically placed cylinder. The piston, whose diameter is 15.6 mm, is loaded with a mass of 2 220 g so that a pressure of 120 kPa (1.20 bar) is exerted on the base of the cylinder.

2.3.1.3 A small plug of blasting explosive weighing 5 to 8 g, 30 mm long and 15 mm in diameter, is wrapped in very fine gauze and placed in the cylinder; the piston and its loading mass are then placed on it so that the blasting explosive is subjected to a pressure of 120 kPa (1.20 bar). The time taken for the appearance of the first signs of oily droplets (nitroglycerine) at the outer orifices of the cylinder holes is noted.

2.3.1.4 The blasting explosive is considered satisfactory if the time elapsing before the appearance of the liquid exudations is more than five minutes, the test having been carried out at a temperature of 15 °C to 25 °C.

Test of blasting explosive for exudation

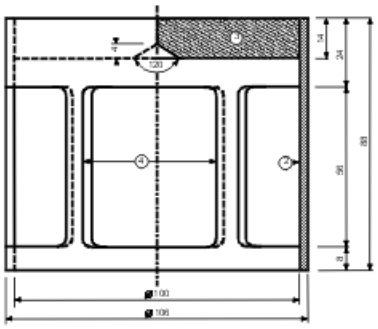


Fig. 2.1.

Bell-form charge; mass 2220 g; capable of being suspended from a bronze piston

Fig. 2.2. Cylindrical bronze piston; dimensions in mm

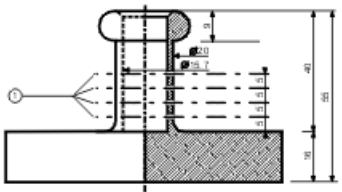


Fig. 2.3. Hollow bronze cylinder, dimensions in mm

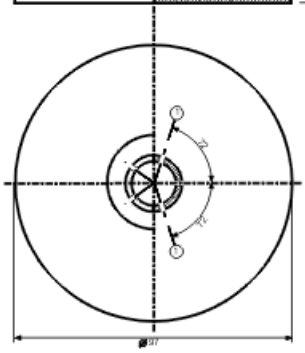


Fig. 1 to 3:

1) 4 series of 5 holes at 0.5 ∅

2) copper

3) iron plate with centre cone at the inferior face

4) 4 openings, approximately 46 x 56, set at even intervals on the periphery

2.3.2 Tests relating to nitrated cellulose mixtures of Class 1 and Class 4.1

2.3.2.1 In order to determine the criteria of the nitrocellulose, the Bergmann-Junk test or the methyl violet paper test in the Manual of Tests and Criteria Appendix 10 shall be performed (see Chapter 3.3, special provisions 393 and 394). If there is doubt that the ignition temperature of the nitrocellulose is considerably higher than 132 °C in the case of the Bergmann-Junk test or higher than 134.5 °C in the case of the methyl violet paper test, the ignition temperature test described in 2.3.2.5 should be carried out before these tests are performed. If the ignition temperature of nitrocellulose mixtures is higher than 180 °C or the ignition temperature of plasticized nitrocellulose is higher than 170 °C, the Bergmann-Junk test or the methyl violet paper test can be carried out safely.

2.3.2.2 Before undergoing the tests in 2.3.2.5, the samples shall be dried for not less than 15 hours at the ambient temperature in a vacuum desiccator containing fused and granulated calcium chloride, the sample substance being spread in a thin layer; for this purpose, substances which are neither in powder form nor fibrous shall be ground, or grated, or cut into small pieces. The pressure in the desiccator shall be brought below 6.5 kPa (0.065 bar).

2.3.2.3 Before being dried as prescribed in 2.3.2.2 above, plasticized nitrocellulose shall undergo preliminary drying in a well-ventilated oven, with its temperature set at 70 °C, until the loss of mass per quarter-hour is less than 0.3% of the original mass.

2.3.2.4 Weakly nitrated nitrocellulose shall first undergo preliminary drying as prescribed in 2.3.2.3 above; drying shall then be completed by keeping the nitrocellulose for at least 15 hours over concentrated sulphuric acid in a desiccator.

2.3.2.5 Ignition temperature (see 2.3.2.1)

a) The ignition temperature is determined by heating 0.2 g of substance enclosed in a glass test tube im mersed in a Wood's alloy bath. The test tube is placed in the bath when the latter has reached 100 °C. The temperature of the bath is then progressively increased by 5 °C per minute;

b) The test tubes must have the following dimensions (length – 125 mm, internal diameter – 15mm, thickness of wall – 0,5 mm) and shall be immersed to a depth of 20 mm;

c) The test shall be repeated three times, the temperature at which ignition of the substance occurs, i.e., slow or rapid combustion, deflagration or detonation, being noted each time;

d) The lowest temperature recorded in the three tests is the ignition temperature.

2.3.3 TESTS RELATING TO FLAMMABLE LIQUIDS OF CLASSES 3, 6.1 AND 8

2.3.3.1 Determination of flash-point

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

International standards:

ISO 1516 (Determination of flash/no flash – Closed cup equilibrium method)

ISO 1523 (Determination of flash point – Closed cup equilibrium method)

ISO 2719 (Determination of flash point – Pensky-Martens closed cup method)

ISO 13736 (Determination of flash point – Abel closed-cup method)

ISO 3679 (Determination of flash point – Rapid equilibrium closed cup method)

ISO 3680 (Determination of flash/no flash – Rapid equilibrium closed cup method)

National standards:

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

Standard ASTM D3828-07a,
Standard ASTM D56-05,
Standard ASTM D3278-96(2004)e1,
Standard ASTM D93-08.

Association française de normalisation, AFNOR, 11, rue de Pressensé, F-93571 La Plaine Saint-Denis Cedex:

Standard NF M 07 - 019

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

Standard NF M 07 - 036

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

Standard DIN 51755 (flash-points below 65°C)

Federal agency for technical requlation and metrology, Russia *119991, GSP-1, Moscow, B-49, Lenin Prospect 9;*

GOST 12.1.044-89 Occupational safety standards system. Fire and explosion hazard of substances and materials.

2.3.3.1.2 To determine the flash-point of paints, gums and similar viscous products containing solvents, only apparatus and test methods suitable for determining the flash-point for viscous liquids shall be used, in accordance with the following standards:

a) international standard ISO 3679: 1983;

b) international standard ISO 3680: 1983;

c) international standard ISO 1523: 1983;

d) international standards EN ISO 13736 and EN ISO 2719, method B.

2.3.3.1.3 The standards listed in 2.3.3.1.1 shall only be used for flash-point ranges which are specified therein. The possibility of chemical reactions between the substance and the sample holder shall be considered when selecting the standard to be used. The apparatus shall, as far as is consistent with safety, be placed in a draught-free position. For safety, a method utilizing a small sample size, around 2 ml, shall be used for organic peroxides and self-reactive substances (also known as "energetic" substances), or for toxic substances.

2.3.3.1.4 When the flash-point, determined by a non-equilibrium method is found to be 23 °C ± 2 °C or 60 °C ± 2 °C, it shall be confirmed for each temperature range by an equilibrium method.

2.3.3.1.5 In the event of a dispute as to the classification of a flammable liquid, the classification proposed by the consignor shall be accepted if a check-test of the flash-point, yields a result not differing by more than 2 °C from the limits (23 °C and 60 °C respectively) stated in 2.2.3.1. If the difference is more than 2 °C, a second check-test shall be carried out, and the lowest figure of the flash-points obtained in either check-test shall be adopted.

2.3.3.2 Determination of initial boiling point

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

International standards:

ISO 3924 *(Petroleum products – Determination of boiling range distribution – Gas chromatography method)*

ISO 4626 *(Volatile organic liquids – Determination of boiling range of organic solvents used as raw materials)*

ISO 3405 *(Petroleum products – Determination of distillation characteristics at atmospheric pressure)*

National standards:

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

Standard ASTM D86-07a,

Standard ASTM D1078-05.

Further acceptable methods:

Method A.2 as described in Document No. 12A of *the List*.

2.3.3.3 Test for determining peroxide content

To determine the peroxide content of a liquid, the procedure is as follows:

A quantity **p** (about 5 g, weighed to the nearest 0.01 g) of the liquid to be titrated is placed in an Erlenmeyer flask; 20 cm^3 of acetic anhydride and about 1 g of powdered solid potassium iodide are added; the flask is shaken and, after 10 minutes, heated for 3 minutes to about 60 °C. When it has been left to cool for 5 minutes, 25 cm^3 of water are added. After this, it is left standing for half an hour, then the liberated iodine is titrated with a decinormal solution of sodium thiosulphate, no indicator being added; complete dis- coloration indicates the end of the reaction. If **n** is the number of cm^3 of thiosulphate solution required, the percentage of peroxide (calculated as H2O2) present in the sample is obtained by the formula:

$$\frac{17n}{100p},$$

where:

n– a quantity of solution of sodium thiosulphate, см^3;

p – a quantity of the liquid to be titrated, g.

2.3.4 TEST FOR DETERMINING FLUDITY

To determine the fluidity of liquid, viscous or pasty substances and mixtures, the following test method shall be used.

2.3.4.1 Test apparatus

Commercial penetrometer conforming to ISO 2137:1985, with a guide rod of 47,5 g + 0,05 g; sieve disc of duralumin with conical bores and a mass of 102.5 g ± 0.05 g (see Figure 2.4); penetration vessel with an inside diameter of 72 mm to 80 mm for reception of the sample.

2.3.4.2 Test procedure

The sample is poured into the penetration vessel not less than half an hour before the measurement. The vessel is then hermetically closed and left standing until the measurement. The sample in the hermetically closed penetration vessel is heated to 35 °C ± 0.5 °C and is placed on the penetrometer table immediately prior to measurement (not more than two minutes). The point S of the sieve disc is then brought into con- tact with the surface of the liquid and the rate of penetration is measured.

2.3.4.3 Evaluation of test results

A substance is pasty if, after the centre S has been brought into contact with the surface of the sample, the penetration indicated by the dial gauge:

a) after a loading time of 5 s ± 0.1 s, is less than 15.0 mm ± 0.3 mm; or

b) after a loading time of 5 s ± 0.1 s, is greater than 15.0 mm ± 0.3 mm, but the additional penetration after another 55 s ± 0.5 s is less than 5.0 mm ± 0.5 mm.

Note: *In the case of samples having a flow point, it is often impossible to produce a steady level surface in the penetration vessel and, hence, to establish satisfactory initial measuring conditions for the contact of the point S. Furthermore, with some samples, the impact of the sieve disc can cause an elastic deformation of the surface and, in the first few seconds, simulate a deeper penetration. In all these cases, it may be appropriate to make the evaluation in paragraph (b) above.*

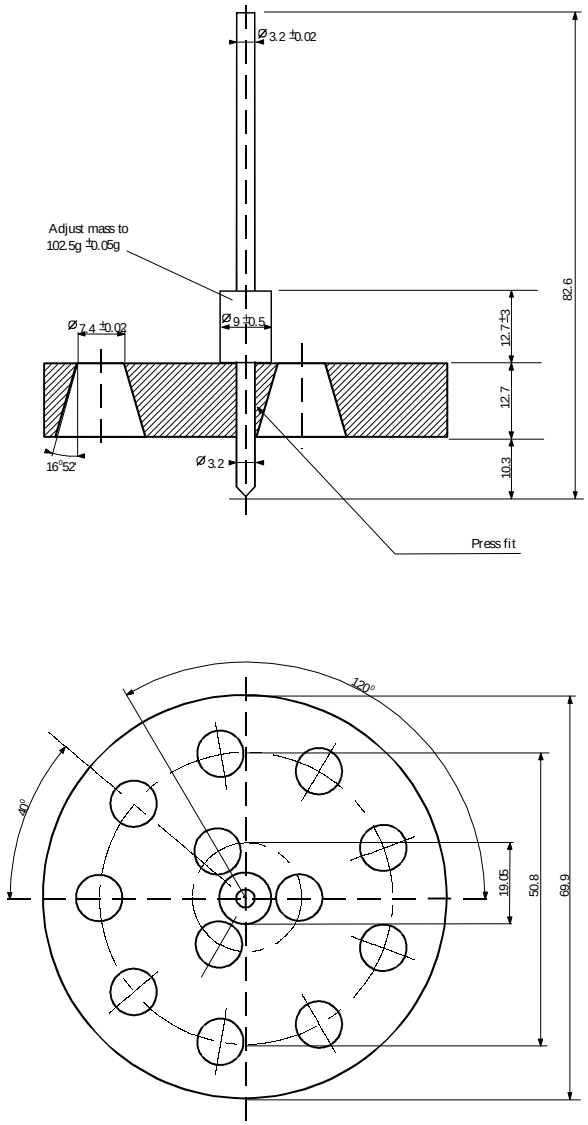


Figure. 2.4. Penetrometer

Adjust mass to 102,5 ± 0,05 g
Press fit
Tolerances not specified are ±0,1 мм

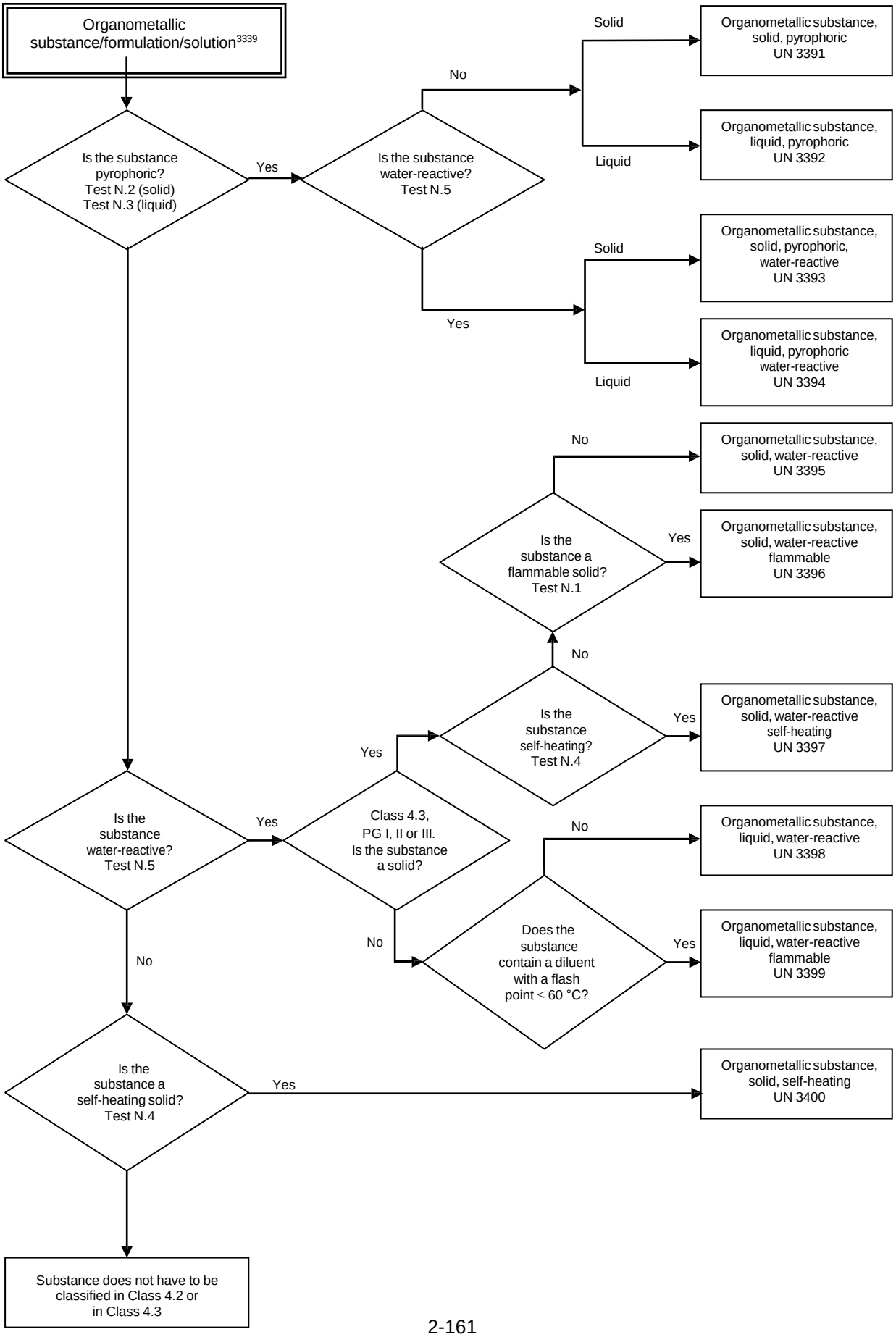
2.3.5 CLASSIFICATION OF ORGANOMETALLIC SUBSTANCES IN CLASSES 4.2 AND 4.3

Depending on their properties as determined in accordance with tests N.1 to N.5 of the Manual of Tests and Criteria, Part III, section 33, organometallic substances may be classified in Class 4.2 or 4.3, as appropriate, in accordance with the flowchart scheme given in Figure 2.3.5.

Note 1: *Depending on their other properties and on the precedence of hazard table (see 2.1.3.10), organometallic substances may have to be classified in other classes as appropriate.*

Note 2: *Flammable solutions with organometallic compounds in concentrations which are not liable to spontaneous combustion or, in contact with water, do not emit flammable gases in dangerous quantities, are substances of Class 3.*

Figure 2.3.5. Flowchart scheme for the classification of organometallic substances in 4.2 and 4.3 [a]



[a] *Test methods N.1 to N.5 can be found in the Manual of Tests and Criteria, Part III, Section 33.*
[b] *If applicable and testing is relevant, taking into account reactivity properties, Class 6.1 and 8 properties should be considered according to the table of precedence of hazards in 2.1.3.10.*