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DANGEROUS GOODS PANEL (DGP)

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Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions* for incorporation in the 2007/2008 edition
2.2: Part 2 — Classification

DRAFT AMENDMENTS OF THE TECHNICAL INSTRUCTIONS TO ALIGN TO THE UN RECOMMENDATIONS - PART 2

(Presented by the Secretary)

SUMMARY

Below are the draft amendments to Part 2 Chapters 1, 2, 3, 4, 6, 7 and 8 to reflect the decisions taken by the UN Committee of Experts on the Transport of Dangerous Goods and the Globally Harmonized System of Classification of Labelling of Chemicals at the second session (Geneva, 10 December 2004)

INTRODUCTORY CHAPTER

Parts of this Chapter are affected by State Variations NL 4, US 14; see Table A-1

1. Responsibilities

Classification must be made by the appropriate national authority when so required or may otherwise be made by the shipper.

2. Classes, divisions, packing groups — definitions

2.1 Substances (including mixtures and solutions) and articles subject to these Instructions are assigned to one of nine classes according to the hazard or the most predominant of the hazards they present. Some of these classes are subdivided into divisions. These classes and divisions are:

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2.2 Many of the substances assigned to Classes 1 to 9 are deemed, without additional labelling, as being environmentally hazardous.

2.2.1 Wastes shall be transported under the requirements of the appropriate class considering their hazards and the criteria in these Instructions.

2.3 Wastes not otherwise subject to these Instructions but covered under the Basel Convention, may be transported under Class 9.

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Chapter 1

CLASS 1 — EXPLOSIVES

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1.5 CLASSIFICATION OF EXPLOSIVES

Note. — For additional information regarding classification of explosives, see UN Recommendations, 2.1.3.1.4, 2.1.3.1.5 ~~and~~, 2.1.3.4~~.~~ and 2.1.3.5.

Secretarial Note.— It is suggested that the provisions for assignment of fireworks to hazard division (UN 2.1.3.5) be referred to in the note under 1.5 "Classification of Explosives"; the text contained in UN 2.1.3.5 is provided overleaf for the information of panel members.

1.5.1.1 Any substance or article having or suspected of having explosive characteristics must be considered for classification in Class 1 in accordance with the tests, procedures and criteria prescribed in Part I of the *UN Manual of Tests and Criteria*. Substances and articles classified in Class 1 must be assigned to the appropriate division and compatibility group in accordance with the procedures and criteria prescribed in that document.

1.5.1.2 Except for substances that are listed by their proper shipping name in the Dangerous Goods List (Table 3-1), goods must not be offered for transport as Class 1 until they have been subjected to the classification procedure prescribed in this Chapter. In addition, the classification procedure must be undertaken before a new product is offered for transport. In this context, a new product is one which, in the opinion of the appropriate national authority, involves any of the following:

a) a new explosive substance or a combination or a mixture of explosive substances which is considered to be significantly different from other combinations or mixtures already classified;

b) a new design of article or an article containing a new explosive substance or a new combination or mixture of explosive substances;

c) a new design of package for an explosive substance or article including a new type of inner packaging.

Note.— The importance of this can be overlooked unless it is realized that a relatively minor change in an inner or outer packaging can be critical and can convert a lesser risk into a mass explosion risk.

1.5.1.3 The producer or other applicant for classification of the product must provide adequate information concerning the names and characteristics of all explosive substances in the product and must furnish the results of all relevant tests which have been done. It is assumed that all the explosive substances in a new article have been properly tested and then approved.

1.5.2 Exclusion from Class 1

1.5.2.1 The appropriate national authority may exclude an article or substance from Class 1 by virtue of test results and the Class 1 definition.

1.5.2.2 Where a substance provisionally accepted into Class 1 is excluded from Class 1 by performing Test Series 6 on a specific type and size of package, this substance, when meeting the classification criteria or definition for another class or division, should be listed in the Dangerous Goods List in that class or division with a special provision restricting it to the type and size of package tested.

1.5.2.3 Where a substance is assigned to Class 1 but is diluted to be excluded from Class 1 by Test Series 6, this diluted substance (hereafter referred to as desensitized explosive) should be listed in the Dangerous Goods List with an indication of the highest concentration which excluded it from Class 1 (see 2;3.1.4 and 2;4.2.4) and if applicable, the concentration below which it is no longer deemed subject to these Instructions. New solid desensitized explosives subject to these Instructions should be listed in Division 4.1 and new liquid desensitized explosives should be listed in Class 3. When the desensitized explosive meets the criteria or definition for another class or division, the corresponding subsidiary risk(s) should be assigned to it.

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2.1.3.5 ***Assignment of fireworks to hazard divisions***

2.1.3.5.1 Fireworks shall normally be assigned to hazard divisions 1.1, 1.2, 1.3, and 1.4 on the basis of test data derived from Test Series 6. However, since the range of such articles is very extensive and the availability of test facilities may be limited, assignment to hazard divisions may also be made in accordance with the procedure in ~~2.1.3.5.2~~.

2.1.3.5.2 Assignment of fireworks to UN Nos. 0333, 0334, 0335 or 0336 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 ~~2.1.3.5.5~~. 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 2.1.3.5.5 should only be made on the basis of full test data submitted to the UN Sub-Committee of Experts on the Transport of Dangerous Goods for consideration.

Note 2.— Test data derived by competent authorities which validates, or contradicts the assignment of Hazard Division to firework types and/or sub-divisions by the specification in column 4 of the table in 2.1.3.5.5 to hazard divisions in column 5 should be submitted to the UN Sub-Committee of Experts on the Transport of Dangerous Goods for information (see also note 3 in 2.1.3.2.3).

2.1.3.5.3 Where fireworks of more than one hazard division are packed in the same package they shall be classified on the basis of the highest hazard division unless test data derived from Test Series 6 indicate otherwise.

2.1.3.5.4 The classification shown in the table in 2.1.3.5.5 applies only for articles packed in fibreboard boxes (4G).

2.1.3.5.5 Default fireworks classification table[1]

Note 1.— References to percentages in the table, unless otherwise stated, are to the mass of all pyrotechnic composition (e.g. rocket motors, lifting charge, bursting charge and effect charge).

Note 21.— Flash composition" in this table refers to pyrotechnic compositions containing an oxidizing substance, or black powder, and a metal powder fuel that are used to produce an aural report effect or used as a bursting charge in fireworks devices.

Note 3.— Dimensions in mm refers to:
- *for spherical and peanut shells the diameter of the sphere of the shell;*
- *for cylinder shells the length of the shell;*
- *for a shell in mortar, Roman candle, shot tube firework or mine the inside diameter of the tube comprising or containing the firework;*
- *for a bag mine or cylinder mine, the inside diameter of the mortar intended to contain the mine.*

[1] This table contains a list of firework classifications that may be used in the absence of Test Series 6 data (see 2.1.3.5.2).

Type	Includes: / Synonym:	Definition	Specification	Classification
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, salute, sound shell, thunderclap, aerial shell kit	Device with or without propellant charge, with delay fuse and bursting charge, pyrotechnic unit(s) or loose pyrotechnic composition 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 composition, 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: > 50 mm and < 180 mm	1.2G
			Colour shell: # 50 mm, or < 60 g pyrotechnic composition, with # 25% flash composition as loose powder and/or report effects	1.3G

Type	Includes: / Synonym:	Definition	Specification	Classification
	Shell of shells (spherical) (Reference to percentages for shell of shells are to the gross mass of the fireworks article)	Device without propellant charge, with delay fuse and bursting charge, containing report shells and inert materials and designed to be projected from a mortar	> 120 mm	1.1G
		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 # 70 mm and/or pyrotechnic units, with # 25% flash composition and # 60% pyrotechnic composition and designed to be projected from a mortar	> 200 mm and # 300 mm	1.3G

Type	Includes: / Synonym:	Definition	Specification	Classification
		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 composition and designed to be projected from a mortar	# 200 mm	1.3G
Battery/ combination	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 fireworks 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 composition, 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% flash composition	1.3G
			# 30 mm inner diameter, 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 composition, propellant charge with or without transmitting fuse	# 30 mm inner diameter and pyrotechnic unit > 25 g, or > 5% and # 25% flash composition	1.3G

Type	Includes: / Synonym:	Definition	Specification	Classification
			# 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 composition and/or pyrotechnic 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 composition	1.1G
			> 20 g pyrotechnic composition and flash composition # 25 %	1.3G
			# 20 g pyrotechnic composition, black powder 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: Cloth or paper bag or cloth or paper cylinder containing propellant charge and pyrotechnic units, designed to be placed in a mortar and to function as a mine	> 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
			# 150 g pyrotechnic composition, 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

Type	Includes: / Synonym:	Definition	Specification	Classification
Fountain	Volcanos, gerbs, showers, lances, Bengal fire, flitter sparkle, cylindrical fountains, cone fountains, illuminating torch	Non-metallic case containing pressed or consolidated pyrotechnic composition producing sparks- and flame	$ 1 kg pyrotechnic composition	1.3G
			< 1 kg pyrotechnic composition	1.4G
Sparkler	Handheld sparklers, non-handheld sparklers, wire sparklers	Rigid wire partially coated (along one end) with slow burning pyrotechnic composition 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 composition and designed to be held in the hand	Perchlorate based items: > 5 g per item or > 10 items per pack	1.3 G
			Perchlorate based items: # 5 g per item and # 10 items per pack; nitrate based items: # 30 g per item	1.4G
Low hazard fireworks and novelties	Table bombs, throwdowns, crackling granules, smokes, fog, snakes, glow worm, serpents, snaps, party poppers	Device designed to produce very limited visible and/or audible effect which contains small amounts of pyrotechnic 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 composition, but no flash composition	1.4G

Type	Includes: / Synonym:	Definition	Specification	Classification
Spinner	Aerial spinner, helicopter, chaser, ground spinner	Non-metallic tube or tubes containing gas- or spark-producing pyrotechnic composition, with or without noise producing composition, with or without aerofoils attached	Pyrotechnic composition per item > 20 g, containing # 3% flash composition as report effects, or whistle composition # 5 g	1.3G
			Pyrotechnic composition per item # 20 g, containing # 3% flash composition as report effects, or whistle composition # 5 g	1.4G
Wheels	Catherine wheels, Saxon	Assembly including drivers containing pyrotechnic composition and provided with a means of attaching it to a support so that it can rotate	$ 1 kg total pyrotechnic composition, no report effect, each whistle (if any) # 25 g and # 50 g whistle composition per wheel	1.3G
			< 1 kg total pyrotechnic composition, 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 compositions, the tubes being fixed to a supporting ring	> 200 g total pyrotechnic composition or > 60 g pyrotechnic composition per driver, # 3% flash composition as report effects, each whistle (if any) # 25 g and # 50 g whistle composition per wheel	1.3G

Type	Includes: / Synonym:	Definition	Specification	Classification
			# 200 g total pyrotechnic composition and # 60 g pyrotechnic composition 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 fireworks 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

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Chapter 2

CLASS 2 — GASES

Parts of this Chapter are affected by State Variation US 6; see Table A-1

2.1 DEFINITIONS AND GENERAL PROVISIONS

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2.2 DIVISIONS

Substances of Class 2 are assigned to one of three divisions based on the primary hazard of the gas during transport.

Note.— UN 1950 ***Aerosols,*** *UN 2037* ***Receptacles, small, containing gas*** *and UN 2037* ***Gas cartridges*** *must be regarded as being in Division 2.1 when the criteria in 2.5.1a) are met.*

a) Division 2.1 — Flammable gases.

Gases which at 20°C and a standard pressure of 101.3 kPa:

i) are ignitable when in a mixture of 13 per cent or less by volume with air; or

ii) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit. Flammability must be determined by tests or by calculation in accordance with methods adopted by ISO (see ISO Standard 10156/1996). Where insufficient data are available to use these methods, tests by a comparable method recognized by the appropriate national authority must be used.

Note.— ***Aerosols*** *(UN 1950) and UN 2037* ***Receptacles, small, containing gas*** *must be regarded as being in Division 2.1 when the criteria in 2.5.2 are met.*

b) Division 2.2 — Non-flammable, non-toxic gases.

Gases which ~~are transported at a pressure not less than 280 kPa at 20°C, or as refrigerated liquefied gases, and which~~:

i) are asphyxiant — gases which dilute or replace the oxygen normally in the atmosphere; or

ii) are oxidizing — gases which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does; or

iii) do not come under the other divisions.

c) Division 2.3 — Toxic gases.

Gases which:

i) are known to be so toxic or corrosive to humans as to pose a hazard to health; or

ii) are presumed to be toxic or corrosive to humans because they have an LC_{50} value equal to or less than 5 000 mL/m^3 (ppm) when tested in accordance with 6.2.1.3.

Note.— Gases meeting the above criteria owing to their corrosivity are to be classified as toxic with a subsidiary corrosive risk.

2.2.2.3 Gases of Division 2.2, other than refrigerated liquefied gases, are not subject to these Instructions if they are transported at a pressure less than 280 kPa at 20 °C.

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Chapter 3

CLASS 3 — FLAMMABLE LIQUIDS

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3.1 DEFINITION AND GENERAL PROVISIONS

3.1.1 Class 3 includes the following substances:

a) Flammable liquids (see 3.1.2 and 3.1.3);

b) Liquid desensitized explosives (see 3.1.4).

3.1.2 Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example paints, varnishes, lacquers, etc., but not including substances otherwise classified on account of their dangerous characteristics) which give off a flammable vapour at temperatures of not more than ~~60.5°C~~ 60°C, closed-cup test, or not more than 65.6°C, open-cup test, normally referred to as the flash point. This class also includes:

a) liquids offered for transport at temperatures at or above their flash point; and

b) substances that are transported or offered for transport at elevated temperatures in a liquid state and which give off a flammable vapour at a temperature at or below the maximum transport temperature (i.e. the maximum temperature likely to be encountered by the substance in transport).

Note. — Since the results of open-cup tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition.

3.1.3 Liquids meeting the definition in 3.1.2 above with a flash point of more than 35°C which do not sustain combustion need not be considered as flammable liquids for the purposes of these Instructions. Liquids are considered to be unable to sustain combustion for the purposes of these Instructions (i.e. they do not sustain combustion under defined test conditions) if:

a) they have passed a suitable combustibility test (see Sustained Combustibility Test prescribed in the *UN Manual of Tests and Criteria*, Part III, subsection 32.5.2); or

b) their fire point according to ISO 2592:1973 is greater than 100°C; or

c) they are miscible solutions with a water content of more than 90 per cent by mass.

3.1.4 Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form homogeneous liquid mixture to suppress their explosive properties (see

2.1.3.5.3). Entries in the Dangerous Goods List (Table 3-1) for liquid desensitized explosives are: UN 1204, UN 2059, UN 3064, UN 3343, UN 3357 and UN 3379.

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Table 2-4. Packing group based on flammability

Packing group	*Flash point (closed-cup)*	*Initial boiling point*
I	—	#35°C
II	<23°C	>35°C
III	≥23°C, ≤~~60.5°C~~60°C	>35°C

Table 2-5. Viscosity and flashpoints

Flow time t in seconds	*Jet diameter in mm*	*Flash point in °C (closed-cup)*
20 < t ≤ 60	4	above 17
60 < t ≤100	4	above 10
20 < t ≤32	6	above 5
32 < t ≤44	6	above –1
44 < t ≤100	6	above –5
100 < t	6	–5 and below

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Chapter 4

CLASS 4 — FLAMMABLE SOLIDS; SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION; SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

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4.2.3 Division 4.1 — Self-reactive substances

4.2.3.1 *Definitions and properties*

4.2.3.1.1 Definitions

For the purposes of these Instructions:

a) Self-reactive substances are thermally unstable sub-stances liable to undergo a strongly exothermic decom-position even without the participation of oxygen (air). The following substances must not be considered to be self-reactive substances of Division 4.1 if:

i) they are explosives according to the criteria of Class 1;

~~ii) they are oxidizing substances according to the assignment procedure in 5.2.1.1;~~

~~(b)~~ ii) They are oxidizing substances according to the classification procedure for Division 5.1 (see ~~5.2.1.1~~) except that mixtures of oxidizing substances which contain 5.0% or more of combustible organic substances must be subjected to the classification procedure defined in Note 3.

iii) they are organic peroxides according to the criteria of Division 5.2;

iv) their heat of decomposition is less than 300 J/g; or

v) their self-accelerating decomposition temperature is greater than 75°C for a 50 kg package.

Note.1— The heat of decomposition can be determined by using any internationally recognized method, e.g. differential scanning calorimetry and adiabatic calorimetry.

Note. 2 — Any substance which shows the properties of a self-reactive substance must be classified as such, even if this substance gives a positive test result, according to 4.3.2 for inclusion in Division 4.2.

Note. 3 — Mixtures of oxidizing substances meeting the criteria of Division 5.1 which contain 5.0% or more of combustible organic substances, which do not meet the criteria mentioned in (a), (c), (d) or (e) above, must be subjected to the self-reactive substance classification procedure.

A mixture showing the properties of a self-reactive substance, type B to F, must be classified as a self-reactive substance of Division 4.1.

A mixture showing the properties of a self-reactive substance, type G, according to the principle of 2.4.2.3.3.2 (g) of the UN Recommendations must be considered for classification as a substance of Division 5.1 (see 5.2.1.1).

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4.3 SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION (DIVISION 4.2)

4.3.1 Definitions and properties

4.3.1.1 Division 4.2 includes:

a) pyrophoric substances: substances, including mixtures and solutions (liquid or solid), which even in small quantities ignite within 5 minutes of coming into contact with air. These substances are the most liable to spontaneous combustion and are called pyrophoric substances; and

b) self-heating substances: other substances which in contact with air without energy supply are liable to self-heating. These substances will ignite only when in large amounts (kilograms) and after long periods of time (hours or days) and are called self-heating substances.

4.3.1.2 Self-heating of substances, leading to spontaneous combustion, is caused by reaction of the substance with oxygen (in the air) and the heat developed not being conducted away sufficiently rapidly to the surroundings. Spontaneous combustion

Table 2-6. List of currently assigned self-reactive substances in packages

Note.— Self-reactive substances to be transported must fulfil the classification and the control and emergency temperatures (derived from the self-accelerating decomposition temperature (SADT)) as listed.

Self-reactive substance	*Concentration (%)*	*Control temperature (°C)*	*Emergency temperature (°C)*	*UN generic entry*	*Notes*
Acetone-pyrogallol copolymer 2-diazo-1-naphthol-5-sulphonate	100			3228	

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Chapter 6

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

INTRODUCTORY NOTES

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Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity* LD_{50} *(mg/kg)*	*Dermal toxicity* LD_{50} *(mg/kg)*	*Inhalation toxicity by dusts and mists* LC_{50} *(mg/L)*
I	~~#5~~ # 5.0	~~#40~~ # 50	~~#0.5~~ # 0.2
II	~~>5, #50~~ > 5.0 and # 50	~~>40, #200~~ > 50 and # 200	~~>40, #200~~ > 0.2 and # 2.0
III[a]	~~solids: >50, #200~~ ~~liquids: >50, #500~~ >50 and #300	~~>200, #1 000~~ > 200 and # 1000	~~>2, #10~~ > 2.0 and # 4.0

Note.— Tear gas substances having toxicity data corresponding to Packing Group III values are nevertheless included in Packing Group II.

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6.3 DIVISION 6.2 — INFECTIOUS SUBSTANCES

6.3.1 Definitions

For the purposes of these Instructions:

6.3.1.1 *Infectious substances* are substances which are known to contain, or are reasonably expected to contain, pathogens. Pathogens are defined as micro-organisms (including bacteria, viruses, rickettsiae, parasites, fungi) and other agents such as prions, which can cause disease in humans or animals.

6.3.1.2 *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.

6.3.1.3 *Cultures* ~~(laboratory stocks)~~ are the result of a process by which pathogens are intentionally propagated. This definition does not include human or animal patient specimens as defined below in 6.3.1.4. ~~are amplified or propagated in order to generate high concentrations, thereby increasing the risk of infection when exposure to them occurs. This definition refers to cultures prepared for the intentional generation of pathogens and does not include cultures intended for diagnostic or clinical purposes.~~

6.3.1.4 Patient specimens are human or animal materials, 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 transported for purposes such as research, diagnosis, investigational activities, disease treatment and prevention.

6.3.1.~~4~~5 *Medical or clinical wastes* are wastes derived from the medical treatment of animals or humans or from bio-research.

6.3.2 Classification of infectious substances

6.3.2.1 Infectious substances must be classified in Division 6.2 and assigned to UN 2814, UN 2900, UN 3291 or UN 3373 as appropriate.

6.3.2.2 Infectious substances are divided into the following categories:

6.3.2.2.1 *Category A:* An infectious substance which is transported in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy ~~to~~ humans or animals. Indicative examples of substances that meet these criteria are given in Table 2-10.

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 in both humans and animals must be assigned to UN 2814. Infectious substances which cause disease only in animals must be assigned to UN 2900.

b) Assignments to UN 2814 or UN 2900 must 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 2814 is **Infectious substance, affecting humans.** *The proper shipping name for UN 2900 is* **Infectious substance, affecting animals** *only*.

Note 2.— The following table (Table 2-10) is not exhaustive. Infectious substances, including new or emerging pathogens, which do not appear in Table 2-10 but which meet the same criteria must be assigned to Category A. In addition, if there is doubt as to whether or not a substance meets the criteria it must be included in Category A.

Note 3.— In Table 2-10, the micro-organisms written in italics are bacteria, mycoplasma, rickettsiae or fungi.

6.3.2.2.2 *Category B:* An infectious substance which does not meet the criteria for inclusion in Category A. Infectious substances in Category B must be assigned to UN 3373 except that cultures as defined in 6.3.1.3 must be assigned to UN 2814 or UN 2900 as appropriate.

Note.— The proper shipping name of UN 3373 is ~~***Diagnostic specimens or Clinical specimen***~~ **Biological Substance, Category B**.

6.3.2.3 ***Exemptions***

6.3.2.3.1 Substances which do not contain infectious substances or substances which are unlikely to cause disease in humans or animals are not subject to these Instructions unless they meet the criteria for inclusion in another class.

6.3.2.3.2 Substances containing microorganisms which are non-pathogenic to humans or animals are not subject to these Instructions unless they meet the criteria for inclusion in another class.

6.3.2.3.3 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 these Instructions unless they meet the criteria for inclusion in another class.

6.3.2.3.4 Environmental samples (including food and water samples) which are not considered to pose a significant risk of infection are not subject to these Instructions unless they meet the criteria for inclusion in another class.

6.3.2.~~4~~3.5 Dried blood spots, collected by applying a drop of blood onto absorbent material, or faecal occult blood screening tests and ~~B~~blood or blood components that 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 are not subject to these Instructions.

~~6.3.2.5 Substances for which there is a low probability that infectious substances are present, or where the concentration is at a level naturally encountered, are not subject to these Instructions. Examples are: foodstuffs, water samples, living persons and substances that have been treated so that the pathogens have been neutralized or deactivated so that they no longer pose a health risk.~~

6.3.2.3.6 Human or animal specimens for which there is minimal likelihood that pathogens are present are not subject to these Instructions if the specimen is transported 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 should meet the following conditions:

(a) The packaging should consist of three components:

(i) a leak-proof primary receptacle(s);

(ii) a leak-proof secondary packaging; and

(iii) 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 × 100 mm;

(b) For liquids, absorbent material in sufficient quantity to absorb the entire contents should be placed between the primary receptacle(s) and the secondary packaging so that, during transport, 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 should be either individually wrapped or separated to prevent contact between them.

Note — 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 transported 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 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."

6.3.3 Biological products

For the purposes of these Instructions, 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 transported 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 these Instructions.

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 must be assigned to UN 2814, UN 2900 or UN 3373, as appropriate.

Note.— Some licensed biological products may present a biohazard only in certain parts of the world. In that case, appropriate national authorities may require these biological products to be in compliance with local requirements for infectious substances or may impose other restrictions.

6.3.4 Genetically modified micro-organisms and organisms

Genetically modified micro-organisms not meeting the definition of infectious substances must be classified according to Chapter 9.

6.3.5 Medical or clinical wastes

6.3.5.1 Medical or clinical wastes containing Category A infectious substances or containing Category B infectious substances in cultures must be assigned to UN 2814 or UN 2900 as appropriate. Medical or clinical wastes containing infectious substances in Catogory B, other than cultures, must be assigned to UN 3291.

6.3.5.2 Medical or clinical wastes that are reasonably believed to have a low probability of containing infectious substances must be assigned to UN 3291.

Note.— The proper shipping name for UN 3291 is ***Clinical waste, unspecified, n.o.s.*** *or* ***(Bio) Medical waste, n.o.s.*** *or* ***Regulated medical waste, n.o.s.***

6.3.5.3 Decontaminated medical or clinical wastes that previously contained infectious substances are not subject to these Instructions unless they meet the criteria for inclusion in another class.

6.3.6 Infected Animals

6.3.~~2~~.6.1 A live animal that has been intentionally infected and is known or suspected to contain an infectious substance must not be transported by air unless the infectious substance contained cannot be consigned by any other means. Infected animals may only be transported under terms and conditions approved by the appropriate national authority.

6.3.6.2 Unless an infectious substance cannot be consigned by any other means, live animals shall not be used to consign such a substance.".

6.3.6.3 Animal carcasses affected by pathogens of category A or which would be assigned to Category A in cultures only, shall be assigned to UN 2814 or UN 2900 as appropriate.

Other animal carcasses affected by pathogens included in Category B shall be transported in accordance with provisions determined by the competent authority.

Table 2-10. Indicative examples of infectious substances included in Category A in any form unless otherwise indicated (6.3.2.2.1 (a))

UN Number and Proper Shipping Name	***Micro-organism***
UN 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 hemorrhagic fever virus Dengue virus (cultures only) Eastern equine encephalitis virus (cultures only)

UN Number and Proper Shipping Name	*Micro-organism*
	Escherichia coli, verotoxigenic (cultures only) Ebola virus Flexal virus *Francisella tularensis (cultures only)* Guanarito virus Hantaan virus Hantaviruses causing ~~hantavirus pulmonary syndrome~~ hemorragic fever with renal syndrome Hendra virus Hepatitis B virus (cultures only) Herpes B virus (cultures only) Highly pathogenic avian influenza virus (cultures only) Human immunodeficiency 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)* Nipah virus Omsk hemorrhagic fever virus *Poliovirus (cultures only)* Rabies virus (cultures only) *Rickettsia rickettsii (cultures only)* *Rickettsia rickettsii* (cultures only) Rift Valley fever virus (cultures only) *Russian spring-summer encephalitis virus (cultures only)* Sabia virus *Shigella dysenteriae type 1 (cultures only)* *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 2900 **Infectious substances affecting animals only**	~~African horse sickness virus~~ African swine fever virus (cultures only) Avian paramyxovirus Type 1 – Velogenic Newcastle disease virus ~~Bluetongue virus~~ Classical swine fever virus (cultures only) Foot and mouth disease virus (cultures only) Goatpox virus (cultures only)

UN Number and Proper Shipping Name	***Micro-organism***
	Lumpy skin disease virus (cultures only) *Mycoplasma mycoides* – Contagious bovine pleuropneumonia (cultures only) Peste des petits ruminants virus (cultures only) Rinderpest virus (cultures only) Sheep-pox virus (cultures only) Swine vesicular disease virus (cultures only) Vesicular stomatitis virus (cultures only)

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Chapter 7

CLASS 7 — RADIOACTIVE MATERIAL

Parts of this Chapter are affected by State Variations BE 4, CA 1, CA 3, CA 4, DE 3, DK 1, JP 2, JP 3, JP 25, JP 26, RU 1, US 10; see Table A-1

7.1 DEFINITION OF CLASS 7

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 7.7.2.1 to 7.7.2.6.

7.1.2 The following radioactive materials are not included in Class 7 for the purposes of these Instructions:

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

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

c) natural material and ores containing naturally occurring radionuclides which are either in their natural state or have only been processed for purposes other than for extraction of the radionuclides, and are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in ~~7.7.2.~~ 7.7.2.1 (b), or calculated in accordance with 7.7.2.2 to 7.7.2.6

d) non-radioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the limit specified in the definition of contamination in 7.2.

7.2 DEFINITIONS

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Approval:

Multilateral approval means approval by the relevant competent authority ~~both~~ of the country of origin of the design or shipment, as applicable and also, where ~~and of each country through or into which~~ the consignment is to be transported~~. The term "~~through or into~~" specifically excludes "over", i.e. the approval and notification requirements must not apply to a country over which radioactive material is carried in an aircraft, provided that there is no scheduled stop in~~ any other country, approval by the competent authority of that country.

. . .

Freight container in the case of radioactive material transport. An article of transport equipment designed to facilitate the transport of packaged goods, by one or more modes of transport without intermediate reloading which is ~~It must be~~ of a permanent enclosed character, rigid and strong enough for repeated use, and must be

fitted with devices facilitating its handling, particularly in transfer between aircraft and from one mode of transport to another. A small freight container is that which has either an overall outer dimension less than 1.5 m, or an internal volume of not more than 3 m^3. Any other freight container is considered to be a large freight container.

. . .

Specific activity of a radionuclide. The activity per unit mass of that nuclide. The specific activity of a material must mean the activity per unit mass ~~or volume~~ of the material in which the radionuclides are essentially uniformly distributed.

. . .

Uranium — natural, depleted, enriched:

Natural uranium. ~~Chemically separated uranium~~ Uranium (which may be chemically separated) containing the naturally occurring distribution of uranium isotopes (approximately 99.28 per cent uranium-238, and 0.72 per cent uranium-235 by mass).

7.3 LOW SPECIFIC ACTIVITY (LSA) MATERIAL, DETERMINATION OF GROUPS

7.3.1 Radioactive material which by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply, is termed low specific activity or LSA material. External shielding materials surrounding the LSA material must not be considered in determining the estimated average specific activity.

7.3.2 LSA material must be in one of three groups:

a) LSA-I

i) uranium and thorium ores and concentrates of such ores, and other ores containing naturally occurring radionuclides which are intended to be processed for the use of these radionuclides;

ii) ~~solid unirradiated~~ natural uranium, ~~or~~ depleted uranium, ~~or~~ natural thorium or their ~~solid or liquid~~ compounds or mixtures~~;~~, providing they are unirradiated and in solid or liquid form;

iii) radioactive material for which the A_2 value is unlimited, excluding fissile material in quantities not excepted under 6;7.10.2; or

iv) other 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 7.7.2.1 to 7.7.2.6, excluding fissile material in quantities not excepted under 6;7.10.2.

b) LSA-II

i) water with tritium concentration up to 0.8 TBq/L; or

ii) other material in which the activity is distributed throughout and the estimated average specific activity does not exceed 10^{-4} A_2/g for solids and gases, and 10^{-5} A_2/g for liquids.

c) LSA-III — solids (e.g. consolidated wastes, activated materials), excluding powders, in which:

i) 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, ceramic, etc.);

ii) the radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble matrix, so that, even under loss of packaging, the loss of radioactive material per package by leaching when placed in water for seven days would not exceed 0.1 A_2; and

iii) the estimated average specific activity of the solid, excluding any shielding material, does not exceed 2×10^{-3} A_2/g.

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7.4 REQUIREMENTS FOR SPECIAL FORM RADIOACTIVE MATERIAL

7.4.1 *Special form radioactive material* means either:

a) an indispersible solid radioactive material; or

b) a sealed capsule containing radioactive material that must be so manufactured that it can be opened only by destroying the capsule.

Special form radioactive material must have at least one dimension not less than 5 mm.

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7.4.6 Specimens that comprise or simulate radioactive material enclosed in a sealed capsule may be excepted from:

a) the tests prescribed in 7.4.5 a) and b) provided the mass of the special form radioactive material ~~is less than 200 g and they are alternatively subjected to the Class 4 impact test prescribed in ISO 2919:1980 "Sealed radioactive sources — Classification"; and~~

(i) is less than 200 g and they are alternatively subjected to the Class 4 impact test prescribed in ISO 2919:1980 "Radiation protection - Sealed radioactive sources General requirements and classification"; or

(ii) is less than 500 g and they are alternatively subjected to the Class 5 impact test prescribed in ISO 2919:1990: "Sealed Radioactive Sources - Classification; and

b) the test prescribed in 7.4.5 d) provided they are alternatively subjected to the Class 6 temperature test specified in ISO 2919:1980 "Sealed radioactive sources — Classification".

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7.7 ACTIVITY LIMITS AND MATERIAL RESTRICTIONS

7.7.1 Contents limits for packages

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7.7.1.7 *Packages containing fissile material*

Unless excepted by 6;7.10.2 ~~P~~packages containing fissile material must not contain:

a) a mass of fissile material different from that authorized for the package design;

b) any radionuclide or fissile material different from those authorized for the package design; or

c) contents in a form or physical or chemical state, or in a spatial arrangement, different from those authorized for the package design;

as specified in their certificates of approval, where appropriate.

7.7.1.8 *Packages containing uranium hexafluoride*

~~The mass of uranium hexafluoride in a package must not exceed a value that would lead to an ullage smaller than 5 per cent at the maximum temperature of the package, as specified for the plant systems where the package must be used. The uranium hexafluoride must be in solid form and the internal pressure of the package must be below atmospheric pressure when presented for transport.~~

Packages containing uranium hexafluoride must not contain:

(a) a mass of uranium hexafluoride different from that authorized for the package design;

(b) a mass of uranium hexafluoride 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; or

(c) uranium hexafluoride other than in solid form or at an internal pressure above atmospheric pressure when presented for transport.

7.7.2 Activity levels

7.7.2.1 The following basic values for individual radionuclides are given in Table 2-13:

a) A_1 and A_2 in TBq;

b) activity concentration for exempt material in Bq/g; and

c) activity limits for exempt consignments in Bq.

7.7.2.2 For individual radionuclides which are not listed in Table 2-13, the determination of the basic radionuclide values referred to in 7.7.2.1 must require ~~competent authority approval or, for international transport,~~ multilateral approval. ~~Where the chemical form of each radionuclide is known,~~ iIt is permissible to use the A_2 value ~~related to its solubility class~~ 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 transport are taken into consideration. Alternatively, the radionuclide values in Table 2-14 may be used without obtaining competent authority approval.

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Table 2-13. Basic radionuclides values for individual radionuclides

Radionuclide (atomic number)	*A_1 (TBq)*	*A_2 (TBq)*	*Activity concentration for exempt material (Bq/g)*	*Activity limit for an exempt consignment (Bq)*
Te-121m	5×10^0	3×10^0	1×10^2	~~1×10^5~~ 1×10^6
Te-123m	8×10^0	1×10^0	1×10^2	1×10^7

(a) A_1 and/or A_2 values for these parent radionuclides include contributions from daughter nuclides with half-lives less than 10 days~~.~~, as listed in the following:

Mg-28	Al-28l
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

Radionuclide (atomic number)	*A_1 (TBq)*	*A_2 (TBq)*	*Activity concentration for exempt material (Bq/g)*	*Activity limit for an exempt consignment (Bq)*
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: Sr-90 Y-90 Zr-93 Nb-93m Zr-97 Nb-97				

Radionuclide (atomic number)	*A_1 (TBq)*	*A_2 (TBq)*	*Activity concentration for exempt material (Bq/g)*	*Activity limit for an exempt consignment (Bq)*
Ru-106 Rh-106				
Ag-108m Ag-108				
Cs-137 Ba-137m				
~~Ce-134 La-134~~				
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-220 Po-216~~				
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-226 Ra-222, Rn-218, Po-214~~				
Th-228 Ra-224, Rn-220, Po-216, Pb212, Bi-212, Tl208 (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)				
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				
~~U-240 Np-240m~~				
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 radiation level 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 transport.

(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 transport.

(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.

Table 2-14. Basic radionuclide values for unknown radionuclides or mixtures

Radioactive contents	*A_1 (Tbq)*	*A_2 (Tbq)*	*Activity concentration for exempt material (Bq/g)*	*Activity limit for an exempt consignment (Bq)*
Only beta- or gamma-emitting nuclides are known to be present	0.1	0.02	1×10^{1}	1×10^{4}
~~Only~~ ~~a~~Alpha-emitting nuclides but no neutron emittens are known to be present	0.2	9×10^{-5}	1×10^{-1}	1×10^{3}
Neutrons emitting nuclides are known to be present or ~~N~~ no relevant data are available	0.001	9×10^{-5}	1×10^{-1}	1×10^{3}

7.8 LIMITS ON TRANSPORT INDEX, CRITICALITY SAFETY INDEX, RADIATION LEVELS FOR PACKAGES AND OVERPACKS

7.8.1 Except for consignments under exclusive use, the transport index of any package or overpack must not exceed 10, nor must the criticality safety index of any package or overpack exceed 50.

7.8.2 Except for packages or overpacks transported under exclusive use and special arrangement under the conditions specified in 7;2.9.5.3, the maximum radiation level at any point on any external surface of a package or overpack must not exceed 2 mSv/h.

7.8.3 The maximum radiation level at any point on any external surface of a package or overpack under exclusive use must not exceed 10 mSv/h.

7.8.4 Packages and overpacks must be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table 2-15 and with the following requirements:

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

b) the transport index must be determined following the procedures specified in 7.6.1.1 and 7.6.1.2;

c) if the surface radiation level is greater than 2 mSv/h, the package or overpack must be transported under exclusive use and under the provisions of 7;2.9.5.3; as appropriate;

d) a package transported under a special arrangement must be assigned to category III-YELLOW except under the provisions of 7.8.5;

e) an overpack which contains packages transported under special arrangement must be assigned to category III-YELLOW except under the provisions of 7.8.5.

7.8.5 In case of international transport of packages requiring competent authority design or shipment approval, for which different approval types apply in the different countries concerned by the shipment, assignment to the category as required in 7.8.4 must be in accordance with the certificate of the country of origin of design.

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Chapter 8

CLASS 8 — CORROSIVES

8.1 DEFINITION OF CLASS 8

Class 8 substances (corrosive substances) are substances which, by chemical action, will cause severe damage when in contact with living tissue or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport.

8.2 ASSIGNMENT OF PACKING GROUPS

8.2.1 Substances and preparations of Class 8 are divided among the three packing groups according to their degree of hazard in transport as follows:

a) Packing Group I: Very dangerous substances and prep-arations;

b) Packing Group II : Substances and preparations present-ing medium danger;

c) Packing Group III: Substances and preparations present-ing minor danger.

8.2.2 Allocation of substances in Class 8 to the packing groups referred to in the introduction to Part 3, Chapter 1 has been on the basis of experience, taking into account such additional factors as inhalation risk and reactivity with water, including the formation of hazardous decomposition products. New substances, including mixtures, can be assigned to packing groups on the basis of the length of time of contact necessary to produce full thickness destruction of human skin. ~~Substances~~ Liquids, and solids which may become liquid during transport which are judged not to cause full thickness destruction of human skin must still be considered for their potential to cause corrosion to certain metal surfaces in accordance with the criteria in 8.2.5 c) (ii).

8.2.3 A substance or preparation meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC_{50}) 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, must be allocated to Class 8.

8.2.4 In assigning the packing group to a substance in accordance with 8.2.2, account must be taken of human experience in instances of accidental exposure. In the absence of human experience, the packing group must be based on data obtained from experiments in accordance with OECD Guidelines for Testing of Chemicals No. 404, *Acute Dermal Irritation/Corrosion*, 1992.

8.2.5 Packing groups are assigned to corrosive substances in accordance with the following criteria:

a) *Packing Group I* is assigned to substances that cause full thickness destruction of intact skin tissue within an observation period of up to 60 minutes starting after an exposure time of 3 minutes or less.

b) *Packing Group II* is assigned to substances that cause full thickness destruction of intact skin tissue within an observation period of up to 14 days starting after an exposure time of more than 3 minutes but not more than 60 minutes.

c) *Packing Group III* is assigned to substances that:

i) cause full thickness destruction of intact skin tissue within an observation period of up to 14 days starting after an exposure time of more than 60 minutes but not more than 4 hours;

ii) are judged not to cause full thickness destruction of intact skin tissue but which exhibit a corrosion rate on steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55°C. 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, Unified Numbering System (UNS) G10200 or SAE 1020, and for testing aluminium, non-clad types 7075-T6 or AZ5GU-T6, must be used. An acceptable test is prescribed in the UN *Manual of Tests and Criteria*, Part III, Section 37.

— END —