



Secretariat

Distr.  
GENERAL

ST/SG/AC.10/C.3/2004/80  
16 September 2004

ENGLISH  
ORIGINAL: ENGLISH AND FRENCH

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**COMMITTEE OF EXPERTS ON THE TRANSPORT OF  
DANGEROUS GOODS AND ON THE GLOBALLY  
HARMONIZED SYSTEM OF CLASSIFICATION  
AND LABELLING OF CHEMICALS**

Sub-Committee of Experts on the  
Transport of Dangerous Goods

Twenty-sixth session, 29 November-3 December 2004  
Item 2 of the provisional agenda

TEXTS ADOPTED BY THE SUB-COMMITTEE AT ITS TWENTY-THIRD, TWENTY-FOURTH  
AND TWENTY-FIFTH SESSIONS AND RELATED PROPOSALS

Draft amendments to the Recommendations  
on the Transport of Dangerous Goods  
(Model Regulations and Manual of Tests and Criteria)

This document contains the draft amendments to the thirteenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.13) and to the fourth revision of the Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.4), adopted by the Sub-committee of Experts at its twenty-third, twenty-fourth and twenty-fifth sessions.

It contains two parts:

- Part 1: Draft amendments to the Recommendations on the  
Transport of Dangerous Goods, Model Regulations.....pages 2 - 40
- Part 2: Draft amendments to the Recommendations on the  
Transport of Dangerous Goods, Manual of Tests and Criteria. ....pages 41 - 46

## Part 1

### DRAFT AMENDMENTS TO THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MODEL REGULATIONS (ST/SG/AC.10/1/Rev.13)

#### Recommendations on the Transport of Dangerous Goods

Add a new paragraph 19 to read as follows:

#### "REPORTING OF ACCIDENTS AND INCIDENTS

19. The relevant national and international organizations should establish provisions for the reporting of accidents and incidents involving dangerous goods in transport. Basic provisions in this connection are recommended in 7.1.9 of the Model Regulations. Reports or summaries of reports that the States or international organizations deem relevant to the work of the Sub-Committee of Experts on the Transport of Dangerous Goods (e.g., reports involving packaging and tank failures, major release) should be submitted to the Sub-Committee for its consideration and action, as appropriate."

#### Model Regulations

Wherever they appear in the Model Regulations replace the words "porous mass" with "porous material" (*apply to 4.1.4 P200 (p), 4.1.6.1.2 (twice), 6.2.1.4.1 (j), 6.2.1.5.2, 6.2.2.1.3 and 6.2.2.7.2 (g), (k) and (l).*

## PART 1

### Chapter 1.1

[1.1.2.2.3 Insert the following new first sentence "Doses to persons shall be below the relevant dose limits.".

At the end of the existing first sentence, add: ", within the restriction that the doses to individuals be subject to dose constraints."].

[1.1.2.2.4 Replace "the radiation hazards involved and" with "radiation protection including"

Replace "to ensure restriction of their exposure and that" with "to restrict their occupational exposure and the exposure".].

[1.1.2.2.5 In the French version, replace "dose effective" with "dose efficace".

Delete indent (a) and renumber (b) and (c) as (a) and (b).].

[1.1.2.4.2 Delete "international", in the last sentence.].

## Chapter 1.2

[1.2.1 Add the following definitions in alphabetical order:

"*ASTM* means the American Society for Testing and Materials, (ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA);"

"*CGA* means the Compressed Gas Association (CGA), (CGA, 4221 Walney Road, 5th Floor, Chantilly VA 20151-2923);"

"*EN (standard)* means a European standard published by the European Committee for Standardization (CEN), (CEN – 36 rue de Stassart. B-1050 Brussels);"

"*IAEA* means the International Atomic Energy Agency, (IAEA, P.O. Box 100 – A -1400 Vienna);"

"*ICAO* means the International Civil Aviation Organization, (ICAO, 999 University Street, Montreal, Quebec H3C 5H7);"

"*IMO* means the International Maritime Organization, (IMO, 4 Albert Embankment, London SE1 7SR);"

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

"*UNECE* means the United Nations Economic Commission for Europe, (UNECE, 8-14 avenue de la Paix, CH-1211 Geneva 10);"

## PART 2

### Chapter 2.0

[2.0.1.2 In the first sentence, delete ", without additional labelling,". Place the end of the paragraph, from "Wastes shall be transported..." to "under Class 9.", in a separate new paragraph to be numbered 2.0.1.2.1.].

### Chapter 2.1

2.1.3.5 Insert the following new paragraphs:

**"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 2.1.3.5.7. 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.

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 addition of other types of fireworks to column 1 of the table in 2.1.3.5.7 shall 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.

2.1.3.5.5 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 2.1.3.5.7 to hazard divisions in column 5 shall 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).

2.1.3.5.6 The classification shown in the table in 2.1.3.5.7 applies only for articles packed in fibreboard boxes (4G).

2.1.3.5.7 *Default fireworks classification table*

**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 2:** *"Flash composition" in this table refers to pyrotechnic compositions containing an oxidizing substance 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.*

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: $\geq 180$ 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 $\leq 25\%$ flash composition, as loose powder and/ or report effects	1.3G
			Colour shell: $\leq 50$ mm, or $\leq 60$ g pyrotechnic composition, with $\leq 2\%$ 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: $\geq 180$ mm	1.1G
			Colour shell: $> 50$ mm and $< 180$ mm	1.2G
			Colour shell: $\leq 50$ mm, or $< 60$ g pyrotechnic composition, with $\leq 25\%$ flash composition as loose powder and/ or report effects	1.3G

Type	Includes: / Synonym:	Definition	Specification	Classification
Shell, spherical or cylindrical <i>(cont'd)</i>	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 ≤ 70mm 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
		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	

Type	Includes: / Synonym:	Definition	Specification	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
			≤ 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
			Rocket motor > 10 g, total flash composition ≤ 25%	1.3G
			Rocket motor ≤ 10 g; black powder bursting charge and ≤ 0.13 g flash composition per report and ≤ 1 g in total	1.4G

Type	Includes: / Synonym:	Definition	Specification	Classification
Mine	Pot-a-feu, ground mine, bag mine, cylinder mine	<p>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:</p> <p>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</p>	> 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 < 2g ; each whistle, if any, ≤ 3 g	1.4G
Fountain	Volcanos, gerbs, showers, lances, Bengal fire, flutter 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



Type	Includes: / Synonym:	Definition	Specification	Classification
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
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

Type	Includes: / Synonym:	Definition	Specification	Classification
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
			≤ 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

## Chapter 2.3

2.3.1.2 Replace "60.5 °C" with "60 °C".

*Consequential amendments:* The same change applies to the definition of "Elevated temperature substance" (second indent) in Chapter 1.2; 2.3.2.5 (first indent); flashpoint values in the table of 2.3.2.6; figure 2.4.2 in 2.4.5; special provisions 162, 282 and 298 in Chapter 3.3; 4.1.2.1 and UN No. 3256 (Dangerous Goods List, Appendix A and alphabetical index).

## Chapter 2.4

[2.4.2.3.1.1 (b) Amend to read as follows:

"(b) They are oxidizing substances according to the assignment procedure of Division 5.1 (see 2.5.2.1.1) but not mixtures of oxidizing substances and combustible organic substances to be classified as self-reactive substances according to the procedure defined in Note 3;"

Add a new NOTE 3 to read as follows:

**"NOTE 3:** *Mixtures of oxidizing substances meeting the criteria of Division 5.1 and 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, C, D or E shall be classified as a self-reactive substance of Division 4.1;*

*A mixture showing the properties of a self-reactive substance type F shall be considered for classification as a substance of Division 5.1 (see 2.5.2.1.1). If the criteria for oxidizing substances are not met, the substance shall be classified as a self-reactive substance of type F;*

*A mixture showing the properties of a self-reactive substance type G shall be considered for classification as a substance of Division 5.1 (see 2.5.2.1.1)."* ]

## Chapter 2.6

2.6.2.2.4.1 Amend the table to read as follows:

Packing group	Oral toxicity LD <sub>50</sub> (mg/kg)	Dermal toxicity LD <sub>50</sub> (mg/kg)	Inhalation toxicity by dusts and mists LC <sub>50</sub> (mg/l)
I	≤ 5.0	≤ 50	≤ 0.2
II	> 5.0 and ≤ 50	> 50 and ≤ 200	> 0.2 and ≤ 2.0
III <sup>a</sup>	> 50 and ≤ 300	> 200 and ≤ 1000	> 2.0 and ≤ 4.0

2.6.3.1.3 Amend to read as follows:

"*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 2.6.3.1.4."

2.6.3.1.4 Add a new 2.6.3.1.4 to read as follows and renumber subsequent paragraphs accordingly:

"2.6.3.1.4 *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."

2.6.3.2.1 Insert ", UN 3291" after "UN 2900".

2.6.3.2.2.1 In the first sentence, replace "disease to humans or animals" with "disease in otherwise healthy humans or animals".

In the Table with the indicative examples:

Under UN 2814:

- Replace "Hantaviruses causing hantavirus pulmonary syndrome" with "Hantavirus causing hemorrhagic fever with renal syndrome".
- Add "(cultures only)" after "Rabies virus", "Rift Valley fever virus" and "Venezuelan equine encephalitis virus".

Under UN 2900:

- Delete "African horse sickness virus" and "Bluetongue virus".
- Insert "Velogenic" before "Newcastle disease virus".
- Add "(cultures only)" after each microorganism in the list.

2.6.3.2.2.2 Delete "except that cultures, as defined in 2.6.3.1.3, shall be assigned to UN 2814 or UN 2900 as appropriate."

In the Note amend the proper shipping name to read: "BIOLOGICAL SUBSTANCE, CATEGORY B".

2.6.3.2.3 Renumber current 2.6.3.2.3 as 2.6.3.2.3.1 and add a new 2.6.3.2.3 to read as follows:

"2.6.3.2.3 *Exemptions*"

Insert the following new sub-paragraphs:

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

2.6.3.2.3.3 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 Regulations unless they meet the criteria for inclusion in another class.

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

2.6.3.2.4 Current 2.6.3.2.4 becomes new 2.6.3.2.3.5. Amend the beginning of the paragraph to read as follows: "Dried blood spots, collected by applying a drop of blood onto absorbent material, or faecal occult blood screening tests and blood or blood components...".

Current 2.6.3.2.5 Delete

2.6.3.2.6 Current 2.6.3.2.6 becomes new 2.6.3.2.3.6. In new 2.6.3.2.3.6 add the following new first sentence: "Unless an infectious substance cannot be consigned by any other means, live animals shall not be used to consign such a substance."

2.6.3.5.1 Delete "or containing Category B infectious substances in cultures" in the first sentence and ", other than in cultures, " in the last sentence.

## Chapter 2.7

[2.7.1.2 (e) Replace "the values specified in 2.7.7.2. " with "the values specified in 2.7.7.2.1 (b), or calculated in accordance with 2.7.7.2.2 to 2.7.7.2.6."].

[2.7.2 In the definition of "*Multilateral approval*", amend the first sentence to read as follows: *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 the consignment is to be transported through or into any other country, approval by the *competent authority* of that country."

In the definition of "Freight container in the case of radioactive material transport", amend the end of the first sentence and the beginning of the current second sentence to read as follows: "...transport without intermediate reloading which is of a permanent enclosed character, ...".

In the definition of "*Specific activity of a radionuclide*", delete: "or volume "

In the definition of "Natural Uranium" (under "Uranium-natural, depleted, enriched") replace "chemical separated uranium" with "uranium (which may be chemically separated)".].

[2.7.3.2 (a)(ii) Amend to read: "Natural uranium, depleted uranium, natural thorium or their compounds or mixtures, providing they are unirradiated and in solid or liquid form;"]

[2.7.4.6 (a) Amend to read:

“(a) The tests prescribed in 2.7.4.5 (a) and 2.7.4.5 (b) provided the mass of the special form radioactive material

- (i) is less than 200 g and they are alternatively subjected to the Class 4 impact test prescribed in ISO 2919:1990 "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"]

[2.7.7.1.7 Amend the beginning of the first sentence to read: "Unless excepted by 6.4.11.2, packages containing...".]

[2.7.7.1.8 Amend to read as follows:  
"Packages containing uranium hexafluoride shall 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."].

[2.7.7.2.1 In the table, amend the value in the last column for Te-121m to read " $1 \times 10^6$ " instead of " $1 \times 10^5$ ".].

Amend (a) and (b) after the table as follows:

"(a)  $A_1$  and/or  $A_2$  values for these parent radionuclides include contributions from daughter radionuclides 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) Insert "Ag-108m Ag-108" after: "Ru-106 Rh-106".

Delete the entries for: "Ce-134, La 134"; "Rn-220, Po-216"; "Th-226, Ra-222, Rn-218, Po-214"; and "U-240, Np-240m".].

[2.7.7.2.2 In the first sentence, delete "competent authority approval, or for international transport," and amend the beginning of the second sentence to read as follows: "It is permissible to use an  $A_2$  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...".

In the table:

- Amend the second entry in the first column to read: "Alpha emitting nuclides but no neutron emitters are known to be present"
- Amend the third entry in the first column to read: "Neutron emitting nuclides are known to be present or no relevant data are available"].

[2.7.8.4 (d) and (e) Add: "except under the provisions of 2.7.8.5".].

[2.7.8.5 Add a new 2.7.8.5 to read:

"2.7.8.5 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 2.7.8.4 shall be in accordance with the certificate of the country of origin of design.".]

## Chapter 2.8

2.8.2.2 Amend the beginning of the last sentence to read as follows: "Liquids, and solids that may become liquid during transport, which are judged not to cause..." (*remainder of the sentence unchanged*).

## Chapter 2.9

[2.9.2.1 a) Add "which are not covered by other classes" at the end.]



## PART 3

### Chapter 3.2

- 3.2.1 In the explanations for column (10), add the following text at the end: "The gases authorized for transport in MEGCs are indicated in the column "MEGC" in Tables 1 and 2 of packing instruction P200 in 4.1.4.1."

#### Dangerous Goods List

Delete the entries for the following UN Nos.: 1014, 1015, 1979, 1980, 1981 and 2600.

[For UN Nos. 2912, 2915, 3321 and 3322, add "325" in column (6).]

[For UN Nos. 3324, 3325 and 3327, add "326" in column (6).]

For UN Nos. 2758, 2760, 2762, 2764, 2772, 2776, 2778, 2780, 2782, 2784, 2787, 3021, 3024 and 3346, add "61" in column (6).

For UN Nos. 1263 and 3066, add "TP27", "TP28" and "TP29" in column (11) for packing groups I, II and III, respectively.

UN 1143 Amend the name in column (2) to read as follows: "CROTONALDEHYDE or CROTONALDEHYDE, STABILIZED" and add "324" in column (6).

UN 1170 Delete "PP2" from column (9).

UN 1463 Add "6.1" before "8" in column (4).

UN 1733 Replace "1 L" with "1 kg" in column (7) and "P001 IBC02" with "P002 IBC08" in column (8) and add "B2, B4" in column (9), "T3" in column (10) and "TP33" in column (11).

UN 1740 Amend the name in column (2) to read: "HYDROGEN DIFLUORIDES, SOLID, N.O.S."

UN 1779 Amend the name in column (2), to read as follows: "FORMIC ACID with more than 85% acid by mass" and add "3" in column (4).

UN 1848 Amend the name in column (2) to read as follows: "PROPIONIC ACID with not less than 10% and less than 90% acid by mass".

UN 1950 Add "LP02" in column (8) and "PP87" and "L2" in column (9).

UN 1956 Insert "292" in column (6).

UN 2015 Replace "T10" with "T9" in column (10).

UN 2030 In column (10), replace "T20" with "T10" for packing group I and "T15" with "T7" for packing group II, and in column (11), replace "TP2" with "TP1" for packing group III.

UN 2662 Delete this entry.

UN 2823 Amend the name in column (2) to read: "CROTONIC ACID, SOLID".

UN 2880 For packing group II: insert "322" in column (6);  
For packing group III: replace "316" with "223", "313" and "314";

UN 3245 Amend the proper shipping name in column (2) to read as follows: "GENETICALLY MODIFIED MICROORGANISMS or GENETICALLY MODIFIED ORGANISMS".

UN 3373 Amend the proper shipping name in column (2) to read: "BIOLOGICAL SUBSTANCE, CATEGORY B", delete "319" in column (6) and add "T1" and "TP1" in columns (10) and (11), respectively.

UN 3435 Delete this entry.

Add the following new entries:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
3412	FORMIC ACID with not less than 10% but not more than 85% acid by mass	8		II		1 L	P001 IBC02		T7	TP2
	FORMIC ACID with not less than 5% but less than 10% acid by mass	8		III		5 L	P001 IBC03 LP01		T4	TP1
3463	PROPIONIC ACID with not less than 90% acid by mass	8	3	II		1 L	P001 IBC02		T7	TP2
3469	PAINT, FLAMMABLE, CORROSIVE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL, FLAMMABLE, CORROSIVE (including paint thinning or reducing compound)	3	8	I	163	NONE	P001		T11	TP2 TP27
		3	8	II	163	1 L	P001 IBC02		T7	TP2 TP8 TP28
		3	8	III	163 223	5 L	P001 IBC03		T4	TP1 TP29
3470	PAINT, CORROSIVE, FLAMMABLE (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL CORROSIVE, FLAMMABLE (including paint thinning or reducing compound)	8	3	II	163	1 L	P001 IBC02		T7	TP2 TP8 TP28
3471	HYDROGENDIFLUORIDES SOLUTION, N.O.S.	8	6.1	II		1 L	P001 IBC02		T7	TP2
		8	6.1	III	223	5L	P001 IBC03		T4	TP1
3472	CROTONIC ACID, LIQUID	8		III		5L	P001 IBC03 LP01		T4	TP1

### Chapter 3.3

3.3.1 **SP191** Delete "may be considered as similar to aerosols except that they" in the first sentence.

**SP216** In the last sentence, insert "and articles" before "containing" and amend the end to read: "... free liquid in the packet or article."

**SP247** Amend the end of the first paragraph to read:

"...may be transported in wooden barrels with a capacity of more than 250 litres and not more than 500 litres meeting the general requirements of 4.1.1, as appropriate, on the following conditions:..."

Replace the word "casks" wherever it appears with "wooden barrels".

Delete paragraph (e).

**SP251** In the first sentence, add "for example" before "for medical," add "or repair" before "purposes".

**SP292** Amend to read as follows:

"Mixtures containing not more than 23.5% oxygen by volume may be transported under this entry when no other oxidizing gases are present. A Division 5.1 subsidiary risk label is not required for any concentrations within this limit."

**SP303** Amend to read as follows:

"Receptacles shall be assigned to the division and, if any, subsidiary hazard of the gas or mixture of gases contained therein determined in accordance with the provisions of Chapter 2.2."

**SP309** Amend to read as follows:

"This entry applies to non sensitized emulsions, suspensions and gels consisting primarily of a mixture of ammonium nitrate and fuel, intended to produce a Type E blasting explosive only after further processing prior to use.

The mixture for emulsions typically has the following composition: 60-85% ammonium nitrate, 5-30% water, 2-8% fuel, 0.5-4% emulsifier agent, 0-10% soluble flame suppressants, and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate.

The mixture for suspensions and gels typically has the following composition: 60-85% ammonium nitrate, 0-5% sodium or potassium perchlorate, 0-17% hexamine nitrate or monomethylamine nitrate, 5-30% water, 2-15% fuel, 0.5-4% thickening agent, 0-10% soluble flame suppressants, and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate.

Substances shall satisfactorily pass Test Series 8 of the Manual of Tests and Criteria, Part I, Section 18 and be approved by the competent authority."

**SP316** Delete "or hydrated".

**SP319** Delete.

Add the following new special provisions:

**322** When transported in non-friable tablet form, these goods are assigned to packing group III."

[**323** The label conforming to the model prescribed in the 13th revised edition of the UN Recommendations on the Transport of Dangerous Goods, Model Regulations, may be used until 1 January 2011."].

**324** This substance needs to be stabilized when in concentrations of not more than 99%".

[**325** In the case of non-fissile or fissile excepted uranium hexafluoride, the material shall be classified under UN No 2978.]

[**326** In the case of fissile uranium hexafluoride, the material shall be classified under UN No. 2977."].

### **Chapter 3.4**

[3.4.10 Add a new 3.4.10 to read as follows:  
"3.4.10 The environmentally hazardous mark is not required when single packagings or inner packagings of combination packagings contain less than 5 l for liquids or 5 kg for solids."].

### **Alphabetical index of substances and articles**

Delete the entries for "1,4-Benzenediol", "p-Dihydroxybenzene", "Hydroquinol", "HYDROQUINONE, SOLID", "Quinol" and "HYDROQUINONE SOLUTION".

Amend the alphabetical index in accordance with the amendments to the Dangerous Goods List in Chapter 3.2.

## **PART 4**

### **Chapter 4.1**

Renumber all references to renumbered paragraphs of Chapters 6.1, 6.5 and 6.6, as appropriate.

4.1.1.5 Insert the following new second sentence:

"Inner packagings containing liquids shall be packaged with their closures upward and placed within outer packagings consistent with the orientation markings prescribed in 5.2.1.6 of these Regulations."

4.1.1.5.1 Insert a new paragraph 4.1.1.5.1 with the same text as in existing 6.1.5.1.6 with the insertion of the words "or a large packaging" after "combination packaging" and the words "or large packaging" after "outer packaging" in the first sentence.

4.1.1.8 Amend to read as follows:

"4.1.1.8 Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other causes), the packaging, including IBCs, may be fitted with a vent provided that the gas emitted will not cause danger on account of its toxicity, its flammability, the quantity released, etc.

A venting device shall be fitted if dangerous overpressure may develop due to normal decomposition of substances. The vent shall be so designed that when the packaging is in the attitude in which it is intended to be transported, leakages of liquid and the penetration of foreign substances are prevented under normal conditions of transport.

4.1.1.8.1 Liquids may only be filled into inner packagings which have an appropriate resistance to internal pressure that may be developed under normal conditions of transport.

4.1.1.8.2 Venting of the package is not permitted for air transport."

4.1.4.1 **P001** Amend special packing provision PP2, to read as follows:

"**PP2** For UN 3065, wooden barrels with a maximum capacity of 250 litres and which do not meet the provisions of Chapter 6.1 may be used."

**P002** In special packing provision **PP37**, amend the second sentence to read as follows:  
"All bags of any type shall be transported in closed cargo transport units or be placed in closed rigid overpacks."

**P003** Add a new special packing provision PP87 to read as follows:  
"**PP87** [For UN 1950 only, aerosols transported for the purpose of reprocessing or of disposal are permitted]. The packagings shall have a means of retaining any free liquid that might escape during transport e.g. absorbent material. The packaging shall be adequately ventilated to prevent the creation of flammable atmosphere and the build-up of pressure. [Toxic aerosols shall not be transported under this special packing provision.]"

**P200** In paragraph (4), amend special provisions "k", "l", "n" and "z" as follows:

Special provision "k": Replace the sentence "The pressure receptacle(s) shall:" and subparagraphs i) and ii) with the following text:

"Cylinders and individual cylinders in a bundle shall have a test pressure greater than or equal to 200 bar and a minimum wall thickness of 3.5 mm for aluminium alloy or 2 mm for steel. Individual cylinders not complying with this requirement shall be transported in a rigid outer packaging that will adequately protect the cylinder and its fittings and meeting the packing group I performance level. Pressure drums shall have a minimum wall thickness of [3.5] mm for aluminium alloy or [2] mm for steel."

Special provision "l": In the last sentence, replace "total quantity" with "maximum net mass".

Special provision "n": Amend to read as follows:

"Cylinders and individual cylinders in a bundle shall contain not more than 5 kg of the gas. [Bundles containing UN 1045 Fluorine, compressed, may be constructed with isolation valves on assemblies (groups) of cylinders not exceeding 150 litres total water

capacity instead of valves on every cylinder. The gas contents of such assemblies shall be limited to 5 kg.]".

Special provision "z": Amend the third paragraph to read as follows:

"Toxic substances with an LC<sub>50</sub> less than or equal to 200 ml/m<sup>3</sup> shall not be transported in tubes, pressure drums or MEGCs and shall meet the requirements of special packing provision "k". However, UN 1975 Nitric oxide and dinitrogen tetroxide mixture may be transported in pressure drums."

In Tables 1 and 2, delete the entries for the following UN Nos.: 1014, 1015, 1979, 1980, 1981 and 2600.

In Table 1, in the heading of column 13, replace "Working pressure, bar" with "Maximum working pressure, bar"

In Table 2:

- For UN Nos. 2192 and 2199, add "q" (twice for UN No. 2199) in the column under the heading "Special packing provisions".
- For UN 2451, delete "300" and "0.75" in the columns for "Test pressure" and "Filling ratio", respectively.

**P650** In paragraph (2) (c), replace "an outer" with "a rigid outer".

In paragraph (4):

Amend the second sentence to read as follows: "The mark shall be in the form of a square set at an angle of 45° (diamond-shaped) with each side have a length of at least 50 mm, the width of the line shall be at least 2 mm and the letters and numbers shall be at least 6 mm high."

Add the following new third sentence: "The proper shipping name "BIOLOGICAL SUBSTANCE, CATEGORY B" in letters at least 6 mm high shall be marked on the outer package adjacent to the diamond-shaped mark."

Insert a new paragraph (5) to read as follows and renumber subsequent paragraphs accordingly:

"(5) At least one surface of the outer packaging shall have a minimum dimension of 100 mm × 100 mm."

Amend current paragraph (5) (renumbered (6)) to read as follows:

"(6) The completed package shall be capable of successfully passing the drop test in 6.3.2.5 as specified in 6.3.2.2 to 6.3.2.4 of these Regulations at a height of 1.2 m. Following the appropriate drop sequence, there shall be no leakage from the primary receptacle(s) which shall remain protected by absorbent material, when required, in the secondary packaging;"

In (7) (renumbered (8)), add a new sub-paragraph (d) to read as follows:

"(d) If there is any doubt as to whether or not residual liquid may be present in the primary receptacle during transport then a packaging suitable for liquids, including absorbent materials, shall be used."

Insert a new paragraph (10) to read as follows and renumber subsequent paragraphs accordingly:

"(10) When packages are placed in an overpack, the package markings required by this packing instruction shall either be clearly visible or be reproduced on the outside of the overpack."

Add a new paragraph (13) to read as follows:

"(13) Other dangerous goods shall not be packed in the same packaging as Division 6.2 infectious substances unless they are necessary for maintaining the viability, stabilizing or preventing degradation or neutralizing the hazards of the infectious substances. A quantity of 30 ml or less of dangerous goods included in Classes 3, 8 or 9 may be packed in each primary receptacle containing infectious substances. When these small quantities of dangerous goods are packed with infectious substances in accordance with this packing instruction no other requirements in these Regulations need be met."

**P800** In paragraph (2), replace "2.5 l" with "3 l".

**P802** In paragraph (4), delete "Austenitic".

4.1.4.3 **LP02** Add a new special packing provision "L2" to read as follows:

**"L2** For UN 1950, only aerosols transported for the purpose of reprocessing or of disposal are permitted. Inner packagings are not required. The large packaging shall meet the Packing Group III performance level. Large packagings shall have a means of retaining any free liquid that might escape during transport e.g. absorbent material. The large packaging shall be adequately ventilated to prevent the creation of flammable atmosphere and the build up of pressure. Toxic aerosols shall not be transported under this packing instruction."

[4.1.9.1.3 Amend to read:

“A package shall not contain any items other than those that are necessary for the use of the radioactive material. The interaction between these items and the package under the conditions of transport applicable to the design, shall not reduce the safety of the package.”].

[4.1.9.2.2 Amend to read: “For LSA material and SCO which is or contains fissile material the applicable requirements of 6.4.11.1, 7.1.7.4.1 and 7.1.7.4.2 shall be met.”].

## Chapter 4.2

4.2.1.15 Add a new 4.2.1.15 to read as follows:

"4.2.1.15 *Additional provisions applicable to the transport of Division 6.2 substances in portable tanks*  
(Reserved).".

Re-number subsequent paragraphs accordingly.

4.2.5.1.1 Add a note to read as follows:

*"NOTE: The gases authorized for transport in MEGCs are indicated in the column "MEGC" in Tables 1 and 2 of packing instruction P200 in 4.1.4.1."*

## Chapter 4.3

4.3.2.4 Existing paragraph 4.3.2.4 becomes new 4.3.2.4.1. Add a new 4.3.2.4 to read as follows:  
**"4.3.2.4 Bulk waste goods of Division 6.2".**

4.3.2.4.2 Add a new paragraph 4.3.2.4.2 to read as follows:

"4.3.2.4.2 *Bulk wastes of Division 6.2 (UN 3291)*

- (a) Only closed bulk containers (BK2) shall be permitted;
- (b) Closed bulk containers, and their openings, shall be leakproof by design. These bulk containers shall have non porous interior surfaces and shall be free from cracks or other features that could damage packagings inside, impede disinfection or permit inadvertent release;
- (c) Wastes of UN 3291 shall be contained within the closed bulk container in UN type tested and approved sealed leakproof plastics bags tested for solids of packing group II and marked in accordance with 6.1.3.1. Such plastics bags shall be capable of passing the tests for tear and impact resistance according to ISO 7765-1:1988 "Plastics film and sheeting. Determination of impact resistance by the free-falling dart method. Part 1: Staircase methods" and ISO 6383-2:1983 "Plastics. Film and sheeting. Determination of tear resistance. Part 2: Elmendorf method". Each bag shall have an impact resistance of at least 165 g and a tear resistance of at least 480 g in both parallel and perpendicular planes with respect to the length of the bag. The maximum net mass of each plastics bag shall be 30 kg;
- (d) Single articles exceeding 30 kg such as soiled mattresses may be transported without the need for a plastics bag when authorized by the competent authority;
- (e) Wastes of UN 3291 which contain liquids shall only be transported in plastics bags containing sufficient absorbent material to absorb the entire amount of liquid without it spilling in the bulk container;
- (f) Wastes of UN 3291 containing sharp objects shall only be transported in UN type tested and approved rigid packagings meeting the provisions of packing instructions P621, IBC620 or LP621.



- (g) Rigid packagings specified in packing instructions P621, IBC620 or LP621 may also be used. They shall be properly secured to prevent damage during normal conditions of transport. Wastes transported in rigid packagings and plastics bags together in the same closed bulk container shall be adequately segregated from each other, e.g. by suitable rigid barriers or dividers, mesh nets or otherwise securing the packagings, such that they prevent damage to the packagings during normal conditions of transport;
- (h) Wastes of UN 3291 in plastics bags shall not be compressed in a closed bulk container in such a way that bags may be rendered no longer leakproof;
- (i) The closed bulk container shall be inspected for leakage or spillage after each journey. If any wastes of UN 3291 have leaked or been spilled in the closed bulk container, it shall not be re-used until after it has been thoroughly cleaned and, if necessary, disinfected or decontaminated with an appropriate agent. No other goods shall be transported together with UN 3291 other than medical or veterinary wastes. Any such other wastes transported in the same closed bulk container shall be inspected for possible contamination."

## **PART 5**

### **Chapter 5.1**

5.1.2.3 Add a new paragraph to read as follows:

"5.1.2.3 Each package bearing package orientation markings as prescribed in 5.2.1.6 of these Regulations and which is overpacked or placed in a large packaging shall be oriented in accordance with such markings."

[5.1.5.1.2 (c) Amend to read:

“(c) For each package requiring competent authority approval, it shall be ensured that all the requirements specified in the approval certificates have been satisfied;”].

[5.1.5.2.2 (c) Amend to read:

“The shipment of packages containing fissile materials if the sum of the criticality safety indexes of the packages in a single freight container or in a single conveyance exceeds 50. Excluded from this requirement shall be shipments by seagoing vessels, if the sum of the criticality safety indexes does not exceed 50 for any hold, compartment or defined deck area and the distance of 6 m between groups of packages or overpacks as required in table 7.1.7.4.2 is met; and” .].

[5.1.5.2.4 (d)(ii) Replace “routing” with “routeing”].

[In (v), insert “symbol” after “SI prefix”].

### **Chapter 5.2**

5.2.1.4 and 5.2.2.1.7 Add "and large packagings" after "capacity".

[5.2.1.5.4 (c) Amend the end of the sentence to read as follows: "...origin of design and either the name of the manufacturer or other identification of the packaging specified by the competent authority of the country of origin of design."].

[5.2.1.5.8 Add the following new paragraph:

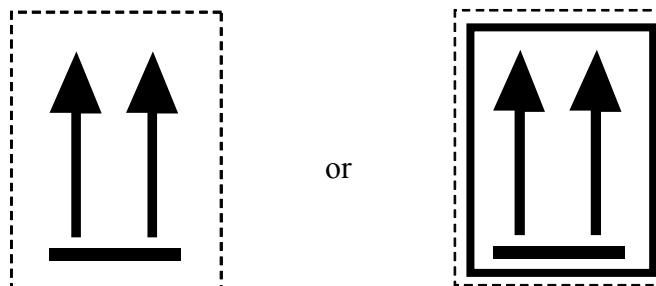
"In case of international transport of packages requiring competent authority design or shipment approval, for which different approval types apply in the different countries concerned, marking shall be in accordance with the certificate of the country of origin of the design."].

5.2.1.6 Add the following new paragraphs:

"5.2.1.6 Except as provided in 5.2.1.6.1:

- combination packagings having inner packagings containing liquid dangerous goods;
- single packagings fitted with vents; and
- open cryogenic receptacles intended for the transport of refrigerated liquefied gases,

shall be legibly marked with package orientation arrows which are similar to the illustration shown below or with those meeting the specifications of ISO 780:1985. The orientation arrows shall appear on two opposite vertical sides of the package with the arrows pointing in the correct upright direction. They shall be rectangular and of a size that is clearly visible commensurate with the size of the packaging. Depicting a rectangular border around the arrows is optional.



Two black or red arrows on white or suitable contrasting background.  
The rectangular border is optional

5.2.1.6.1 Orientation arrows are not required on packages containing:

- (a) pressure receptacles;
- (b) dangerous goods in inner packagings of not more than 120 ml which are prepared with sufficient absorbent material between the inner and outer packagings to completely absorb the liquid contents;
- (c) Division 6.2 infectious substances in primary receptacles of not more than 50 ml;

[(d) Class 7 radioactive material in Type B or C packages; or]

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

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

[5.2.1.7 Add a new 5.2.1.7 to read as follows:

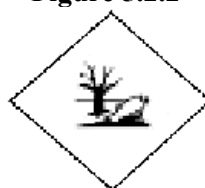
"5.2.1.7 *Special marking provisions for environmentally hazardous substances*

5.2.1.7.1 Packages containing environmentally hazardous substances shall be durably marked with the environmentally hazardous substance mark.

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

5.2.1.7.3 The environmentally hazardous substance mark shall be as shown in Figure 5.2.2. For packagings, the dimensions shall be 100 mm × 100 mm. For transport units (see 5.3.2.3.1), the minimum dimensions shall be 250 mm × 250 mm.

**Figure 5.2.2**



Symbol (fish and tree): black on white or suitable contrasting background"]

[5.2.2.1.12.2 (b) Insert "symbol" after "SI prefix".].

5.2.2.2.1 Add the following note at the end of the existing text:

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

5.2.2.2.1.1 Add the following sentence at the end: "Labels shall be displayed on a background of contrasting colour, or shall have either a dotted or solid outer boundary line."

[5.2.2.1.12.5 Add the following new paragraph:

"5.2.2.1.12.5 In case of international transport of packages requiring competent authorities design or shipment approval, for which different approval types apply in the different countries concerned, labelling shall be in accordance with the certificate of the country of origin of design."].

5.2.2.1.13 Delete.

[5.2.2.2.2 In the labels for class 5:

Replace the text under label No. 5.1 with the following:

"(No. 5.1)  
Division 5.1  
Oxidizing substances  
Symbol (flame over circle): black; Background: yellow  
Figure "5.1" in bottom corner"

Replace label No. 5.2 and the text under the label with the following:



"(No. 5.2)  
Division 5.2  
Organic peroxides  
Symbol (flame over circle): black; Background: upper half red; lower half yellow;  
Figure "5.2" in bottom corner".]

### Chapter 5.3

5.3.1.1.2 [Amend to read as follows:]\* [Add the following sentence at the end]\*\*: "Placards shall be displayed on a background of contrasting colour, or shall have either a dotted or solid outer boundary line."

[5.3.1.1.5.1 Replace: "which conform with the model 7D" with "which conform to the model 7D"].

[5.3.2.3 Add a new 5.3.2.3 to read as follows:

"5.3.2.3 *Environmentally hazardous substance mark*

5.3.2.3.1 A transport unit containing environmentally hazardous substances shall be marked on at least two opposing sides of the unit and in any case in such a position as may be seen by all those involved in the loading or unloading processes, with the environmentally hazardous substance mark to be affixed in accordance with the provisions of 5.3.1.1.4 for placards."].

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\* *Amendment adopted by the Sub-Committee.*

\*\* *Amendment proposed by the Secretariat.*

## Chapter 5.4

5.4.1.4.1 Replace current (b) and (c) with the following:

- "(b) The proper shipping name, as determined according to 3.1.2, including the technical name enclosed in parenthesis, as applicable (see 3.1.2.8);
- (c) The primary hazard class or, when assigned, the division of the goods, including for Class 1, the compatibility group letter. The words "Class" or "Division" may be included preceding the primary hazard class or division numbers; "

Insert a new (d) to read as follows:

- "(d) Subsidiary hazard class or division number(s), when assigned, shall be entered following the primary hazard class or division and shall be enclosed in parenthesis. The words "Class" or "Division" may be included preceding the subsidiary hazard class or division numbers;".

Current "(d)" becomes new "(e)".

5.4.1.4.2 Amend the first paragraph and the examples to read as follows:

"The five elements of the dangerous goods description specified in 5.4.1.4.1 shall be shown in the order listed above (i.e. (a), (b), (c), (d), (e)) with no information interspersed, except as provided in these Regulations. Examples of a dangerous goods description are:

UN1098 ALLYL ALCOHOL 6.1 (3) I

UN1098, ALLYL ALCOHOL, Division 6.1, (Class 3), PG I"

*(The existing NOTE remains unchanged).*

[5.4.1.4.3 (e) Add a new sub-paragraph (e) to read as follows:

- "(e) Substances meeting the criteria in 2.9.3.3 shall be identified as such by adding the words "AQUATIC POLLUTANT" immediately following the dangerous goods description. An example is: "UN 2218 ACRYLIC ACID, STABILIZED 8 (3) II, AQUATIC POLLUTANT"."]

5.4.1.5.1 In the current last but one sentence, replace "packagings" with "packages" and insert the following sentence before the last sentence: "UN packaging codes may only be used to supplement the description of the kind of package (e.g. one box (4G)).".

[5.4.1.5.7.2(b) Replace "routing" with "routeing".].

[5.4.1.5.7.3 Insert the following new paragraph:

"5.4.1.5.7.3 In case of international transport of packages requiring competent authorities design or shipment approval, for which different approval types apply in the different countries concerned, the UN number and proper shipping name required in 5.4.1.4.1 shall be in accordance with the certificate of the country of origin of design."].

Renumber existing 5.4.1.5.7.3 as 5.4.1.5.7.4.

## **PART 6**

### **Chapter 6.1**

6.1.2.5 Under 2., replace "wooden barrel" with "reserved".

6.1.2.7 In the table, replace the text in the row for "Wooden barrels" with "(Reserved)".

6.1.4.6 Amend to read: "6.1.4.6 (*Deleted*)".

6.1.5.1.6 Replace current text with the following:

"6.1.5.1.6 (Reserved)

*NOTE: For the conditions for assembling different inner packagings in an outer packaging and permissible variations in inner packagings, see 4.1.1.5.1.".*

6.1.5.2.4 Delete. Renumber next paragraph accordingly.

6.1.5.3.1 In the table, delete "wooden barrels" under "Packaging".

### **Chapter 6.2**

6.2.1.3.6.5.4 Amend footnote 1 to read as follows:

<sup>1</sup> See for example CGA Publications S-1.2-2003 "Pressure Relief Device Standards - Part 2 - Cargo and Portable Tanks for Compressed Gases" and S-1.1-2003 "Pressure Relief Device Standards - Part 1 - Cylinders for Compressed Gases".

6.2.1.5.1 Amend subparagraph (c) to read as follows:

"(c) Checking of the threads if there is evidence of corrosion or if the fittings are removed;"

Amend the end of Note 2 under subparagraph (d) to read as follows:

"... based on acoustic emission testing, ultrasonic examination or a combination of acoustic emission testing and ultrasonic examination."

6.2.2.5.3.1 In (a), insert "of personnel" after "responsibilities" and delete ", and power of the management".

In (b), replace "systematic actions" with "procedures".

Delete the commas before "and" in (c) and (d).

6.2.2.5.4.10 Amend to read as follows:

"6.2.2.5.4.10 Modifications to approved design types

The manufacturer shall either:

- (a) inform the issuing competent authority of modifications to the approved design type, where such modifications do not constitute a new design, as specified in the pressure receptacle standard; or
- (b) request a subsequent design type approval where such modifications constitute a new design according to the relevant pressure receptacle standard. This additional approval shall be given in the form of an amendment to the original design type approval certificate."

6.2.2.7.2 In (g) add the following new last sentence at the end of the existing text:

"In the case of pressure receptacles for UN 1001 acetylene, dissolved and UN 3374 acetylene, solvent free, at least one decimal shall be shown after the decimal point and two digits for pressure receptacles of less than 1 kg;"

In (k) and (l): Insert ", any coating," after "during filling" and replace "two" with "three" in the first sentence, new last sentence at the end of the existing text:

"At least one decimal shall be shown after the decimal point. For pressure receptacles of less than 1 kg, the mass shall be expressed to two significant figures rounded down to the last digit;"

6.2.4 Renumber current paragraphs 6.2.4.1 and 6.2.4.2 as 6.2.4.1.1 and 6.2.4.1.2 respectively and insert a new 6.2.4.1 to read as follows:

**"6.2.4.1            *Small receptacles containing gas (gas cartridges)*"**

Add the following new paragraphs:

**"6.2.4.2            *Aerosol dispensers***

Each filled aerosol dispenser shall be subjected to a test performed in a hot water bath or an approved water bath alternative.

6.2.4.2.1        *Hot water bath test*

6.2.4.2.1.1 The temperature of the water bath and the duration of the test shall be such that the internal pressure reaches that which would be reached at 55 °C (50 °C if the liquid phase does not exceed 95% of the capacity of the aerosol dispenser at 50 °C). If the contents are sensitive to heat or if the aerosol dispensers are made of plastics material which softens at this test temperature, the temperature of the bath shall be set at between 20 °C and 30 °C but, in addition, one aerosol dispenser in 2000 shall be tested at the higher temperature.

6.2.4.2.1.2 No leakage or permanent deformation of an aerosol dispenser may occur, except that a plastic aerosol dispenser may be deformed through softening provided that it does not leak.

#### 6.2.4.2.2 *Alternative methods*

With the approval of the Competent Authority alternative methods which provide an equivalent level of safety may be used provided that the requirements of 6.2.4.2.2.1, 6.2.4.2.2.2 and 6.2.4.2.2.3 are met.

##### 6.2.4.2.2.1 Quality systems

Aerosol dispenser fillers and component manufacturers shall have a quality system. The quality system shall implement procedures to ensure that all aerosol dispensers that leak or that are deformed are rejected and not offered for transport.

The quality system shall include:

- (a) a description of the organizational structure and responsibilities;
- (b) the relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;
- (c) quality records, such as inspection reports, test data, calibration data and certificates;
- (d) management reviews to ensure the effective operation of the quality system;
- (e) a process for control of documents and their revision;
- (f) a means for control of non-conforming aerosol dispensers;
- (g) training programmes and qualification procedures for relevant personnel; and
- (h) procedures to ensure that there is no damage to the final product.

An initial audit and periodic audits shall be conducted to the satisfaction of the competent authority. These audits shall ensure the approved system is and remains adequate and efficient. Any proposed changes to the approved system shall be notified to the competent authority in advance.

##### 6.2.4.2.2.2 Pressure and leak testing of aerosol dispensers before filling

Every empty aerosol dispenser shall be subjected to a pressure equal to or in excess of the maximum expected in the filled aerosol dispensers at 55 °C (50 °C if the liquid phase does not exceed 95% of the capacity of the receptacle at 50 °C). This shall be at least two-thirds of the design pressure of the aerosol dispenser. If any aerosol dispenser shows evidence of leakage at a rate equal to or greater than  $3.3 \times 10^{-2}$  mbar.l.s<sup>-1</sup> at the test pressure, distortion or other defect, it shall be rejected.



## 6.2.4.2.2.3 Testing of the aerosol dispensers after filling

Prior to filling the filler shall ensure that the crimping equipment is set appropriately and the specified propellant is used.

Each filled aerosol dispenser shall be weighed and leak tested, The leak detection equipment shall be sufficiently sensitive to detect at least a leak rate of  $2.0 \times 10^{-3}$  mbar.l.s<sup>-1</sup> at 20 °C.

Any filled aerosol dispenser which shows evidence of leakage, deformation or excessive weight shall be rejected."

6.2.4.3 Add a new paragraph to read as follows:

"6.2.4.3 With the approval of the competent authority, aerosols and receptacles, small, containing pharmaceutical products and non flammable gases which are required to be sterile, but may be adversely affected by water bath testing, are not subject to 6.2.4.1 [and 6.2.4.2] if:

- (a) They are manufactured under the authority of a national health administration and, if required by the competent authority, follow the principles of Good Manufacturing Practice (GMP) established by the World Health Organization (WHO)<sup>2</sup>; and
- (b) An equivalent level of safety is achieved by the manufacturer's use of alternative methods for leak detection and pressure resistance, such as helium detection and water bathing a statistical sample of at least 1 in 2000 from each production batch."

## Chapter 6.4

[6.4.5.2 (b) Amend to read as follows:

“(b) more than a 20% increase in the maximum radiation level at any external surface of the package.”.

Consequential changes in 6.4.5.4.1(c)(ii), 6.4.5.4.2(c), 6.4.5.4.4(c)(ii), 6.4.5.4.5(b)(ii) and 6.4.7.14(b)].

[6.4.7.16 In the first sentence, replace "liquids" with "liquid radioactive material"].

[6.4.8.3 In the first sentence, delete "Except as required in 6.4.3.1 for a package transported by air," and replace "6.4.8.4," with "6.4.8.5 and in the absence of insulation,"].

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<sup>2</sup> WHO Publication: "Quality assurance of pharmaceuticals. A compendium of guidelines and related materials. Volume 2: Good manufacturing practices and inspection".

[6.4.8.4 The text of current 6.4.8.13 becomes new 6.4.8.4, with the following amendments:

In the first sentence, insert "under exclusive use" before "shall not exceed 85 °C" and replace "6.4.8.4" with "6.4.8.5". Delete the second sentence: ("The package shall... exceeds 50 °C.").

[6.4.8.4 to 6.4.8.12 Renumber as 6.4.8.5 to 6.4.8.13. Amend all cross-references accordingly.].

[6.4.11.2 (a) Amend the end of the sentence after the formula to read: "provided that the smallest external dimension of each package is not less than 10 cm and that either:".

Amend (a) (iii) to read as follows:

"(iii) there are not more than 5 g of *fissile material* in any 10 litre volume of material. Neither beryllium nor deuterium shall be present in quantities exceeding 1% of the applicable consignment mass limits provided in Table 6.4.11.2, except for deuterium in natural concentration in hydrogen."].

[6.4.11.7 (b) Amend the first sentence to read as follows: "For packages containing uranium hexafluoride only, with maximum enrichment of 5 mass percent uranium-235:"].

[6.4.22.1 (a) and (b) Amend to read as follows:

"(a) Each design that meets the requirements of 6.4.6.4 shall require multilateral approval;

(b) Each design that meets the requirement of 6.4.6.1 to 6.4.6.3 shall require unilateral approval by the competent authority of the country of origin of the design, unless multilateral approval is otherwise required by these Regulations."].

[6.4.23.3 (a) Replace "the consignment" with "the shipment".].

[6.4.23.12 (e) Replace "routing" with "routeing".].

[6.4.23.14 Insert new paragraphs, (l) (bis), (m) (i) (bis) and (n) (bis) and renumber accordingly:

"(l) (bis) A description of the containment system;"

"(m) (i) (bis) A description of the confinement system;"

"(n) (bis) For *packages* containing more than 0.1 kg of uranium hexafluoride, a statement specifying those prescriptions of 6.4.6.4 that apply if any and any amplifying information which may be useful to other competent authorities."].

[6.4.23.15 Delete the last sentence.].

[6.4.24.3 In the first sentence, delete "until 31 December 2003" and insert " multilateral approval of package design," before "the mandatory programme of quality assurance".

Delete the sentence: "After this date use may continue subject, additionally, to multilateral approval of package design."].

## Chapter 6.5

6.5.1 Amend the title to read "**General requirements**".

6.5.1.5 and 6.5.1.6 Delete the title of both sub-sections.

6.5.1.5.9 Delete.

6.5.3 Insert a new section 6.5.3 as follows:

### **"6.5.3 Construction requirements**

#### **6.5.3.1 General requirements"**

6.5.3.1.1 to 6.5.3.1.8: Text of existing 6.5.1.5.1 to 6.5.1.5.8.

6.5.4 Text of existing 6.5.1.6 with appropriate renumbering of paragraphs, sub-paragraphs and references to paragraphs numbers.

Renumber accordingly subsequent paragraphs of existing 6.5.3 and 6.5.4 and references thereto.

6.5.4.1.3 Delete.

6.5.4.5.2 (renumbered 6.5.6.5.2) Replace the last sentence of this paragraph with the following text:

"Flexible IBCs shall be filled with a representative material and then shall be loaded to six times their maximum permissible gross mass, the load being evenly distributed."

6.5.4.5.5 (b) (renumbered 6.5.6.5.5 (b)): Add at the end: "and no loss of contents."

6.5.4.9.2 (renumbered 6.5.6.9.2) In subparagraph (a), amend the first sentence to read: "Metal IBCs: the IBC shall be filled to not less than 95% of its maximum capacity for solids or 98% of its maximum capacity for liquids."

Amend subparagraph (b) to read as follows: "Flexible IBCs: the IBC shall be filled to [the maximum permissible gross mass], the contents being evenly distributed."

In subparagraph (c), amend the first sentence to read: "Rigid plastics IBCs: the IBC shall be filled to not less than 95% of its maximum capacity for solids or 98% of its maximum capacity for liquids."

In subparagraph (d), insert "maximum" before "capacity" and delete "in accordance with the design type".

6.5.6.9.4 Add a new paragraph to read as follows:

"6.5.6.9.4 *Drop height*

For solids and liquids, if the test is performed with the solid or liquid to be transported or with another substance having essentially the same physical characteristics:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

For liquids if the test is performed with water:

(a) Where the substances to be transported have a relative density not exceeding 1.2:

Packing group II	Packing group III
1.2 m	0.8 m

(b) Where the substances to be transported have a relative density exceeding 1.2, the drop heights shall be calculated on the basis of the relative density (d) of the substance to be transported rounded up to the first decimal as follows:

Packing group II	Packing group III
$d \times 1.0$ m	$d \times 0.67$ m

## Chapter 6.6

6.6.5.1.6 Amend to read as follows:

"6.6.5.1.6 (Reserved)

*NOTE: For the conditions for assembling different inner packagings in a large packaging and permissible variations in inner packagings, see 4.1.1.5.2."*

Insert a new 6.6.5.2.2 with the same text as existing 6.5.4.1.3, replacing the reference to 6.5.4.9.4 by a reference to 6.6.5.3.4.4 in sub-paragraph (a).

Renumber accordingly existing 6.6.5.2.2 to 6.6.5.2.4 and references thereto.

6.6.5.3.2.4 and 6.6.5.3.3.5: Amend by replacing the existing text with that of 6.5.4.5.5 (renumbered 6.5.6.5.5) and 6.5.4.6.5 (renumbered 6.5.6.6.5) respectively, but replacing the word "IBCs" by "large packagings".

## Chapter 6.7

6.7.3.8.1.1 and

6.7.4.7.4 In footnotes 4 and 6, replace "CGA S-1.2-1995" and "CGA Pamphlet S-1.2-1995" with "CGA S-1.2-2003 "Pressure Relief Device Standards-Part 2-Cargo and Portable Tanks for Compressed Gases".". "

6.7.5.4.1 Replace the first sentence with the following two sentences:

"The elements of MEGCs used for the transport of UN 1013 carbon dioxide and UN 1070 nitrous oxide shall be isolated by a valve into assemblies of not more than 3000 litres. Each assembly shall be fitted with one or more pressure relief devices.".  
(Current final sentence remains unchanged).

6.7.5.5.1 and

6.7.5.5.2 Replace "CGA S-1.2-1995" with "CGA S-1.2-2003 "Pressure Relief Device Standards, Part 2, Cargo and Portable Tanks for Compressed Gases"".

Replace "CGA S-1.1-1994" with "CGA S-1.1-2003 "Pressure Relief Device Standards,, Part 1, Cylinders for Compressed Gases"".

6.7.5.6.1 Amend to read as follows:

"6.7.5.6.1 Pressure relief devices shall be clearly and permanently marked with the following:

- (a) the manufacturer's name and relevant catalogue number;
- (b) the set pressure and/or the set temperature;
- (c) the date of the last test;".

6.7.5.6.2 Delete this paragraph and renumber subsequent paragraph accordingly.

6.7.5.8.1 In the third sentence, replace "and oxidising" with ", pyrophoric and oxidizing".

## PART 7

### Chapter 7.1

7.1.1 Amend current section 7.1.1 to read as follows:

#### **"7.1.1 Application, general provisions and loading requirements**

7.1.1.1 This Chapter contains provisions applicable to dangerous goods transport operations by all modes of transport.

- 7.1.1.2 Dangerous goods shall not be offered for transport unless;
- (a) goods have been properly classified, packaged, marked, labelled, labelled and described and certified on a dangerous goods transport document; and
  - (b) are in a fit condition for transport as required by these Regulations, and no dangerous residue of the dangerous goods adheres to the outside of the package.

- 7.1.1.3 Dangerous goods shall not be transported unless:
- (a) transport units have been appropriately marked, labelled and placarded; and
  - (b) transport units are otherwise in a condition for transport as required by these Regulations.

7.1.1.4 Packages containing dangerous goods shall only be loaded in transport units which are strong enough to withstand the shocks and loadings normally encountered during transport, having regard to the conditions to be expected during the anticipated journey. The transport unit shall be constructed in such a way as to prevent the loss of contents. Where appropriate the transport unit shall be fitted with devices to facilitate securing and handling of the dangerous goods.

7.1.1.5 The interior and exterior of a transport unit shall be inspected prior to loading to ensure that there is no damage that could affect its integrity or that of the packages to be loaded in it.

7.1.1.6 Transport units shall be loaded so that incompatible dangerous or other goods are segregated in accordance with this Chapter. Specific loading instructions such as orientation arrows, not to be double stacked, keep dry or temperature control requirements shall be met. Liquid dangerous goods shall be loaded below dry dangerous goods whenever possible.

7.1.1.7 Packages containing dangerous goods and unpackaged articles of dangerous goods shall be secured by suitable means capable of restraining the goods (such as fastening straps, sliding slatboards, adjustable brackets) in the transport unit in a manner that will prevent any movement during transport which would change the orientation of the packages or cause them to be damaged. When dangerous goods are transported with other goods (e.g. heavy machinery or crates), all goods shall be securely fixed or packed in the transport units so as to prevent the release of dangerous goods. Movement of packages may also be prevented by filling any voids by the use of dunnage or by blocking and bracing. Where restraints such as banding or straps are used, these shall not be over-tightened to cause damage or deformation of the package.

7.1.1.8 Packages shall not be stacked unless designed for that purpose. Where different design types of packages that have been designed for stacking are to be loaded together, consideration shall be given to their compatibility for stacking with each other. Where necessary, stacked packages shall be prevented from damaging the package below by the use of load-bearing devices.

7.1.1.9 During loading and unloading, packages containing dangerous goods shall be protected from being damaged. Particular attention shall be paid to the handling of packages during their preparation for transport, the type of transport unit on which they are to be carried and to the method of loading or unloading, so that accidental damage is not caused through dragging or mishandling the packages. Packages that appear to be leaking or damaged so that the contents may escape shall not be accepted for transport. If a package is found to be damaged so that the contents leak, the damaged package shall not be transported but moved to a safe place in accordance with instructions given by a competent authority or a designated responsible person who is familiar with the dangerous goods, the risks involved and the measures that should be taken in an emergency.

**NOTE 1:** *Additional operational requirements for the transport of packages and, IBCs are provided in the special packing provisions for packages and IBCs (see Chapter 4.1).*

**NOTE 2:** *Additional guidance on the packing of transport units can be found in the IMO/ILO/UNECE Guidelines for Packing Cargo Transport Units (CTUs) contained in the supplement to the International Maritime Dangerous Goods Code. Modal and National Codes of Practice (such as the Agreement governing the exchange and use of Wagons between Railway Undertakings (RIV 2000) Appendix II loading guidelines published by the International Union of Railways (UIC)), or the United Kingdom Department for Transport Code of Practice on Safety of Loads on Vehicles) may also be available.*

7.1.4 Insert a new section 7.1.4 as follows and renumber subsequent sections accordingly:

**7.1.4 Special provisions applicable to the transport of gases**

7.1.4.1 Aerosols transported under the provisions of special packing provision PP87 of packing instruction P003 or special packing provision L2 of packing instruction LP02 shall be transported in well-ventilated transport units."

[7.1.7.1.1 (renumbered 7.1.8.1.1) Amend to read as follows:

"Packages, overpacks and *freight containers* containing *radioactive material* and unpackaged radioactive material shall be segregated during transport and during storage in transit:

- (a) from workers in regularly occupied working areas by distances calculated using a dose criterion of 5 mSv in a year and conservative model parameters;
- (b) from members of the critical group of the public, in areas where the public has regular access, by distances calculated using a dose criterion of 1 mSv in a year and conservative model parameters;
- (c) from undeveloped photographic film by distances calculated using a radiation exposure criterion for undeveloped photographic film due to the transport of radioactive material for 0.1 mSv per consignment of such film; and
- (d) from other dangerous goods in accordance with [7.1.2 and 7.1.3.2]."

[7.1.7.1.3 (renumbered 7.1.8.1.3) Delete.]

[7.1.7.3.3 (renumbered 7.1.8.3.3) In (a), amend the beginning of the first sentence to read as follows: Except under the condition of exclusive use, and for consignments of LSA-I material, the total number of packages, ..." and delete the last sentence.

Delete sub-paragraph (b). Rename (c) and (d) accordingly].

7.1.9 Add a new section to read as follows:

**"7.1.9 Reporting of accidents or incidents involving dangerous goods in transport**

7.1.9.1 Accidents and incidents involving the transport of dangerous goods shall be reported to the competent authority of the State in which they occurred in accordance with the reporting requirements of that State and applicable regional/modal agreements.

7.1.9.2 Information reported shall include at least the description of the goods as provided in 5.4.1.4, description of the accident/incident, date and location, estimated loss of dangerous goods, containment information (e.g., packaging or tank type, identification markings, capacity and quantity) and cause and type of any packaging or tank failure that resulted in a release of dangerous goods.

7.1.9.3 Certain types of dangerous goods, as determined by the competent authority or established under applicable regional/modal agreements, may be excepted from these requirements for reporting of accidents or incidents."

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## Part 2

### DRAFT AMENDMENTS TO THE UN RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MANUAL OF TESTS AND CRITERIA (ST/SG/AC.10/11/Rev.4)

Appendix 5 Amend to read as follows:

#### "APPENDIX 5

#### EXAMPLE OF A TEST METHOD FOR VENT SIZING

##### 1. Introduction

This example of a method for vent sizing is used to determine the required emergency vent capacity to be fitted to a specific IBC or tank for a particular organic peroxide Type F, or self-reactive substance Type F, or formulations thereof. The method is based on experimental data which indicates that, for organic peroxide or self-reactive substance formulations, the ratio of the minimum emergency vent area to the capacity of the IBC or tank is constant and can be determined using a reduced scale tank with a 10 litre capacity. In the tests, the reduced scale tank is heated at rates equivalent to that given by complete fire engulfment or, in the case of insulated IBC or tanks, the heat transfer through the insulation with the assumption that 1% of the insulation is missing (see 4.2.1.13.8 and 4.2.1.13.9 of the Model Regulations). Other methods may be used provided that they adequately size the emergency relief device(s) on an IBC or a tank to vent all the material evolved during self-accelerating decomposition or a period of not less than one hour of complete fire-engulfment.

***Warning: The method does not take into account the possibility of initiation of deflagration. If this is a possibility, particularly if initiation in the vapour phase can propagate to the liquid phase, then tests should be performed which take this into account.***

##### 2. Apparatus and materials

The reduced scale tank consists of a stainless steel test vessel with a gross volume of 10 l. The top of the tank is provided with either a 1 mm opening which simulates the pressure relief valve (PRV) of the IBC or tank or a real PRV of a diameter which is scaled using the vent area to vessel volume ratio. A second opening simulates the emergency vent opening and is closed by a bursting disk. The diameter of this vent opening can be varied by using orifice plates with different apertures. The bursting pressure of the disk fixed to the 10 l vessel should be equal to the maximum rupture pressure of the bursting disks to be fitted to the IBC or tank. This pressure should be lower than the test pressure of the tank involved. Usually, the bursting pressure is set at a level that can cope with the pressures encountered during normal transport conditions such as hydrostatic pressure from the liquid due to turn over of the tank, slopping of the contents, etc. The 10 l vessel should be provided with a bursting disk with a set pressure in the range of the disk(s) fitted on the tank or IBC as to be used in transport. For safety, it is recommended to provide the test vessel with an extra bursting disk (bursting pressure approximately 80% of the design pressure of the 10 l test vessel) with a large opening for additional emergency venting of the test vessel in the event that the chosen orifice diameter is too small.

The outer surface of the test vessel, below the liquid level, is provided with an electrical heating coil or cartridge heaters connected to a power supply. Vessel contents should be heated at a constant rate independent of the heat being generated by the organic peroxide or self-reactive substance. The resistance

of the heating coil should be such that, with the power available, the calculated heating rate (see section 3) can be achieved. The whole vessel is insulated with rock wool, cellular glass or ceramic fibre.

The temperature inside the tank is measured by means of three thermocouples, two located in the liquid phase (near the top and bottom) and one in the gas phase. Two thermocouples are used in the liquid phase to check the homogeneity of the heating. The pressure is recorded by a pressure transducer(s) capable of recording slow and fast (at least 1000 points/sec.) changes of pressure. Examples of test vessels are illustrated in Figure A5.1. Additional information may be obtained if the tank is mounted in a tray designed to collect any solids or liquids ejected.

The tests should be performed at a test site with suitable safety distances. Alternatively, the test can be performed in a bunker provided with sufficient ventilation and vent openings to prevent pressure build-up in it. Explosion-proof electrical equipment should be used in such a bunker to minimise the risk of ignition. **However, the tests should be performed on the assumption that the decomposition products will ignite.**

### 3. Calculation of the heating rate to be used in the test

If an IBC or tank is non-insulated, a heat load of the shell as given in 4.2.1.13.8 of the Model Regulations is required. For an insulated IBC or tank, the Model Regulations require that the heat load to the shell be equivalent to the heat transfer through the insulation plus the heat load to the shell on the assumption that 1% of the insulation is missing.

The following information on the IBC or tank and organic peroxide or self-reactive substance is needed for the heating rate calculation:

$F_r$	= fraction of tank directly heated (1 if non-insulated, 0.01 if insulated)	[-]
$M_t$	= total mass of organic peroxide or self-reactive substance and diluent	[kg]
$K$	= heat conductivity of the insulation layer	[W.m <sup>-1</sup> .K <sup>-1</sup> ]
$L$	= thickness of insulation layer	[m]
$U$	= $K/L$ = heat transfer coefficient	[W.m <sup>-2</sup> .K <sup>-1</sup> ]
$A$	= wetted area of IBC or tank	[m <sup>2</sup> ]
$C_p$	= specific heat of the organic peroxide or self-reactive substance formulation	[J.kg <sup>-1</sup> .K <sup>-1</sup> ]
$T_{po}$	= temperature of organic peroxide or self-reactive substance formulation at relieving conditions	[K]
$q_i$	= indirectly exposed heat	[W]
$q_d$	= directly exposed heat	[W]
$F$	= insulation factor	[-]

Heat input,  $q_i$  (W), via indirectly exposed surface (insulated part) is calculated by equations (1) and (2):

$$q_i = 70961 \times F \times [(1 - F_r) \times A]^{0.82} \quad (1)$$

where:  $F$  = insulation factor;  
 $F = 1$  for non-insulated shells, or

$$F = 2 \times \frac{U(923 - T_{po})}{47032} \quad \text{for insulated shells} \quad (2)$$

In the calculation of  $F$  a multiplication factor of 2 is introduced to take into account a 50% loss in insulation efficiency in an incident.

Heat input,  $q_d$  (W), via the directly exposed surface (non-insulated part) is calculated by equation (3):

$$q_d = 70961 \times F \times [F_r \times A]^{0.82} \quad (3)$$

where:  $F$  = insulation factor = 1 (non-insulated)

The overall heating rate,  $dT/dt$  (K/min), due to fire engulfment is calculated by equation (4):

$$\frac{dT}{dt} = \frac{(q_i + q_d)}{M_1 C_p} 60 \quad (4)$$

### **Example 1: insulated tank**

For a typical 20 m<sup>3</sup> insulated tank:

$F_r$	= fraction of tank directly heated	= 0.01
$M_t$	= total mass of organic peroxide or self-reactive substance and diluent	= 16 268 kg
$K$	= heat conductivity of the insulation layer	= 0.031 W.m <sup>-1</sup> .K <sup>-1</sup>
$L$	= thickness of the insulation layer	= 0.075 m
$U$	= heat transfer coefficient	= 0.4 W.m <sup>-2</sup> .K <sup>-1</sup>
$A$	= wetted area of tank	= 40 m <sup>2</sup>
$C_p$	= specific heat of the organic peroxide form	= 2 000 J.kg <sup>-1</sup> .K <sup>-1</sup>
$T_{po}$	= temperature of peroxide at relieving conditions	= 100 °C

and

$$q_i = 70961 \times 2 \times \frac{0.4 \times (923 - 373)}{47032} \times [(1 - 0.01) \times 40]^{0.82} = 13558 \text{ W}$$

$$q_d = 70961 \times 1 \times [0.01 \times 40]^{0.82} = 33474 \text{ W}$$

$$\frac{dT}{dt} = \frac{(13558 + 33474)}{16268 \times 2000} \times 60 = 0.086 \text{ K} \cdot \text{min}^{-1}$$

### **Example 2: non-insulated IBC**

For a typical 1.2 m<sup>3</sup> non-insulated stainless steel IBC (only direct heat input,  $q_d$ ):

$F_r$	= fraction of tank directly heated	= 1
$M_t$	= total mass of organic peroxide and diluent	= 1 012 kg
$A$	= wetted area of IBC	= 5.04 m <sup>2</sup>
$C_p$	= specific heat of the organic peroxide form	= 2 190 J.kg <sup>-1</sup> .K <sup>-1</sup>

and

$$q_d = 70961 \times 1 \times [1 \times 5.04]^{0.82} = 267308 \text{ W}$$

$$q_d = 0$$

$$\frac{dT}{dt} = \frac{(0 + 267308)}{1012 \times 2190} \times 60 = 7.2 \text{K} \cdot \text{min}^{-1}$$

#### 4. Procedure

Fill the test vessel shell with the amount of organic peroxide or self-reactive substance required to give the same degree of fill (by volume of the shell) as to be used in the tank (maximum degree of fill 90 %, by volume) and then install the required orifice plate<sup>1</sup> and bursting disk. For example, it is common practice to fit four 250 mm diameter bursting disks to a 20 ton tank. This corresponds to a test vessel orifice diameter of about 11 mm.

The vessel is heated at the desired rate by applying power to the heating coil. A higher than calculated heating rate may be applied initially until a temperature 5 °C above the self-accelerating decomposition temperature (for a 50 kg package) of the organic peroxide or self-reactive substance is reached. The calculated heating rate should be applied once this temperature is reached. The temperature and pressure in the test vessel are recorded during the entire experiment. After rupture of the bursting disk, the heating should be continued for approximately 30 minutes more to be sure that all dangerous effects are measured. ***Keep distance during the execution of the test and afterwards the vessel should not be approached until the contents have cooled.***

The diameter of the orifice should be varied (if necessary) until a suitable opening is determined at which the maximum recorded pressure does not exceed the pressure as specified in Section 5, Test criteria and method of assessing the results. The step size used should be related to the options available in practice for the tank, i.e larger vent sizes or more vents. If necessary the concentration of the organic peroxide or self-reactive substances can be lowered. The test should be performed in duplicate at the level at which the total vent area has sufficient capacity.

#### 5. Test criteria and method of assessing the results

The minimum or suitable (if it is acceptable to use a vent size larger than the minimum vent size) IBC or tank vent area,  $A_{IBC}$  or  $A_{tank}$  (m<sup>2</sup>), can be calculated using the minimum or suitable orifice vent area as tested in the 10 litre test at which the maximum pressure during venting is:

- for tanks not more than test pressure of the tank (according to 4.2.1.13.4 tank shall be designed for a test pressure of at least 0.4 MPa),
- for IBC not more than 200 kPa gauge pressure, as tested according 6.5.4.8.4, or higher under an approval granted by the competent authority,

and the volumes of the test vessel and IBC or tank.

The minimum total IBC or tank vent area is given by:

$$\text{For IBCs:} \quad A_{IBC} = V_{IBC} \times \left( \frac{A_{\text{test vessel}}}{V_{\text{test vessel}}} \right)$$

<sup>1</sup> *It is recommended that either small-scale vent experiments (100 - 200 ml scale) or experiments using a very strong vessel (>100 bar) be performed prior to the performance of the 10 l vent test in order to obtain information on the maximum pressure effect from the test substance and on the required orifice diameter to be used in the first 10 l scale vent test.*

For tanks: 
$$A_{\text{tank}} = V_{\text{tank}} \times \left( \frac{A_{\text{test vessel}}}{V_{\text{test vessel}}} \right)$$

where:

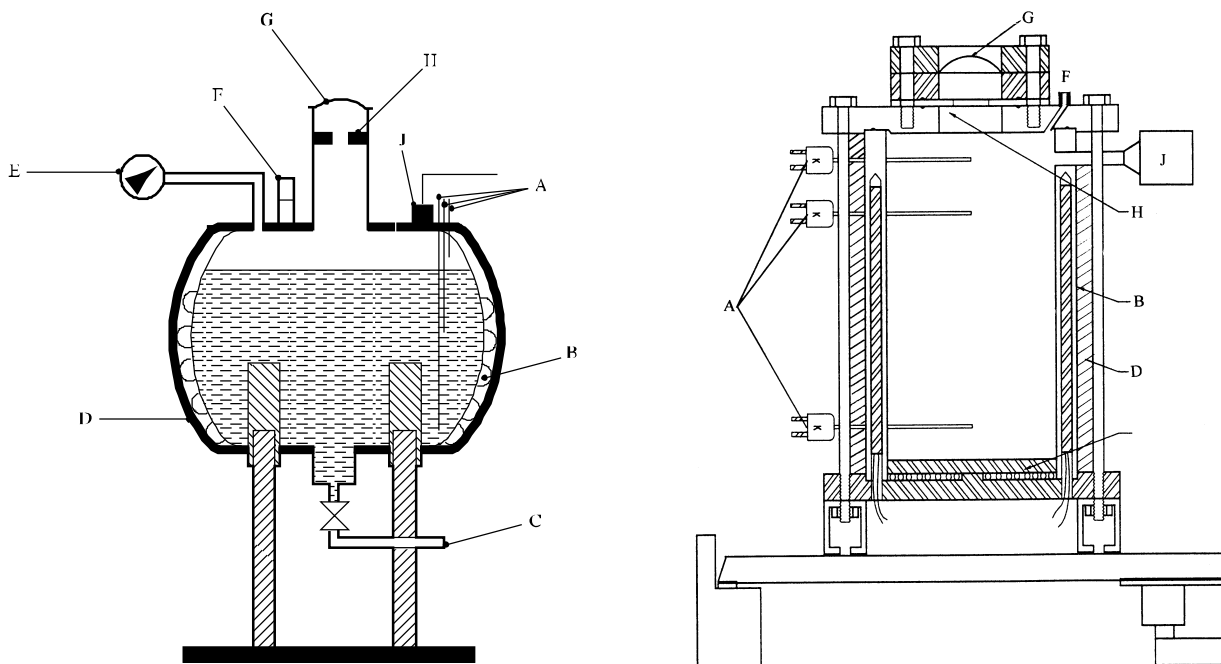
$A_{\text{test vessel}}$	=	Area of venting of 10 litre test vessel	=	$[m^2]$
$A_{\text{IBC}}$	=	Area of venting of IBC	=	$[m^2]$
$A_{\text{tank}}$	=	Area of venting of tank	=	$[m^2]$
$V_{\text{test vessel}}$	=	Area of venting of tank	=	$[m^3]$
$V_{\text{IBC}}$	=	Area of venting of tank	=	$[m^3]$
$V_{\text{tank}}$	=	Volume of tank	=	$[m^3]$

*Example:*

For a typical organic peroxide in a 20 m<sup>3</sup> insulated tank:

$A_{\text{test vessel}}$	=	Minimum suitable orifice area found in test	=	$9.5 \times 10^{-5} m^2$
$V_{\text{tank}}$	=	Volume of tank	=	$20 m^3$
$V_{\text{test vessel}}$	=	Volume of test vessel	=	$0.01 m^3$

$$A_{\text{tank}} = 20 \times \left( \frac{9,5 \times 10^{-5}}{0,01} \right) = 0,19 m^2$$



- 
- (A) Thermocouples (two in liquid on one in vapour space)
  - (B) Heating coil/heating cartridge
  - (C) Drain line, optional
  - (D) Insulation
  - (E) Manometer, optional
  - (F) Pressure relief valve, optional
  - (G) Bursting disk
  - (H) Orifice plate
  - (J) Pressure transducer or pressure relief valve & transducer on tee
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**Figure A5.1: 10 LITRE VESSELS FOR VENTING TESTS"**