



**Secretariat**

Distr.  
GENERAL

ST/SG/AC.10/1998/15  
18 September 1998

Original: ENGLISH

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**COMMITTEE OF EXPERTS ON THE  
TRANSPORT OF DANGEROUS GOODS**

(Twentieth session,  
Geneva, 7-16 December 1998,  
agenda item 2 (c))

**WORK OF THE SUB-COMMITTEE OF EXPERTS  
ON THE TRANSPORT OF DANGEROUS GOODS**

**Draft amendments to the Recommendations on the Transport of Dangerous Goods**

**Consolidated text of draft amendments to the model regulations annexed to the tenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods (ST/SG/AC.10/1/Rev.10)**

**Note by the secretariat**

This consolidated text contains all draft amendments to the Model Regulations annexed to the tenth revised edition of the UN Recommendations on the Transport of Dangerous Goods, adopted by the Sub-Committee on its thirteenth, fourteenth and fifteenth sessions in 1997 and 1998 (ST/SG/AC.10/C.3/26/Add.2, Annex 2, ST/SG/AC.10/C.3/28, Annex 1, ST/SG/AC.10/C.3/28/Add.1, Annex 2 and ST/SG/AC.10/C.3/30/Add.2).

**ANNEXED TO THE TENTH REVISED EDITION OF THE UNITED NATIONS  
RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS  
(Refer to ST/SG/AC.10/1/Rev.10)**

**TABLE OF CONTENTS**

Amend the table of contents to reflect to the various parts of the Model Regulations, as appropriate.

**Chapter 1.2**

1.2.1 Add the following definition of Liner:

*"Liner* means a separate tube or bag inserted into a packaging, large packaging or IBC but not forming an integral part of it, including the closures of its openings."

**Chapter 2.0**

2.0.1.1 In the title of Division 4.1, delete "and related" after "self-reactive".

2.0.1.3 Amend this paragraph to read as follows:

"2.0.1.3 Certain substances or articles may be assigned to packing groups in accordance with their degree of danger. The packing groups have the following meanings:

Packing Group I: Substances or articles presenting high danger

Packing Group II: Substances or articles presenting medium danger

Packing Group III: Substances or articles presenting low danger."

2.0.3(c) Add a new sub-paragraph (c) to read as follows:

"(c) liquid desensitized explosives of Class 3;"

Re-number consequently other alinea.

2.0.3(d) Delete "and related" after "self-reactive" (existing alinea (c)).

2.0.3.1 In table, add "\*" after 3 I, 3 II and 3 III and delete "\*" after 5.1 I, 5.1 II and 5.1 III in first column.

Amend footnote \*/ to read as follows:

"/ Substances of Division 4.1 other than self-reactive substances and solid desensitized explosives and substances of Class 3 other than liquid desensitized explosives."

2.0.4 Add a new section 2.0.4 as follows:

**"2.0.4 Transport of samples**

2.0.4.1 When the hazard class of a substance is uncertain and it is being transported for further testing, a tentative hazard class, proper shipping name and identification number shall be assigned on the basis of the consignor's knowledge of the substance and application of:

(a) The classification criteria of these Regulations; and

- (b) The precedence of hazards given in 2.0.3.

The most severe packing group possible for the shipping name chosen shall be used.

Where this provision is used the proper shipping name shall be supplemented with the word "sample" (e.g., FLAMMABLE LIQUID, N.O.S. Sample). In certain instances, where a specific proper shipping name is provided for a sample of a substance considered to meet certain classification criteria (e.g., GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, UN 3167) that shipping name shall be used. When an N.O.S. entry is used to transport the sample, the proper shipping name need not be supplemented with the technical name as required by special provision 274."

2.0.4.2 Samples of the substance shall be transported in accordance with the requirements applicable to the tentative assigned proper shipping name provided:

- (a) The substance is not considered to be a substance prohibited for transport by 1.1.2;
- (b) The substance is not considered to meet the criteria for Class 1 or considered to be an infectious substance or a radioactive material;
- (c) The substance is in compliance with 2.4.2.3.2.5(b) or 2.5.3.2.5.1 if it is a self-reactive substance or an organic peroxide, respectively;
- (d) The sample is transported in a combination packaging with a net mass per package not exceeding 2.5 kg; and
- (e) The sample is not packed together with other goods."

## Chapter 2.1

2.1.3.5.3 Amend to read as follows:

"2.1.3.5.3 Where a substance is assigned to Class 1 but is diluted to be excluded from Class 1 by Test Series 6, this diluted substance (hereafter referred to as desensitized explosive) shall be listed in the Dangerous Goods List of Chapter 3.2 with an indication of the highest concentration which excluded it from Class 1 (see 2.3.1.4 and 2.4.2.4) and if applicable, the concentration below which it is no longer deemed subject to these Regulations. New solid desensitized explosives subject to these Regulations shall be listed in Division 4.1 and new liquid desensitized explosives shall be listed in Class 3. When the desensitized explosive meets the criteria or definition for another class or division, the corresponding subsidiary risk(s) shall be assigned to it."

## Chapter 2.3

2.3.1.1 Add a new paragraph 2.3.1.1 to read as follows:

"2.3.1.1 Class 3 includes the following substances:

- (a) Flammable liquids (see 2.3.1.2 and 2.3.1.3);
- (b) Liquid desensitized explosives (see 2.3.1.4).

Renumber existing paragraph 2.3.1.1 and 2.3.1.2 as 2.3.1.2 and 2.3.1.3.

Add a new paragraph 2.3.1.4 to read as follows:

"2.3.1.4 Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form an homogeneous liquid mixture to suppress their explosives properties (see 2.1.3.5.3).

Entries in the Dangerous Goods List for liquid desensitized explosives are : UN 1204, UN 2059, UN 3064 and UN 3343."

2.3.2.3(b) Amend to read as follows:

"(b) The mixture or any separated solvent does not meet the criteria for Division 6.1 or Class 8."

## Chapter 2.4

2.4.1.1(a) Delete "and related" after "self-reactive".

2.4.2 In the heading, insert "solid" before "desensitized" and delete "and related" after "self-reactive".

2.4.2.1(b) Delete "and related" after "self-reactive".

2.4.2.3 Delete "and related" after "self-reactive".

2.4.2.3.1.1(b) Delete.

2.4.2.3.2 Delete "and related" after "self-reactive".

2.4.2.3.2.2 Delete.

2.4.2.3.2.3 Renumber as 2.4.2.3.2.2.

Figure 2.1 (b) Delete the footnote as well as the asterisk in the box of exit F.

2.4.2.3.2.4 Add the following new entry:

SELF-REACTIVE SUBSTANCE	Concentration (%)	Packing method	Control temperature (° C)	Emergency temperature (° C)	UN generic entry	Remarks
2,2'-AZODI(ISOBYRONITRILE) as a water based paste	≤ 50%	OP6			3224	

2.4.2.4 Amend to read as follows:

### "2.4.2.4 Division 4.1 *Solid desensitized explosives*

2.4.2.4.1 Definition

Solid desensitized explosives are explosive substances which are wetted with water or alcohols or are diluted with other substances, to form a homogeneous solid mixture to suppress their explosive properties (see 2.1.3.5.3). Entries in the Dangerous Goods List for solid desensitized explosives are UN Nos 1310, UN 1320, UN 1321, UN 1322, UN 1336, UN 1337, UN 1344, UN 1347, UN 1348, UN 1349, UN 1354, UN 1356, UN 1357, UN 1317, UN 1371, UN 2555, UN 2556, UN 2852, UN 2907, UN 3270, UN 3319 and UN 3344.

## 2.4.2.4.2 Substances that:

- (a) have been provisionally accepted into Class 1 according to Test Series 1 and 2 but exempted from Class 1 by Test Series 6;
- (b) are not self-reactive substances of Division 4.1;
- (c) are not substances of Class 5;

are also assigned to Division 4.1: UN 2956, UN 3241, UN 3242 and UN 3251 are such entries."

**Chapter 2.5**

2.5.3.2.4 Replace "+10" by "+15" in the column headed "Control Temperature (°C)" and "+15" by "+20" in the column headed "Emergency temperature (°C)" for the entry "tert-BUTYL PEROXY-2-ETHYLHEXANOATE (in tanks)".

Replace "-5" by "+5" in the column headed "Control Temperature (°C)" and "+5" by "+10" in the column headed "Emergency Temperature (°C)" for the entry "tert-BUTYL PEROXYPIVALATE (in tanks)".

Replace "-10" by "0" in the column headed "Control Temperature (°C)" and "0" by "+5" in the column headed "Emergency Temperature (°C)" for the entry "Di-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE (in tanks)".

Replace " $\leq 42$ " by " $\leq 52$ " in the column headed "Concentration (%)" for the third entry for " tert-BUTYL PEROXYNEODECANOATE".

Replace "OP8,M" by "OP8,N,M" in the column headed "Packing Method" for the last entry for "tert-BUTYL HYDROPEROXIDE".

Replace "OP8" by "OP8,N" in the column headed "Packing Method" and "3117" by "3119" in the column headed "Number (Generic entry)" for the last entry for "DI-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE".

Replace "OP8" by "OP8,N" in the column headed "Packing Method" for the second entry for "2,4,4-TRIMETHYLPENTYL-2-PEROXYNEODECANOATE".

Replace "OP7" by "OP5" in the column headed "Packing Method" and "3115" by "3113" in the column headed "Number (Generic entry)" for the entry for "2,5-DIMETHYL-2,5-DI-(2-ETHYLHEXANOYLPEROXY)HEXANE".

Replace "-10" by "-20" in the column headed "Control Temperature (°C)" and "0" by "-10" in column headed "Emergency Temperature (°C)" for the second entry for "DIISOPROPYL PEROXYDICARBONATE".

Replace "+5" by "0" in the column headed "Control Temperature (°C)" for the second entry for "tert-BUTYL PEROXYNEOHEPTANOATE".

Replace "+10" by "-10" in the column headed "Control Temperature (°C)" for the second entry for "CUMYL PEROXYNEOHEPTANOATE".

Delete " $\geq 28$ " in the column headed "Diluent type B (%) 1)" and add " $\geq 28$ " in the column headed "Diluent type A (%)" for the second entry for "CYCLOHEXANONE PEROXIDE(S)".

Add " $\geq 23$ " in the column headed "Diluent type B (%) 1)" for the second entry for "DI-(2-ETHYLHEXYL) PEROXYDICARBONATE".

Replace "+25" by "+20" in the column headed "Emergency Temperature ( $^{\circ}$ C)" for the entry for "DIMYRISTYL PEROXYDICARBONATE (in IBCs)".

Add "3)" in the column headed "Subsidiary risks and remarks" for the second entry for "ISOPROPYL sec-BUTYL PEROXYDICARBONATE + DI-sec-BUTYL PEROXYDICARBONATE + DI-ISOPROPYL PEROXYDICARBONATE".

Wherever it appears in the column headed "ORGANIC PEROXIDE", amend the name of "1,1-DI-(tert-BUTYLPEROXY)-3,5,5-TRIMETHYLCYCLOHEXANE" to read:

"1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE"

Wherever it appears in the column headed "ORGANIC PEROXIDE", amend the name of "2,4,4-TRIMETHYLPENTYL-2-PEROXYNEODECANOATE" to read:

"1,1,3,3-TETRAMETHYLBUTYL PEROXYNEODECANOATE"

Wherever it appears in the column headed "ORGANIC PEROXIDE", amend the name of "2,4,4-TRIMETHYLPENTYL-2-PEROXYPHENOXYACETATE" to read:

"1,1,3,3-TETRAMETHYLBUTYL PEROXYPHENOXYACETATE"

Under "Notes on 2.5.3.2.4:", add a new note 28) to read as follows:

"28) *Available active oxygen*  $\leq 7.6\%$ ."

2.5.3.2.4 Add the following new entries:

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) 1)	Inert solid (%)	Water (%)	Packing Method	Control Temperature (°C)	Emergency Temperature (°C)	Number (Generic entry)	Subsidiary risks and remarks
DI-(2-ETHOXYETHYL) PEROXYDICARBONATE	≤ 52		≥48			OP7	-10	0	3115	
tert-HEXYL PEROXYPIVALATE	≤ 72		≥28			OP7	+10	+15	3115	
DI-(3-METHOXYBUTYL) PEROXYDICARBONATE	≤ 52		≥48			OP7	-5	+5	3115	
DI-(3-METHYLBENZOYL) PEROXIDE + BENZOYL (3-METHYLBENZOYL) PEROXIDE + DIBENZOYL PEROXIDE	≤ 20+≤ 18+≤ 4		≥58			OP7	+35	+40	3115	
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE	≤ 62 as a stable dispersion in water					OP8	-15	-5	3117	
2,2-DI-(4,4-DI-(tert-BUTYLPEROXY CYCLOHEXYL) PROPANE	≤ 22		≥78			OP8			3107	
tert-HEXYL PEROXYNEODECANOATE	≤71	≥29				OP7	0	+10	3115	
1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE	≤77		≥23			OP7			3105	
3,6,9-TRIETHYL-3,6,9-TRIMETHYL-1,4,7-TRIPEROXONANE	≤42	≥58				OP7			3105	28)
tert-BUTYL PEROXYNEODECANOATE	≤32	≥68				OP8,N	0	+10	3119	
tert-BUTYL PEROXYNEODECANOATE (in IBCs)	≤42 as a stable dispersion in water					N	-5	+5	3119	
CUMYL PEROXYNEODECANOATE (in IBCs)	≤52 as a stable dispersion in water					N	-15	-5	3119	
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE (in IBCs)	≤52 as a stable dispersion in water					N	-20	-10	3119	
2,5-DIMETHYL-2,5-DI-(tert-BUTYLPEROXY)HEXANE	≤77			≥23		OP8			3108	
2,5-DIMETHYL-2,5-DI-(tert-BUTYLPEROXY)HEXYNE-3	>86-100					OP5			3101	3)
METHYL ETHYL KETONE PEROXIDE(S)	≤37	≥55			≥8	OP7			3105	9)

Amend the following entries to read:

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B (%) 1)	Inert solid (%)	Water (%)	Packing Method	Control Temperature (°C)	Emergency Temperature (°C)	Number (Generic entry)	Subsidiary risks and remarks
tert-AMYL PEROXYBENZOATE	≤100					OP5			3103	
DI-n-PROPYL PEROXYDICARBONATE	≤100					OP3	- 25	- 15	3113	
	≤77		≥23			OP5	- 20	- 10	3113	

**Chapter 2.6**

2.6.3.1.3(b) Amend to read:

"(b) Those where a relatively low probability exists that pathogens of risk groups 2 or 3 are present. Specimens transported for the purpose of initial diagnosis for other than the presence of pathogens or specimens transported for routine screening tests fall within this Group;"

**Chapter 3.2****DANGEROUS GOODS LIST**

Insert the following amendments:

- UN 1210 Amend the name in column (2) to read:  
"PRINTING INK, flammable or PRINTING INK RELATED MATERIAL (including printing ink thinning or reducing compound), flammable"
- UN 1305 Delete "INHIBITED" from the description in column (2).
- UN 1408 Replace Special Provision "40" by "223" in column (6).
- UN 1829: Replace "TP2" with "TP4" and insert "TP25, TP26" in column (11).
- UN 2054 Replace "3" with "8" in column (3) and insert "3" in column (4).  
Replace "III" with "I" in column (5) and replace "5L" with "NONE" in column (7).  
Replace "T2" with "T8" in column (10) and replace "TP1" with "TP2, TP9" in column (11).
- UN 2250: Insert "T3" in column (10) and "TP3" in column (11).
- UN 2447: Insert "TP26" in column (11).
- UN 2530 Delete.
- UN 3057: Insert "TP21" in column (11).
- UN 3090 Insert special provision "287" in column (6).
- UN 3176: Insert "TP26" in column (11).
- UN 3268 Insert special provision "289" in column (6).
- UN 3270 Add special provision "[286]" in column (6) and amend the name in column (2) to read as follows:  
"NITROCELLULOSE MEMBRANE FILTERS, with not more than 12.6% nitrogen, by dry mass"
- UN 3353 Insert special provision "289" in column (6).

Add the following new entries:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0501	PROPELLANT, SOLID	1.4C				NONE	114(b)			
0502	ROCKETS with inert head	1.2C				NONE	130			
0503	AIR BAG INFLATORS, PYROTECHNIC or AIR BAG MODULES, PYROTECHNIC or SEAT- BELT PRETENSIONERS, PYROTECHNIC	1.4G			289	NONE	135			
0504	1H-TETRAZOLE	1.1D		II			112(c)			
3357	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30% nitroglycerin, by mass	3		II	109, 274, 288					

3. Insert Portable tank instruction "T50" in column (10) of the Dangerous Goods List for the following entries:

UN 1060, UN 1073, UN 2035, UN 3057, UN 3070, UN 3161 and UN 3163.

4. Add Portable tank instruction "T20" in column (10) of the Dangerous Goods List for the following entries: UN 3229, UN 3230, UN 3239 and UN 3240.

### Chapter 3.3

#### Section 3.3.1

##### Special provisions

SP40 Delete.

SP188(a) Amend to read as follows:

"(a) For a cell with a liquid cathode, the lithium content of the anode, when fully charged, is not more than 0.5 g, and for a cell with a solid cathode, the lithium content of the anode, when fully charged, is not more than 1 g;"

(b) Amend to read as follows:

"(b) For a battery with liquid cathodes, the aggregate lithium content of the anodes, when fully charged, is not more than 1g, and for a battery with solid cathodes, the aggregate lithium content of the anodes, when fully charged, is not more than 2 g;"

(f) Amend the beginning to read as follows:

- "(f) If, when fully charged, the aggregate lithium content of the anodes in a liquid cathode battery is more than 0.5 g, or of the aggregate lithium content of the anodes in a solid cathode battery is more than 1 g, it does not contain a liquid or gas..." [remainder unchanged].
- (g) Amend to read as follows:
- "(g) The lithium content of the anode of each cell, when fully charged, is not more than 5 g;"
- (h) Amend to read as follows:
- "(h) The aggregate lithium content of the anodes of each battery, when fully charged, is not more than 25 g;"

SP230 Add a new first sentence to read:

"This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries."

Delete (b) and (c), and renumber consequently.

Amend existing sub-paragraph (f) (new (d)) to read as follows:

"(d) Each battery containing cells or series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);"

SP235 Delete the last sentence.

SP237 Amend to read as follows:

"237 The membrane filters, including paper separators, coating or backing materials, etc., that are present in transport, shall not be liable to propagate a detonation as tested by one of the tests described in the Manual of Tests and Criteria, Part I, [Test series 1(a)].

In addition, the competent authority may determine, on the basis of the results of suitable burning rate tests taking account of the standard tests in the Manual of Tests and Criteria, Part III, sub-section 33.2.1, that nitrocellulose membrane filters in the form in which they are to be transported are not subject to the provisions of these Regulations applicable to flammable solids in Division 4.1."

SP240 Replace "or sodium batteries" by ",sodium batteries or lithium batteries".

SP269 Delete.

SP280 Delete the last sentence.

SP283 Amend to read as follows:

"283 Articles, containing gas, intended to function as shock absorbers, including impact energy-absorbing devices, or pneumatic springs are not subject to these Model Regulations

provided each article:

- (a) Has a gas space capacity not exceeding 1.6 litres and a charge pressure not exceeding 280 bar where the product of the capacity (litres) and charge pressure (bars) does not exceed 80 (i.e 0.5 litre gas space and 160 bar charge pressure, 1 litre gas space and 80 bar charge pressure, 1.6 litre gas space and 50 bar charge pressure, 0.28 litre gas space and 280 bar charge pressure) ;
- (b) Has a minimum burst pressure of 4 times the charge pressure at 20°C for products not exceeding 0.5 litre gas space capacity and 5 times charge pressure for products greater than 0.5 litre gas space capacity;
- (c) Is manufactured from material which will not fragment upon rupture;
- (d) Is manufactured in accordance with a quality assurance standard acceptable to the competent authority, and
- (e) The design type has been subjected to a fire test demonstrating that the article relieves its pressure by means of a fire degradable seal or other pressure relief device, such that the article will not fragment and that the article does not rocket."

SP286 Add a new special provision 286 to read as follows:

"[286 Nitrocellulose membrane filters covered by this entry, each with a mass not exceeding 0.5g, are not subject to these Regulations when contained individually in an article or a sealed packet.]"

SP287 Add the following new special provision:

"287 New, uncycled and uncharged lithium ion cells and batteries are not subject to these Regulations if:

- (a) The electrolyte does not meet the definition of any class or division in these Regulations; or
- (b) If the electrolyte meets the definition of a hazard class or division in these Regulations, the electrolyte will not flow from a ruptured or cracked case and there is no free liquid to flow."

SP288 Add the following new special provision:

"288 These substances shall not be classified and transported unless authorized by the competent authority on the basis of results from Series 2 tests and a Series 6(c) test on packages as prepared for transport (see 2.1.3.1)."

SP289 Add the following new special provision:

"289 Air bags or seat-belts installed in vehicles or in completed vehicle components such as steering columns, door panels, seats etc. are not subject to these Regulations."

## Chapter 4.1

Title Add "AND LARGE PACKAGINGS" at the end.

Introductory notes

Note 1 Amend the first sentence to read as follows:

*"Dangerous goods of all classes other than Classes 1, 2, and 7, divisions 5.2 and 6.2 and the self-reactive substances of division 4.1 have for packing purposes been assigned to three packing groups in accordance with the degree of danger they present, i.e."*

*Packing group I: Substances or articles presenting high danger;  
Packing group II: Substances or articles presenting medium danger; and  
Packing group III: Substances or articles presenting low danger."*

Note 2 Add ", including IBCs and large packagings" after "packagings", delete "category" at the end and add "group" after "danger".

4.1.1 Replace this section with the following:

"4.1.1 **General provisions for the packing of dangerous goods, other than goods of Classes 2 or 7 or Division 6.2, in packagings, including IBCs and large packagings.**

4.1.1.1 Dangerous goods shall be packed in good quality packagings, including IBCs and large packagings, which shall be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between transport units and/or warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings, including IBCs and large packagings, shall be constructed and closed so as to prevent any loss of contents when prepared for transport which might be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example). No dangerous residue shall adhere to the outside of packages, IBCs and large packagings during transport. These provisions apply to new, reused, reconditioned or remanufactured packagings, including IBCs and large packagings, as appropriate.

4.1.1.2 Parts of packagings, including IBCs and large packagings, which are in direct contact with dangerous goods

- (a) Shall not be affected or significantly weakened by those dangerous goods, and
- (b) Shall not cause a dangerous effect e.g. catalysing a reaction or reacting with the dangerous goods.

Where necessary, they shall be provided with a suitable inner coating or treatment.

4.1.1.3 Unless provided elsewhere in these Regulations, each packaging, including IBCs and large packagings - except inner packagings of combination packagings - shall conform to a design type successfully tested in accordance with the requirements of 6.1.5, 6.5.4 or 6.6.5, respectively.

4.1.1.4 When filling packagings, including IBCs and large packagings, with liquids, sufficient ullage (outage) shall be left to ensure that neither leakage nor permanent distortion of the packaging occurs as a result of an expansion of the liquid caused by temperatures likely to occur during transport. Unless specific requirements are prescribed in national or international rules, agreements or recommendations, liquids shall not completely fill a packaging at a temperature of 55 °C. However sufficient ullage shall be left in an IBC to ensure that at the mean

bulk temperature of 50 °C it is not filled to more than 98% of its water capacity.

4.1.1.4.1 For air transport, packagings intended to contain liquids shall also be capable of withstanding a pressure differential without leakage as specified in the international regulations for air transport.

4.1.1.5 Inner packagings shall be packed in an outer packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials, etc., shall be secured in outer packagings with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.

4.1.1.6 Dangerous goods shall not be packed together in the same outer packaging or in large packagings, with dangerous or other goods if they react dangerously with each other and cause:

- (a) Combustion and/or evolution of considerable heat;
- (b) Evolution of flammable, toxic or asphyxiant gases;
- (c) The formation of corrosive substances; or
- (d) The formation of unstable substances.

4.1.1.7 The closures of packagings containing wetted or diluted substances shall be such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during transport.

4.1.1.7.1 Where two or more closure systems are fitted in series on an IBC, that nearest to the substance being carried shall be closed first.

4.1.1.8 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. Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other cause), the packaging 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. 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 matter are prevented under normal conditions of transport. Venting of the package is not permitted for air transport.

4.1.1.9 New, remanufactured or reused packagings, including IBCs and large packagings, or reconditioned packagings and repaired IBCs shall be capable of passing the tests prescribed in 6.1.5, 6.5.4 or 6.6.5, respectively. Before being filled and handed over for transport, every packaging, including IBCs and large packagings, shall be inspected to ensure that it is free from corrosion, contamination or other damage and every IBC shall be inspected with regard to the proper functioning of any service equipment. Any packaging, which shows signs of reduced strength as compared with the approved design type shall no longer be used or shall be so reconditioned, that it is able to withstand the design type tests. Any IBC which shows signs of reduced strength as compared with the tested design type shall no longer be used or shall be so repaired that it is able to withstand the design type tests.

4.1.1.10 Liquids shall be filled only into packagings, including IBCs, which have an appropriate resistance to the internal pressure that may develop under normal conditions of transport. Packagings and IBCs marked with the hydraulic test pressure prescribed in 6.1.3.1(d) and 6.5.2.2.1, respectively shall be filled only with a liquid having a vapour pressure:

- (a) Such that the total gauge pressure in the packaging or IBC (i.e. the vapour pressure of the

filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55°C, determined on the basis of a maximum degree of filling in accordance with 4.1.1.4 and a filling temperature of 15°C, will not exceed two thirds of the marked test pressure, or

- (b) At 50°C less than four sevenths of the sum of the marked test pressure plus 100 kPa; or
- (c) At 55°C less than two thirds of the sum of the marked test pressure plus 100 kPa.

Metal IBCs intended for the carriage of liquids shall not be used to carry liquids having a vapour pressure of more than 110kPa (1.1 bar) at 50°C or 130kPa (1.3 bar) at 55°C.

**EXAMPLES OF REQUIRED MARKED TEST PRESSURES FOR PACKAGINGS, INCLUDING IBCs, CALCULATED AS IN 4.1.1.10 (c)**

UN No	Name	Class	Packing Group	$V_{p55}$ (kPa)	$V_{p55} \times 1.5$ (kPa)	$(V_{p55} \times 1.5) \text{ minus } 100$ (kPa)	Required minimum test pressure gauge under 6.1.5.5.4.(c) (kPa)	Minimum test pressure (gauge) to be marked on the packaging (kPa)
2056	Tetrahydrofuran	3	II	70	105	5	100	100
2247	n-Decane	3	III	1.4	2.1	-97.9	100	100
1593	Dichloromethane	6.1	III	164	246	146	146	150
1155	Diethyl ether	3	I	100	299	199	199	250

**Note 1:** For pure liquids the vapour pressure at 55 °C ( $V_{p55}$ ) can often be obtained from scientific tables.

**Note 2:** The table refers to the use of 4.1.1.10 (c) only, which means that the marked test pressure shall exceed 1.5 times the vapour pressure at 55 °C less 100 kPa. When, for example, the test pressure for n-decane is determined according to 6.1.5.5.4 (a), the minimum marked test pressure may be lower.

**Note 3:** For diethyl ether the required minimum test pressure under 6.1.5.5.5 is 250 kPa.

4.1.1.11 Empty packagings, including IBCs and large packagings, that have contained a dangerous substance shall be treated in the same manner as is required by these Regulations for a filled packaging, unless adequate measures have been taken to nullify any hazard.

4.1.1.12 Every packaging and IBC intended to contain liquids shall successfully undergo a suitable leakproofness test, and be capable of meeting the appropriate test level indicated in 6.1.5.4.3, or 6.5.4.7 for the various types of IBCs:

- (a) Before it is first used for transport;
- (b) After remanufacturing or reconditioning of any packaging, before it is re-used for transport;
- (c) After the repair of any IBC, before it is re-used for transport.

For this test the packaging, or IBC, need not have its closures fitted. The inner receptacle of a composite packaging or IBC may be tested without the outer packaging, provided the test results are not affected. This test is not necessary for inner packagings of combination packagings.

4.1.1.13 Packagings, including IBCs, used for solids which may become liquid at temperatures likely to be encountered during transport shall also be capable of containing the substance in the liquid state.

4.1.1.14 Packagings, including IBCs, used for powdery or granular substances shall be siftproof or shall be

provided with a liner.

4.1.1.15 *Use of salvage packagings*

4.1.1.15.1 Damaged, defective or leaking packages, or dangerous goods that have spilled or leaked may be transported in salvage packagings mentioned in 6.1.5.1.11. This does not prevent the use of a bigger size packagings of appropriate type and performance level under the conditions of 4.1.1.15.2.

4.1.1.15.2 Appropriate measures shall be taken to prevent excessive movement of the damaged or leaking packages within a salvage packaging. When the salvage packaging contains liquids, sufficient inert absorbent material shall be added to eliminate the presence of free liquid."

4.1.2 Replace this section with the following:

**"4.1.2 Additional general provisions for the use of IBCs**

4.1.2.1 When IBCs are used for the transport of liquids with a flash point of 60.5°C (closed cup) or lower, or of powders liable to dust explosion, measures shall be taken to prevent a dangerous electrostatic discharge.

4.1.2.2 The periodic testing and inspection requirements for IBCs are provided in Chapter 6.5. An IBC shall not be filled and offered for transport after the date of expiry of the last periodic test required by 6.5.4.14.3, or the date of expiry of the last periodic inspection required by 6.5.1.6.4. However, an IBC filled prior to the date of expiry of the last periodic test or inspection may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, an IBC may be transported after the date of expiry of the last periodic test or inspection:

- (a) After emptying but before cleaning, for purposes of performing the required test or inspection prior to refilling; and
- (b) Unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection in order to allow the return of dangerous goods or residues for proper disposal or recycling. Reference to this exemption shall be entered in the transport document.

4.1.2.3 For rigid plastics IBCs and composite IBCs with plastics inner receptacles, unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous liquids shall be five years from the date of manufacture of the receptacle except where a shorter period of use is prescribed because of the nature of the liquid to be transported.

4.1.2.4 IBCs of type 31HZ2 shall be filled to at least 80% of the volume of the outer casing and always be carried in closed transport units."

4.1.3.5 Amend to read as follows:

"4.1.3.5 Packagings, IBCs and large packagings shall conform to the requirements of Chapter 6.1, 6.5 or 6.6, respectively, and shall meet the test requirements of 6.1.5, 6.5.4 or 6.6.5, respectively, for packing group II, subject to 4.1.1.13, 6.1.2.4 and 6.5.1.4.4. Packagings meeting the test criteria of packing group I may be used. To avoid unnecessary confinement metal packagings of packing group I shall not be used."

4.1.3.19/

PI 112(c) Add " 5. For UN 0503 metal packagings shall not be used.", under the heading "PARTICULAR PACKING PROVISIONS OF EXCEPTIONS".

PI 130 Add "0501" at the end of the list of UN numbers, under the heading "PARTICULAR PACKING PROVISIONS OR EXCEPTIONS".

4.1.5.1.1 Insert "or of Chapter 6.6" after "Chapter 6.1".

4.1.5.3/

PI 521 Replace "32%" by "52%" in the description of chemical name in the entry for "Di-tert-butyl peroxide".

Add the following new entry:

UN No	Organic peroxide	Type of IBC <u>1/</u>	Maximum quantity (litres)	Control temperature <u>2/</u>	Emergency temperature
<b>3109</b>	<b>ORGANIC PEROXIDE, TYPE F, LIQUID</b>  tert-Butyl hydroperoxide, not more than 72% with water	31A	1250		

4.1.5.3/

PI 522 Replace "+25 °C" by "+20 °C" in the column headed "Emergency temperature" for the entry of "Dimyristyl peroxydicarbonate, not more than 42%, stable dispersion, in water".

Add the following new entries:

UN No	Organic peroxide	Type of IBC <u>1/</u>	Maximum quantity (litres)	Control temperature <u>2/</u>	Emergency temperature
3119	<b>ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED</b>				
	tert-Butyl peroxyneodecanoate, not more than 32% in diluent type A	31A	1250	0 °C	+ 10 °C
	tert-Butyl peroxyneodecanoate, not more than 42%, stable dispersion, in water	31A	1250	- 5 °C	+ 5 °C
	Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 52%, stable dispersion, in water	31A	1250	+ 10 °C	+ 15 °C
	Cumyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1250	- 15 °C	- 5 °C
	1,1,3,3-Tetramethylbutyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1250	- 5 °C	+ 5 °C
	Di-(2-ethylhexyl) peroxydicarbonate, not more than 52%, stable dispersion, in water	31A	1250	- 20 °C	- 10 °C

4.1.6.5/

PI 620 Insert "other than for solid infectious substances," at the beginning of (a)(iii) under the heading "A packaging shall include:".

## Chapter 4.2

4.2.1.1 Replace "(T1-T34)" with "(T1-T20)" in the fifth line.

4.2.1.9.6 (a) Add "or maximum temperature of the substance during transport in the case of a heated substance" after "at 20°C,".

4.2.1.9.7 Add the following new paragraph:

"4.2.1.9.7 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.6.3.13.4 need not be provided with a means of closing off the forklift pockets."

4.2.1.11 Add "(other than Division 4.1 self-reactive substances)" after "Class 4 substances".

4.2.1.11.1 Delete existing text and insert "[reserved]".

Add the following Note:

*"Note: For Division 4.1 self-reactive substances, see 4.2.1.13.1."*

- 4.2.1.13 Insert "and Division 4.1 self-reactive substances" after "Division 5.2 substances."  
4.2.1.13.1 Replace "Organic peroxide" with "substance".  
4.2.1.13.2 Replace "organic peroxides (Type F)" with "Type F organic peroxides or Type F self-reactive substances" in the first sentence.

Replace "organic peroxide" with "substance" in the second sentence.

- 4.2.1.13.3 Insert "or self-reactive substances" after "organic peroxides".  
4.2.1.13.6 Replace "organic peroxide" with "substances".  
4.2.1.13.8 Add ", or a combination of the two," after "types".

4.2.1.13.11 }  
4.2.1.13.12 } Replace "organic peroxide" with "substances".  
4.2.1.13.14 }

- 4.2.1.13.15 Insert "and self-reactive substances" after "organic peroxides" and replace "T34" with "T20".

- 4.2.2.9 Add the following new paragraph:

"4.2.2.9 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.6.4.12.4 need not be provided with a means of closing off the forklift pockets."

- 4.2.3.9 Add the following new paragraph:

"4.2.3.9 Forklift pockets of portable tanks shall be closed off when the tank is filled. This provision does not apply to portable tanks which according to 6.6.4.12.4, as appropriate, need not be provided with a means of closing off the forklift pockets."

- 4.2.4.2.2 Replace "(T1-T34)" with "(T1-T20)" in the first sentence.

Amend the second sentence to read as follows:

"In T20, self-reactive substances of Division 4.1 and Division 5.2 organic peroxides permitted to be transported in portable tanks are listed along with the applicable control and emergency temperatures."

4.2.4.2.5 Replace the existing table with the following:

"

<b>Portable tank instruction specified</b>	<b>Portable tank instructions also permitted</b>
T1	T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T15, T16
T2	T4, T5, T6, T7, T8, T9, T10, T11, T15, T16
T3	T4, T5, T6, T7, T8, T9, T10, T11, T15, T16
T4	T5, T6, T7, T8, T9, T10, T11, T15, T16
T5	T8, T11, T16
T6	T7, T8, T9, T10, T11, T15, T16
T7	T8, T11, T15, T16
T8	T11, T15, T16
T9	T10, T11, T15, T16
T10	T11, T16
T11	T16
T15	T16
T16	None
T20	None

4.2.4.2.6/

T1-T33 Replace the table with the following:

"

<b>T1 - T16</b>		<b>PORTABLE TANK INSTRUCTIONS</b>			<b>T1 -T16</b>
<i>These portable tank instructions apply to liquid and solid substances of Classes 3 to 9. The general provisions of section 4.2.1 and the requirements of section 6.6.2 shall be met.</i>					
<b>Portable tank instruction</b>	<b>Minimum test pressure (bar)</b>	<b>Minimum shell thickness (in mm-reference steel) (see 6.2.4)</b>	<b>Bottom opening requirements (see 6.6.2.6)</b>	<b>Pressure-relief requirements (see 6.6.2.8)</b>	
T1	1.5	See 6.6.2.4.2	See 6.6.2.6.2	Normal	
T2	1.5	See 6.6.2.4.2	See 6.6.2.6.3	Normal	
T3	2.65	See 6.6.2.4.2	See 6.6.2.6.2	Normal	
T4	2.65	See 6.6.2.4.2	See 6.6.2.6.3	Normal	
T5	2.65	See 6.6.2.4.2	Not Allowed	See 6.6.2.8.3	
T6	4	See 6.6.2.4.2	See 6.6.2.6.3	Normal	
T7	4	6mm	Not allowed	Normal	
T8	4	6mm	Not allowed	See 6.6.2.8.3	
T9	6	See 6.6.2.4.2	See 6.6.2.6.3	Normal	
T10	6	See 6.6.2.4.2	See 6.6.2.6.3	See 6.6.2.8.3	
T11	6	6mm	Not allowed	See 6.6.2.8.3	
T15	10	10mm	Not allowed	Normal	
T16	10	10mm	Not allowed	See 6.6.2.8.3	

4.2.4.2.6/

T34 1. Amend the heading of portable tank instruction T34 to read as follows:

<b>T20</b>		<b>PORTABLE TANK INSTRUCTION</b>					<b>T20</b>	
<i>This portable tank instruction applies to self-reactive substances of Division 4.1 and to Division 5.2 organic peroxides. The general provisions of section 4.2.1 and the requirements of section 6.6.2 shall be met. The provisions specific to self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 in 4.2.1.13 shall also be met.</i>								
<b>UN No.</b>	<b>Substance</b>	<b>Min. test pressure (bar)</b>	<b>Min. shell thickness (mm-reference steel)</b>	<b>Bottom opening requirements</b>	<b>Pressure relief requirements</b>	<b>Filling limits</b>	<b>Control temp.</b>	<b>Emerg. temp.</b>

"

## 2. Add the following new entries:

3229	SELF-REACTIVE LIQUID TYPE F	4	See 6.6.2.4.2	See 6.6.2.6.3	See 6.6.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13		
3230	SELF-REACTIVE SOLID TYPE F	4	See 6.6.2.4.2	See 6.6.2.6.3	See 6.6.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13		
3239	SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED	4	See 6.6.2.4.2	See 6.6.2.6.3	See 6.6.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13	<u>*/</u>	<u>*/</u>
3240	SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED	4	See 6.6.2.4.2	See 6.6.2.6.3	See 6.6.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	See 4.2.1.13.13	<u>*/</u>	<u>*/</u>

## 3. Add an asterisk in the columns "Control Temp." and "Emergency Temp." for UN 3119 and UN 3120 and add the following footnote:

\*/ As approved by the competent authority.

## 4. Under UN 3119, insert the following amendments:

Replace "+10 °C" by "+15 °C" in the column headed "Control temperature" and "+15 °C" by "+20 °C" in the column headed "Emergency temperature" for the entry "tert-Butyl peroxy-2-ethylhexanoate, not more than 32% in diluent type B".

Replace "-5 °C" by "+5 °C" in the column headed "Control temperature" and "+5 °C" by "+10 °C" in the column headed "Emergency temperature" for the entry "tert-Butyl peroxy-pivalate, not more than 27% in diluent type B".

Replace "-10 °C" by "0 °C" in the column headed "Control temperature" and "0 °C" by "+5 °C" in the column headed "Emergency temperature" for the entry "Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 38% in diluent type A".

4.2.4.2.6/

T50

Add the following new entries:

"

UN No.	Non-refrigerated liquefied gases	Max. allowable working pressure (bar) Small; Bare; Sunshield; Insulated	Openings below liquid level	Pressure relief requirements	Maximum filling ratio (kg/l)
1060	Methylacetylene and propadiene mixture, stabilized	28.0 24.5 22.0 20.0	Allowed	Normal	0.43
1078	Refrigerant gas, n.o.s.	See MAWP definition in 6.6.3.1	Allowed	Normal	4.2.2.7
2035	1,1,1-Trifluoroethane (Refrigerant gas R 143a)	31.0 27.5 24.2 21.8	Allowed	Normal	0.76
3057	Trifluoroacetyl chloride	14.6 12.9 11.3 9.9	Not allowed	6.6.3.7.3	1.17
3070	Ethylene oxide and dichlorodifluoromethane mixture with not more than 12.5% ethylene oxide	14.0 12.0 11.0 9.0	Allowed	6.6.3.7.3	1.09
3161	Liquefied gas, flammable, n.o.s.	See MAWP definition in 6.6.3.1	Allowed	Normal	See 4.2.2.7
3163	Liquefied gas, n.o.s.	See MAWP definition in 6.6.3.1	Allowed	Normal	See 4.2.2.7

"

4.2.4.3 Delete the following portable tank special provisions: TP 11, TP14 and TP15.

Add new portable tank special provisions TP25 and TP26 to read as follows:

"TP25 - Sulphur trioxide 99.95% pure and above may be transported in tanks without an inhibitor provided that it is maintained at a temperature equal to or above 32.5°C.

TP26 - When transported under heated conditions, the heating device shall be fitted outside the shell. For UN 3176 this requirement only applies when the substance reacts dangerously with water."

## Chapter 5.4

5.4.1.2.2 Add ", with no additional information interspersed" at the end of the first sentence.

## Chapter 6.1

6.1.1.4 Add the following new paragraph:

"6.1.1.4 Packagings shall be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured packaging meets the requirements of this Chapter.

6.1.2.7 In the table, under "1. Drums" , insert at the end:

"

kind	Material	Category	Code	Paragraph
N.	Metal, other than steel or aluminium	non-removable head	N1	6.1.4.1
		removable head	N2	

"

6.1.4.1 Amend to read as follows:

**"6.1.4.1 *Steel drums and drums of metals other than aluminium or steel***

1A1 steel non-removable head

1A2 steel removable head

1N1 metal other than aluminium or steel, non-removable head

1N2 metal other than aluminium or steel, removable head"

6.1.4.1.1 Replace "steel sheet" with "steel sheet (for 1A1 and 1A2) or sheet of metal other than steel or aluminium (for 1N1 and 1N2)".

6.1.4.1.5 Replace "(1A1)" and "(1A2)" by "(1A1 or 1N1)" and "(1A2 or 1N2)" respectively.

6.1.5.3.1 In the table, insert "Metal drums, other than steel or aluminium drums" under "Aluminium drums".

### Chapter 6.3

6.3.2.6(b) Read the last sentence as follows:

"Following each impact, there shall be no leakage from the primary receptacle(s)."

### Chapter 6.5

6.5.1.2 Delete the definition of Liner.

6.5.1.4.1(a) Amend the heading of table as follows:

"For solids, loaded or discharged"

6.5.1.4.4 Add the following new paragraph:

"6.5.1.4.4 The letter "W" may follow the IBC code. The letter "W" signifies that the IBC, although of the same type indicated by the code, is manufactured to a specification different from those in section 6.5.3 and is considered equivalent in accordance with the requirements in 6.5.1.1.2."

6.5.2.1.1 Amend the first sentence to read as follows:

"Each IBC manufactured and intended for use according to these Regulations shall bear markings which are durable, legible and placed in a location so as to be readily visible. Letters, numerals and symbols shall be at least 12 mm high and shall show:"

6.5.2.2.4 Amend to read as follows:

"6.5.2.2.4 Where a composite IBC is designed in such a manner that the outer casing is intended to be dismantled for transport when empty (such as for return of the IBC for reuse to the original consignor), each of the parts intended to be detached when so dismantled shall be marked with the month and year of manufacture and the name or symbol of the manufacturer and other identification of the IBC as specified by the competent authority (6.5.2.1.1(f))."

6.5.3.1.1(c) Delete the second sentence.

6.5.3.1.6 In sub-paragraph (a), replace the existing table with the following new table:

Capacity (C) in litres	Wall thickness (T) in mm			
	Types 11A, 11B, 11N		Types 21A, 21B, 21N, 31A, 31B, 31N	
	Unprotected	Protected	Unprotected	Protected
≤ 1000	2.0	1.5	2.5	2.0
> 1000 ≤ 2000	$T=C/2000 + 1.5$	$T=C/2000 + 1.0$	$T=C/2000 + 2.0$	$T=C/2000 + 1.5$
> 2000 ≤ 3000	$T=C/2000 + 1.5$	$T=C/2000 + 1.0$	$T=C/1000 + 1.0$	$T=C/2000 + 1.5$

In sub-paragraph (b), add "(see (c))" at the end of the definition of the variable  $Rm_1$ .

Add a new sub-paragraph (c) as follows:

- "(c) For purposes of the calculation described in (b), the guaranteed minimum tensile strength of the metal to be used ( $R_{m1}$ ) shall be the minimum value according to national or international material standards. However, for austenitic steels, the specified minimum value for  $R_m$  according to the material standards may be increased by up to 15% when a greater value is attested in the material inspection certificate. When no material standard exists for the material in question, the value of  $R_m$  shall be the minimum value attested in the material inspection certificate."

6.5.3.1.7 Replace "4.1.3.2" by "4.1.1.4".

6.5.4.8.4.2 Replace "4.1.2.2" by "4.1.1.4".

## **Chapter 6.6**

**Renumber existing Chapter 6.6 as Chapter 6.7 and insert a new Chapter 6.6 as follows:**

### **"CHAPTER 6.6**

#### **REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF LARGE PACKAGINGS**

##### **6.6.1 General**

6.6.1.1 Large packagings are packagings consisting of an outer packaging which contains articles or inner packagings and which

- (a) Are designed for mechanical handling;
- (b) Exceed 400 kg net mass / 450 litres capacity but have a volume of not more than 3000 l / (3 m<sup>3</sup>).

The requirements of this Chapter do not apply to:

- Class 2, except articles including aerosols;
- Class 6.2, except clinical waste of UN 3291;
- Class 7 packages containing radioactive material.

6.6.1.2 Packagings shall be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured packaging meets the requirements of this Chapter.

##### **6.6.2 Code for designating types of packagings**

The code used for large packagings consist of:

- (a) Two Arabic numerals:
  - 50 for rigid large packagings; or
  - 51 for flexible large packagings
- (b) Capital letters in Latin characters indicating the nature of the material, e.g. wood, steel etc. The

capital letters used shall be those shown in 6.1.2.6.

### 6.6.3 Marking

6.6.3.1 *Primary marking.* Each large packaging manufactured and intended for the use according to these Regulations shall bear durable and legible markings showing:

- (a) The United Nations packaging symbol ;

For metal large packagings on which the marking is stamped or embossed, the capital letters "UN" may be applied instead of the symbol;

- (b) The code "50" designating a large rigid packaging or "51" for flexible large packagings, followed by the material type in accordance with 6.5.1.4.1(b);
- (c) A capital letter designating the packing group(s) for which the design type has been approved:  
 X for packing groups I, II and III  
 Y for packing groups II and III  
 Z for packing group III only;
- (d) The month and year (last two digits) of manufacture;
- (e) The State authorising the allocation of the mark; indicated by the distinguishing sign for motor vehicles in international traffic;
- (f) The name or symbol of the manufacturer and other identification of the large packagings as specified by the competent authority;
- (g) The stacking test load in kg. For large packagings not designed for stacking the figure "0" shall be shown;
- (h) The maximum permissible gross mass in kilograms.

The primary marking required above shall be applied in the sequence of the sub-paragraphs.

6.6.3.2 *Examples of the marking:*

	50 A/X/05 2500/1000	96/N/PQRS	For a large steel packaging suitable for stacking; stacking load: 2500 kg; maximum gross mass: 1000 kg.
	50 H/Y04 0/800	95/D/ABCD 987	For a large plastics packaging not suitable for stacking; maximum gross mass: 800 kg.
	51H/Z/0697/S/1999 0/500		For a large flexible packaging not suitable for stacking; maximum gross mass: 500 kg.

### 6.6.4 Specific requirements for large packagings

**6.6.4.1**     *Specific requirements for metal large packagings*

- 50A rigid steel large packagings
- 50B rigid aluminium large packagings
- 50N metal (other than steel or aluminium) large packagings

6.6.4.1.1 The large packaging shall be made of suitable ductile metal in which the weldability has been fully demonstrated. Welds shall be skillfully made and afford complete safety. Low-temperature performance shall be taken into account when appropriate.

6.6.4.1.2 Care shall be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.

**6.6.4.2**     *Specific requirements for flexible material large packagings*

- 51H flexible plastics large packagings
- 51M flexible paper large packagings

6.6.4.2.1 The large packaging shall be manufactured from suitable materials. The strength of the material and the construction of the flexible large packagings shall be appropriate to its capacity and its intended use.

6.6.4.2.2 All materials used in the construction of flexible large packagings of types 51M shall, after complete immersion in water for not less than 24 hours, retain at least 85% of the tensile strength as measured originally on the material conditioned to equilibrium at 67% relative humidity or less.

6.6.4.2.3 Seams shall be formed by stitching, heat sealing, glueing or any equivalent method. All stitched seam-ends shall be secured.

6.6.4.2.4 Flexible large packagings shall provide adequate resistance to ageing and to degradation caused by ultraviolet radiation or the climatic conditions, or by the substance contained, thereby rendering them appropriate to their intended use.

6.6.4.2.5 For plastics flexible large packagings where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the large packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.6.4.2.6 Additives may be incorporated into the material of the large packaging to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.6.4.2.7 When filled, the ratio of height to width shall be not more than 2:1.

**6.6.4.3**     *Specific requirements for plastics large packagings*

- 50H rigid plastics large packagings

6.6.4.3.1 The large packaging shall be manufactured from suitable plastics material of known specifications and be of adequate strength in relation to its capacity and its intended use. The material shall be adequately resistant to ageing and to degradation caused by the substance contained or, where relevant, by ultraviolet

radiation. Low temperature performance shall be taken into account when appropriate. Any permeation of the substance contained shall not constitute a danger under normal conditions of transport.

6.6.4.3.2 Where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the outer packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.6.4.3.3 Additives may be incorporated in the material of the large packaging to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

#### **6.6.4.4 *Specific requirements for fibreboard large packagings***

50G rigid fibreboard large packagings

6.6.4.4.1 Strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used, appropriate to the capacity of the large packagings and to their intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than  $155 \text{ g/m}^2$  - see ISO535:1991. It shall have proper bending qualities. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting or corrugated fibreboard shall be firmly glued to the facings.

6.6.4.4.2 The walls, including top and bottom, shall have a minimum puncture resistance of 15 J measured according to ISO 3036:1975.

6.6.4.4.3 Manufacturing joins in the outer packaging of large packagings shall be made with an appropriate overlap and shall be taped, glued, stitched with metal staples or fastened by other means at least equally effective. Where joins are effected by gluing or taping, a water resistant adhesive shall be used. Metal staples shall pass completely through all pieces to be fastened and be formed or protected so that any inner liner cannot be abraded or punctured by them.

6.6.4.4.4 Any integral pallet base forming part of a large packaging or any detachable pallet shall be suitable for mechanical handling with the large packaging filled to its maximum permissible gross mass.

6.6.4.4.5 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the large packaging that might be liable to damage in handling.

6.6.4.4.6 The body shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the large packaging.

6.6.4.4.7 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

6.6.4.4.8 Where large packagings are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

#### **6.6.4.5**     *Specific requirements for wooden large packagings*

50D   natural wood large packagings

50C   plywood large packagings

6.6.4.5.1   The strength of the materials used and the method of construction shall be appropriate to the capacity and intended use of the large packagings.

6.6.4.5.2   Natural wood shall be well seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the large packagings. Each part of the large packagings shall consist of one piece or be equivalent thereto. Parts are considered equivalent to one piece when a suitable method of glued assembly is used as for instance Lindermann joint, tongue and groove joint, ship lap or rabbet joint; or butt joint with at least two corrugated metal fasteners at each joint, or when other methods at least equally effective are used.

6.6.4.5.3   Large packagings of plywood shall be at least 3-ply. They shall be made of well seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the large packaging. All adjacent plies shall be glued with water resistant adhesive. Other suitable materials may be used with plywood for the construction of the large packaging.

6.6.4.5.4   Large packagings of reconstituted wood shall be made of water resistant reconstituted wood such as hardboard, particle board or other suitable type.

6.6.4.5.5   Large packagings shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

6.6.4.5.6   Any integral pallet base forming part of a large packaging or any detachable pallet shall be suitable for mechanical handling with the large packaging filled to its maximum permissible gross mass.

6.6.4.5.7   The pallet or integral base shall be designed so as to avoid any protrusion of the base of the large packaging that might be liable to damage in handling.

6.6.4.5.8   The body shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the large packaging.

6.6.4.5.9   Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

6.6.4.5.10  Where large packagings are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

#### **6.6.5**     **Test requirements for large packagings**

##### **6.6.5.1**     *Performance and frequency of test*

6.6.5.1.1   The design type of each large packaging shall be tested as provided in 6.6.5.3 in accordance with procedures established by the competent authority.

6.6.5.1.2 Tests shall be successfully performed on each large packaging design type before such a packaging is used. A large packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes large packagings which differ from the design type only in their lesser design height.

6.6.5.1.3 Tests shall be repeated on production samples at intervals established by the competent authority. For such tests on fibreboard large packagings, preparation at ambient conditions is considered equivalent to the provisions of 6.6.5.2.3.

6.6.5.1.4 Tests shall also be repeated after each modification which alters the design, material or manner of construction of large packagings.

6.6.5.1.5 The competent authority may permit the selective testing of large packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and large packagings which are produced with small reductions in external dimension(s).

6.6.5.1.6 Where a large packaging has been successfully tested with different types of inner packagings, a variety of such different inner packagings may also be assembled in this large packaging. In addition, provided an equivalent level of performance is maintained, the following variations in inner packagings are allowed without further testing of the package:

- (a) Inner packagings of equivalent or smaller size may be used provided:
  - (i) the inner packagings are of similar design to the tested inner packagings (e.g. shape - round, rectangular, etc);
  - (ii) the material of construction of the inner packagings (glass, plastics, metal etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested inner packaging;
  - (iii) the inner packagings have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc);
  - (iv) sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings; and
  - (v) inner packagings are oriented within the large packagings in the same manner as in the tested package;
- (b) A lesser number of the tested inner packagings, or of the alternative types of inner packagings identified in (a) above, may be used provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the inner packagings.

6.6.5.1.7 The competent authority may at any time require proof, by tests in accordance with this section, that serially-produced large packagings meet the requirements of the design type tests.

6.6.5.1.8 Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one sample.

### **6.6.5.2**     ***Preparation for testing***

6.6.5.2.1     Tests shall be carried out on large packagings prepared as for transport including the inner packagings or articles used. Inner packagings shall be filled to not less than 98% of their maximum capacity for liquids or 95% for solids. For large packagings where the inner packagings are designed to carry liquids and solids, separate testing is required for both liquid and solid contents. The substances in the inner packagings or the articles to be transported in the large packagings may be replaced by other material or articles except where this would invalidate the results of the tests. When other inner packagings or articles are used they shall have the same physical characteristics (mass, etc) as the inner packagings or articles to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected.

6.6.5.2.2     Large packagings made of plastics materials and large packagings containing inner packagings of plastic materials - other than bags intended to contain solids or articles - shall be drop tested when the temperature of the test sample and its contents has been reduced to  $-18^{\circ}\text{C}$  or lower. This conditioning may be disregarded if the materials in question are of sufficient ductility and tensile strength at low temperatures. Where test sample are prepared in this way, the conditioning in 6.6.5.2.3 may be waived. Test liquids shall be kept in the liquid state by the addition of anti-freeze if necessary.

6.6.5.2.3     Large packagings of fibreboard shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h). There are three options, one of which shall be chosen.

The preferred atmosphere is  $23 \pm 2^{\circ}\text{C}$  and  $50\% \pm 2\%$  r.h. The two other options are:  $20 \pm 2^{\circ}\text{C}$  and  $65\% \pm 2\%$  r.h.; or  $27 \pm 2^{\circ}\text{C}$  and  $65\% \pm 2\%$  r.h.

*Note: Average values shall fall within these limits. Short term fluctuations and measurement limitations may cause individual measurements to vary by up to  $\pm 5\%$  relative humidity without significant impairment of test reproducibility.*

### **6.6.5.3**     ***Test requirements***

#### **6.6.5.3.1**     ***Bottom lift test***

##### **6.6.5.3.1.1**    ***Applicability***

For all types of large packagings which are fitted with means of lifting from the base, as a design type test.

##### **6.6.5.3.1.2**    ***Preparation of large packagings for test***

The large packagings shall be loaded to 1.25 times its maximum permissible gross mass, the load being evenly distributed.

##### **6.6.5.3.1.3**    ***Method of testing***

The large packagings shall be raised and lowered twice by a lift truck with the forks centrally positioned and spaced at three quarters of the dimension of the side of entry (unless the points of entry are fixed). The forks shall penetrate to three quarters of the direction of entry. The test shall be repeated from each possible direction of entry.

#### 6.6.5.3.1.4 *Criteria for passing the test*

No permanent deformation which renders the large packagings unsafe for transport and no loss of contents.

#### **6.6.5.3.2** *Top lift test*

##### 6.6.5.3.2.1 *Applicability*

For types of large packagings which are intended to be lifted from the top and fitted with means of lifting, as a design type test.

##### 6.6.5.3.2.2 *Preparation of large packagings for test*

The large packagings shall be loaded to twice its maximum permissible gross mass.

##### 6.6.5.3.2.3 *Method of testing*

The large packagings shall be lifted in the manner for which it is designed until clear of the floor and maintained in that position for a period of five minutes.

##### 6.6.5.3.2.4 *Criteria for passing the test*

No permanent deformation which renders the large packagings unsafe for transport and no loss of contents.

#### **6.6.5.3.3** *Stacking test*

##### 6.6.5.3.3.1 *Applicability*

For all types of large packagings which are designed to be stacked on each other, as a design type test.

##### 6.6.5.3.3.2 *Preparation of large packagings for test*

The large packagings shall be filled to its maximum permissible gross mass.

##### 6.6.5.3.3.3 *Method of testing*

The large packagings shall be placed on its base on level hard ground and subjected to a uniformly distributed superimposed test load (see 6.6.5.3.3.4) for a period of at least five minutes, large packagings of wood, fibreboard and plastic materials for a period of 24 h.

##### 6.6.5.3.3.4 *Calculation of superimposed test load*

The load to be placed on the large packagings shall be 1.8 times the combined maximum permissible gross mass of the number of similar large packagings that must be stacked on top of the large packagings during transport.

6.6.5.3.3.5 *Criteria for passing the test*

No permanent deformation which renders the large packagings unsafe for transport and no loss of contents.

**6.6.5.3.4** *Drop test*6.6.5.3.4.1 *Applicability*

For all types of large packagings as a design type test.

6.6.5.3.4.2 *Preparation of large packagings for testing*

The large packagings shall be filled in accordance with 6.6.5.2.1

6.6.5.3.4.3 *Method of testing*

The large packagings shall be dropped onto a rigid, non-resilient, smooth, flat and horizontal surface, in such a manner as to ensure that the point of impact is that part of the base of the large packagings considered to be the most vulnerable.

6.6.5.3.4.4 *Drop height*

<b>Packing Group I</b>	<b>Packing Group II</b>	<b>Packing Group III</b>
1.8m	1.2m	0.8m

*Note: Packagings for substances and articles of Class 1, self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 shall be tested at the Packing Group II performance level.*

6.6.5.3.4.5 *Criteria for passing the test*

6.6.5.3.4.5.1 The large packagings shall not exhibit any damage liable to affect safety during transport. There shall be no leakage of the filling substance from inner packaging(s) or article(s).

6.6.5.3.4.5.2 No rupture is permitted in large packagings for articles of Class 1 which would permit the spillage of loose explosive substances or articles from the large packagings.

6.6.5.3.4.5.3 Where a large packagings undergoes a drop test the sample passes the test if the entire contents are retained even if the closure is no longer sift-proof.

**6.6.5.4** *Certification and test report*

6.6.5.4.1 In respect of each design type of large packagings a certificate and mark (as in 6.6.3) shall be issued attesting that the design type including its equipment meets the test requirements.

6.6.5.4.2 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the large packagings:

- 1 Name and address of the test facility;
- 2 Name and address of applicant (where appropriate);
- 3 A unique test report identification;
- 4 Date of the test report;
- 5 Manufacturer of the large packagings;
- 6 Description of the large packagings design type (e.g. dimensions, materials, closures, thickness, etc) and/or photograph(s);
- 7 Maximum capacity/maximum permissible gross mass;
- 8 Characteristics of test contents, e.g. types and descriptions of inner packagings or articles used;
- 9 Test descriptions and results;
- 10 The test report shall be signed with the name and status of the signatory.

6.6.5.4.3 The test report shall contain statements that the large packagings prepared as for transport was tested in accordance with the appropriate provisions of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority."

#### **Chapter 6.7 (existing Chapter 6.6 renumbered as Chapter 6.7)**

6.7.2.11.2 Add the following new paragraph:

"6.7.2.11.2 Frangible disks shall be appropriate for the vacuum pressures which may be produced in the portable tank."

6.7.2.12.2 Replace the third sentence by the following:

"These devices may be fusible, spring-loaded or frangible disk components, or a combination of spring-loaded and frangible disk devices."

6.7.2.20.3 Add the following new paragraph:

"6.7.2.20.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate."

6.7.3.16.3 Add the following new paragraph:

"6.7.3.16.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate."

6.7.4.15.3 Add the following new paragraph:

"6.7.4.15.3 If a portable tank is designed and approved for handling in open seas, the words "OFFSHORE PORTABLE TANK" shall be marked on the identification plate."

**Chapter 7.1**

7.1.1 Add the following three new paragraphs:

"7.1.1.3 Dangerous goods shall be secured by suitable means in the transport unit in a manner that will prevent any movement during the journey which would change the orientation of the package or cause it to be damaged."

7.1.1.4 During loading and unloading dangerous goods shall be protected from being damaged. Particular attention shall be paid to the handling of packages during their preparation for transport to 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 of the packages.

7.1.1.5 During transport, IBCs and large packagings shall be securely fixed or packed into the transport unit so as to prevent lateral or longitudinal movement or impact and so as to provide adequate external support."

7.1.4.3.1.2 Amend to read as follows:

"7.1.4.3.1.2 *Derivation of control and emergency temperatures*

Type of receptacle	SADT <u>1/</u>	Control temperature	Emergency temperature
Single packagings and IBCs	20 °C or less over 20 °C to 35 °C over 35 °C	20 °C below SADT 15 °C below SADT 10 °C below SADT	10 °C below SADT 10 °C below SADT 5 °C below SADT
Portable tanks	< 50 °C	10 °C below SADT	5 °C below SADT

1/ i.e. the SADT of the substance as packaged for transport.

**Appendix A and Index**

1. Amend as appropriate Appendix A and the alphabetical index in accordance with the amendments adopted for Chapter 3.2.
2. Delete the following entry in the alphabetical index:  
"Engine starting fluid with flammable gas, see 2.1 1950 "

**Appendix B**

**GLOSSARY OF TERMS**

Add the following new entry:

**"AIR BAG INFLATORS, PYROTECHNIC or AIR BAG MODULES, PYROTECHNIC or SEAT-BELT PRETENSIONERS, PYROTECHNIC**

Articles which contain pyrotechnical substances and are used as life-saving vehicle air bags or seat-belts."