

DANGEROUS GOODS PANEL (DGP)

TWENTIETH MEETING

Montréal, 24 October to 04 November 2005

Agenda Item 2: Development of recommendations for amendments to the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) for incorporation in the 2007-2008 Edition

DRAFT AMENDMENTS TO THE TECHNICAL INSTRUCTIONS TO ALIGN TO THE UN RECOMMENDATIONS — PART 4

(Presented by the Secretary)

SUMMARY

Below are the draft amendments to Part 4, Chapter 1, 2, 4, 5, 6, 8 and 11 to reflect the decisions taken by the UN Committee of Experts on the Transport of Dangerous Goods and the Globally Harmonized System of Classification of Labelling of Chemicals at the second session (Geneva, 10 December 2004) and as modified by the decisions of WG/04 and WG/05.

Chapter 1

GENERAL PACKING REQUIREMENTS

1.1 GENERAL REQUIREMENTS APPLICABLE TO ALL CLASSES EXCEPT CLASS 7

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1.1.9 Inner packagings must be so packed, secured or cushioned 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. and so as to control their movement. Inner packagings containing liquids must be packaged with their closures upward and placed within outer packagings consistent with the orientation markings prescribed in 5;3.2.11 b) of these Instructions. Inner packaging that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastic material, etc., must be secured in outer packagings with suitable cushioning material. Any leakage of the contents must not substantially impair the protective properties of the cushioning material or of the outer packaging.

Editorial Note.— The following new paragraph was moved from 6;4.1.6.

- 1.1.9.1 Where an outer packaging of a combination packaging has been successfully tested with different types of inner packagings, a variety of such different inner packagings may also be assembled in this outer packaging or 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:
 - 1) the inner packagings are of similar design to the tested inner packagings (e.g. shape round, rectangular, etc.);
 - 2) 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;
 - 3) the inner packagings have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc.);
 - 4) sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings; and
 - 5) inner packagings are oriented within the outer packaging 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.

Chapter 2

GENERAL

- 2.1 Each of the succeeding Chapters of this Part is devoted to the specific packing instructions applicable to an individual class of dangerous goods. In some cases the Chapters start with general requirements which apply to all goods in that class.
- 2.2 The Dangerous Goods List (Table 3-1) shows for each article or substance, in columns 9 and 11, the number of the packing instruction that must be used.
- 2.3 The packing instruction numbers are prominently displayed on the outer edge of each page for easy reference. Each instruction shows, where applicable, the acceptable single and combination packagings. For combination packagings, tables show the acceptable outer packagings and associated inner packagings with the maximum net quantity permitted in each inner packaging. The maximum quantity per inner packaging may be further limited by the maximum quantity per package specified in Table 3-1. Where provisions for particular articles or substances apply, tables show the inner packagings with associated quantity limitations and single packagings which are acceptable for the individual

commodities (identified by their UN Number). If a commodity is identified in the table applicable to inner packagings of combination packagings but not in the table applicable to single packagings, it means that the particular commodity is not permitted in single packagings. Where appropriate, particular packing requirements are also indicated for each commodity; these requirements are detailed at the end of that packing instruction. Particular packing requirements apply to both inner packagings of combination packagings and single packagings as appropriate.

- 2.4 Unless otherwise specified, each packaging must conform to the applicable requirements of Part 6. Generally packing instructions do not provide guidance on compatibility and the user should not select a packaging without checking that the substance is compatible with the packaging material selected (e.g. most fluorides are unsuitable for glass receptacles). Where glass receptacles are permitted in the packing instructions porcelain, earthenware and stoneware packagings are also allowed.
- 2.5 The following packagings must not be used when the substances being transported are liable to become liquid during transport:

Packagings

<u>Drums:</u> <u>1D and 1G</u>

<u>Boxes:</u> <u>4C1, 4C2, 4D, 4F, 4G and 4H1</u>

 Bags:
 5L1, 5L2, 5L3, 5H1, 5H2, 5H3, 5H4, 5M1 and 5M2

 Composite packagings:
 6HC, 6HD2, 6HG1, 6HG2, 6HD1, 6PC, 6PD1, 6PD2,

6PG1, 6PG2 and 6PH1

- 2.46 Where the packing instructions in this part authorize the use of a particular type of outer packaging (e.g. 4G, 1A2), packagings bearing the same packaging identification code followed by the letter "V" marked in accordance with the requirements of 6;4.1.7 h) (e.g. 4GV, 1A2V) may also be used under the same conditions and limitations applicable to the use of that type of packaging according to the relevant packing instruction. For example, a combination packaging marked with the packaging code "4GV" may be used whenever a combination packaging marked "4G" is authorized, provided the requirements in the relevant packing instruction regarding types of inner packagings and quantity limitations are respected.
- 2.7 Cylinders may be used for liquids and solids when indicated in a packing instruction. The cylinder must meet the standards set out below.
- 2.7.1 Unless otherwise indicated in these Instructions, cylinders conforming to:
 - a) the applicable requirements of Part 6 Chapter 5 or
 - b) the national or international standards on the design, construction, testing, manufacturing and inspection, as applied by the country in which the cylinders are manufactured, provided that the provisions of 2.7 and 6;5.3.3 are met.
- 2.7.2 Every design type of cylinder must be approved by the competent authority of the country of manufacture or as indicated in Part 6, Chapter 5.
- 2.7.3 Unless otherwise indicated, cylinders having a minimum test pressure of 0.6 MPa must be used.
- 2.7.4 Unless otherwise indicated, cylinders may be provided with an emergency pressure relief device

designed to avoid bursting in case of overfill or fire accidents.

Cylinder valves must be designed and constructed in such a way that they are inherently able to withstand damage without release of the contents or must be protected from damage which could cause inadvertent release of the contents of the cylinder, by one of the methods as given in 4; 4.1.1.8 (a) to (e)

- 2.7.5 The level of filling must not exceed 95 percent of the capacity of the cylinder at 50 °C. Sufficient ullage (outage) must be left to ensure that the cylinder will not be liquid full at a temperature of 55 °C.
- 2.7.6 Unless otherwise indicated cylinders must be subjected to a periodic inspection and test every 5 years. The periodic inspection must include an external examination, an internal examination or alternative method as approved by the competent authority, a pressure test or equivalent effective non-destructive testing with the agreement of the competent authority including an inspection of all accessories (e.g. tightness of valves, emergency relief valves of fusible elements). Cylinders must not be filled after they become due for periodic inspection and test but may be transported after the expiry of the time limit. Cylinder repairs must meet the requirements of 4; 4.1.1.11.
- 2.7.7 Prior to filling, the filler must perform an inspection of the cylinder and ensure that the cylinder is authorized for the substances to be transported and that the provisions of these Instructions have been met. Shut-off valves must be closed after filling and remain closed during transport. The consignor must verify that the closures and equipment are not leaking.
- 2.7.8 Refillable cylinders must not be filled with a substance different from that previously contained unless the necessary operations for change of service have been performed.
- 2.7.9 Marking of cylinders for liquids and solids according to 2.7 (not conforming to the requirements of Chapter 6.2) must be in accordance with the requirements of the competent authority of the country of manufacturing.

Secretarial Note.— Amend Packing Instructions 303, 304, 306, 307,308, 309, 310, 409, 431, 432, 604, 605, 611, 612, 618, 620, 812, 813, 820, 821 and 914 as indicated below.

- "Cylinders that meet the requirements of PI200 Part 4;2.7 are permitted"
- "Cylinders as permitted by PI 200 Part 4;2.7"
- "PPR8 "Only metal cylinders that meet the requirements of P200 Part 4;2.7 are permitted"
- 2.58 The appropriate authority of the State of Origin may approve the use of a packaging alternative to those provided in a particular packing instruction indicated in Table 3-1 for listed dangerous goods provided:

Editorial Note.—	Renumber subsequent paragraphs

DGP/20-WP/7

Chapter 3

CLASS 1 — EXPLOSIVES

131	PACKING INSTRUCTION 131	131
Inner packagings	Intermediate packagings	Outer packagings
Bags paper plastic Receptacles fibreboard metal plastic wood	Not necessary	Boxes aluminium (4B) fibreboard (4G) natural wood, ordinary (4C1) natural wood, with sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) steel (4A)
Reels		Drums aluminium, removable head (1B2) fibre (1G) plastic, removable head (1H2) plywood (1D) steel, removable head (1A2)
PARTICULAR PACKING REQ	QUIREMENTS OR EXCEPTIONS:	
	bags must not be used as inner packagings. d as inner packagings for UN 0030, 0255, 0360, 0361,	, 0456 and 0500.

133	PACKING INSTRUCTION 133	133			
Inner packagings	Intermediate packagings	Outer packagings			
Receptacles	Receptacles	Boxes			
fibreboard	fibreboard	aluminium (4B)			
metal	metal	fibreboard (4G)			
plastic	plastic	natural wood, ordinary (4C1)			
wood	wood	natural wood, with sift-proof walls (4C2)			
Trays, fitted with dividing partitions		plywood (4D)			
fibreboard		reconstituted wood (4F)			
plastic		solid plastic (4H2)			
wood		steel (4A)			

PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:

- Trays should must only be used as inner packagings for UN 0044, 0073, 0319, 0320, 0364, 0365, 0366, 0376, 0377 and 0378.
 Receptacles are only required as intermediate packagings when the inner packagings are trays.

Chapter 4

CLASS 2 — GASES

200

PACKING INSTRUCTION 200

200

For cylinders, the general packing requirements of 4.1.1 must be met.

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- c) In no case must cylinders be filled in excess of the limit permitted in the following requirements:
 - For compressed gases, the working pressure must be not more than two thirds of the test pressure of the cylinders.
 Restrictions to this upper limit on working pressure are imposed by special packing provision "o". In no case must the internal pressure at 65°C exceed the test pressure.
 - 2) For high pressure liquefied gases, the filling ratio must be such that the settled pressure at 65°C does not exceed the test pressure of the cylinders.

The use of test pressures and filling ratios other than those in the table is permitted provided that the above criterion is met, except where special packing provision "o" applies.

For high pressure liquefied gases and gas mixtures for which relevant data is are not available provided in the table, the maximum filling ratio (FR) must be determined as follows:

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\begin{split} FR &= 8.5 \times 10^{-4} \times d_g \times P_h \\ \text{where} \quad &FR &= \text{maximum filling ratio} \\ \quad &d_g &= \text{gas density (at 15°C, 1 bar)(in g/l)} \end{split}
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Gas specific provisions:

e 5) UN 1040 Ethylene oxide may also be packed in hermetically sealed glass ampoules (IP.8) or metal inner packagings (IP.3 and IP.3A) suitably cushioned in fibreboard, wooden or metal boxes meeting the Packing Group I performance level. The maximum quantity permitted in any glass inner packaging is 30 g, and the maximum quantity permitted in any metal inner packaging is 200 g. After filling, each inner packaging must be determined to be leak-tight by placing the inner packaging in a hot water bath at a temperature, and for a period of time, sufficient to ensure that an internal pressure equal to the vapour pressure of ethylene oxide at 55°C is achieved. The total quantity maximum net mass in any outer packaging must not exceed 2.5 kg. When cylinders are used, they must be of the seamless or welded steel types that are equipped with suitable pressure relief devices. Each cylinder must be tested for leakage with an inert gas before each refilling and must be insulated with three coats of heat retardant paint or in any equally efficient manner. The maximum net quantity per cylinder must not exceed 25 kg.

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g-7) A cylinder must contain not more than 5 kg of the gas UN 1045 Fluorine compressed.

For UN 2190, oxygen difluoride, compressed, individual cylinders must contain not more than 5 Kg of the gas.

For UN 1045 fluorine, compressed, individual cylinders must contain not more than 5 kg of the gas.

Editorial Note.—

Replace e) to m) with 5) to 13) and amend Tables 1 and 2 accordingly.

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UN No.	Name and description	Class or Division	Subsidiary risk	LC ₅₀ ml/m ³	Cylinders	Test Period, years	Test pressure, bar*	Maximum wWorkin g pressure, bar*	
		•							
1014	Carbon dioxide and oxygen mixture, compressed	2.2	5.1		X	10			
≠ 1016	Carbon monoxide, compressed	2.3	2.1	3760	X	5			1
1023	Coal gas, compressed	2.3	2.1		X	5			
1979	Rare gases mixture, compressed	2.2			X	10			
1980	Rare gases and oxygen mixture, compressed	2.2			X	10			
1981	Rare gases and nitrogen mixture, compressed	2.2			X	10			
	Table 2. LIQ	QUEFIED	GASES A	AND DISSO	DLVED G	ASES		<u> </u>	
UN No.	Table 2. LI(Class or Division	GASES A			ASES Test Period, years	Test pressure, bar	Filling Ratio	Special packing provisions
		Class or	Subsidiary			Test Period,	pressure,		packing
		Class or	Subsidiary			Test Period,	pressure,		packing
No.	Name and description	Class or Division	Subsidiary risk	LC ₅₀ ml/m ³	Cylinders	Test Period, years	pressure, bar	Ratio	packing provisions
No.	Name and description	Class or Division	Subsidiary risk	LC ₅₀ ml/m ³	Cylinders	Test Period, years	pressure, bar	Ratio	packing provisions
No 1005	Name and description Ammonia, anhydrous Carbon dioxide and nitrous oxide	Class or Division	Subsidiary risk	LC ₅₀ ml/m ³	Cylinders	Test Period, years	pressure, bar	0.53	packing provisions
No 1005 1015	Name and description Ammonia, anhydrous Carbon dioxide and nitrous oxide	Class or Division 2.3	Subsidiary risk	LC ₅₀ ml/m ³	Cylinders	Test Period, years	pressure, bar	0.53	packing provisions
No 1005	Name and description Ammonia, anhydrous Carbon dioxide and nitrous oxide mixture Ethylene oxide, or ethylene oxide with nitrogen up to a total pressure of	Class or Division 2.3	Subsidiary risk	LC ₅₀ ml/m ³	Cylinders X	Test Period, years 5	33 250	0.53 0.75	packing provisions
No 1005 1015 1040	Name and description Ammonia, anhydrous Carbon dioxide and nitrous oxide mixture Ethylene oxide, or ethylene oxide with nitrogen up to a total pressure of	Class or Division 2.3	Subsidiary risk	LC ₅₀ ml/m ³	Cylinders X	Test Period, years 5	33 250	0.53 0.75	packing provisions
No	Ammonia, anhydrous Carbon dioxide and nitrous oxide mixture Ethylene oxide, or ethylene oxide with nitrogen up to a total pressure of 1mpa (10 bar) at 50°e	Class or Division 2.3 2.2	Subsidiary risk 8	LC ₅₀ ml/m ³ 4000	X X	Test Period, years 5 40	33 250	0.53 0.75 0.78	packing provisions b

	1079	Sulphur dioxide	2.3	8	2520	X	5	14	1.23	
	•••									
/	2191	Sulphuryl fluoride	2.3		3020	X	5	50	1.10	-
	•••									
/	2204	Carbonyl sulphide	2.3	2.1	1700	X	5	26	0.84	4
	•••									
	2451	Nitrogen trifluoride	2.2	5.1		X	10	200 300	0.50 0.75	
	•••				1					
/	3300	Ethylene oxide and carbon dioxide mixture with more than 87% ethylene oxide	2.3	2.1	More than 2900	X	5	28	0.73	e
	•••									
/	3318	Ammonia solution, relative density less than 0.880 at 15°C in water, with more than 50% ammonia	2.3	8		X	5			ŧ

Chapter 5

CLASS 3 — FLAMMABLE LIQUID

<u>3</u>13

PACKING INSTRUCTION 31X

313

This instruction applies to UN 3473 on Passenger aircraft and Cargo Aircraft Only.

The general packing requirements of Part 4, Chapter 1 must be met, except that the requirements of 4;1.1.2, 1.1.13, and 1.1.16 to 1.1.21 do not apply.

Fuel cell cartridges must be packed in strong outer packagings. When fuel cell cartridges are packed with equipment, they must be packed in inner packagings or placed in the outer packaging with cushioning material so that the cartridges are protected against damage that may be caused by the movement or placement of the equipment and the cartridges within the outer packaging.

Secretarial Note.— DGP-WG/05-WP/46.

Chapter 8 — CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

650

PACKING INSTRUCTION 650

This packing instruction applies to UN 3373.

- 1) The packaging must be of good quality, strong enough to withstand the shocks and loadings normally encountered during transport, including transhipment between transport units and between transport units and warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings must be constructed and closed to prevent any loss of contents that might be caused under normal conditions of transport by vibration or by changes in temperature, humidity or pressure.
- 2) The packaging must consist of three components:
 - a) a primary receptacle;
 - b) a secondary packaging; and
 - an rigid outer packaging.

of which either the secondary or the outer packaging must be rigid.

- 3) Primary receptacles must be packed in secondary packagings in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packagings must be secured in outer packagings with suitable cushioning material. Any leakage of the contents must not compromise the integrity of the cushioning material or of the outer packaging.
- 4) For transport, the mark illustrated below must be displayed on the external surface of the outer packaging on a background of a contrasting colour and must be clearly visible and legible. The mark must be in the form of a square set at an angle of 45° (diamond-shaped) with each side having a length of at least 50 mm, the width of the line must be at least 2 mm, and the letters and numbers must be at least 6 mm high. The proper shipping name "Diagnostic specimen" or "Clinical specimen Biological substance, Category B" in letters at least 6 mm high must be marked on the outer package adjacent to the diamond-shaped mark.

6) The completed package must be capable of successfully passing the drop test in 6;6.2 as specified in 6;6.1.5 of the Instructions

except that the height of the drop must not be less than 1.2 m. Following the appropriate drop sequence, there must be no leakage from the primary receptacle(s) which must remain protected by absorbent material, when required, in the secondary packaging.

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- 10) When packages are placed in an overpack, the package markings required by this packing instruction must either be clearly visible or the markings must be reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack."
- 11) Infectious substances assigned to UN 3373 which are packed and marked in accordance with this packing instruction are not subject to any other requirement in these Instructions except for the following:
 - a) the name and address of the shipper and of the consignee must be provided on each package;
 - ab) the proper shipping name, UN number and the name, address and telephone number of a person responsible must be provided on a written document (such as an air waybill) or on the package;
 - bc) classification must be in accordance with 2;6.3.2;
 - e d) the incident reporting requirements in 7;4.4 must be met; and
 - de) the inspection for damage or leakage requirements in 7;3.1.3 and 7;3.1.4;
 - e f) passengers and crew members are prohibited from transporting infectious substances either as, or in, carry-on baggage or checked baggage or on their person.

Note.— When the shipper or consignee is also the 'person responsible' as referred to in b) above, the name and address need be marked only once in order to satisfy the name and address marking provisions in both a) and b), above.

Secretarial Note.— DGP-WG/05-WP/12

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

900

PACKING INSTRUCTION 900

900

Vehicles, machines or equipment containing internal combustion engines or batteries must meet the following requirements:

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- f) in the event that vehicles, machines or equipment containing internal combustion engines are being shipped in a dismantled state such that fuel lines have been disconnected, those fuel lines must be sealed securely;
- g) when internal combustion engines are being shipped separately, all fuel, coolant or hydraulic systems remaining in or on the engine must be drained as far as practicable and all disconnected fluid pipes must be sealed with leak proof caps, which are positively retained;
- hg) vehicles equipped with theft-protection devices, installed radio communications equipment or navigational system must have such devices, equipment or system disabled;
- i-h) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the *UN Manual of Tests and Criteria*, Part III, subsection 38.3, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
- j-i) if sodium batteries are installed they must conform to the requirements of special provision A94, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits.

When internal combustion engines are being shipped separately, all fuel, coolant or hydraulic systems remaining in or on the engine must be drained as far as practicable and all disconnected fluid pipes must be sealed with leak-proof caps, which are positively retained

Replacements for the dangerous goods permitted in paragraphs a) to $\underline{\textbf{j.i.}}$) must not be carried under this packing instruction.

Secretarial Note.— DGP-WG/05-WP/15

904

PACKING INSTRUCTION 904

904

Solid carbon dioxide (dry ice) when offered for transport by air must be packed in accordance with the general packing requirements of Part 4, Chapter 1 and be in packaging designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packaging. Arrangements between shipper and operator(s) must be made for each shipment, to ensure that ventilation safety procedures are followed. The dangerous goods transport document requirements of Part 5, Chapter 1 are not applicable provided alternative written documentation is supplied containing the following information: proper shipping name (**Dry ice** or **Carbon dioxide, solid**), class 9, UN number 1845, the number of packages and the net quantity of dry ice in each package. The information must be included with the description of the goods. The net mass of the **Carbon dioxide, solid** (**Dry ice**) must be marked on the outside of the package.

Dry ice used as a refrigerant for other than dangerous goods may be shipped in a unit load device or other type of pallet prepared by a single shipper provided that the shipper has made prior arrangements with the operator. The Unit Load Device must display an identification tag having a border of prominent red hatchings on both sides and the minimum dimensions of $148 \text{ mm} \times 210 \text{ mm}$. The hazard class and total quantity of the Dry ice must be visibly indicated on this tag.

Note.— For loading restrictions see 7;2.11; for special marking requirement see 5;2.4.7.

Secretarial Note. — DGP-WG/04-WP/24 as amended

905

PACKING INSTRUCTION 905

905

The description "Life-saving appliances, self-inflating" (UN 2990) is intended to apply to life-saving appliances that present a hazard if the self-inflating device is activated accidentally.

Life-saving appliances, such as life-rafts, life vests, aircraft survival kits or aircraft evacuation slides, may only contain the dangerous goods listed below:

a) Division 2.2 gases, in cylinders that conform to the requirements of Packing Instruction 200; these may be connected to the life-saving appliance. Division 2.2 gases, must be contained in cylinders which conform to the requirements of the appropriate national authority of the country in which they are approved and filled. as specified by the competent authority, which Such cylinders may be connected to the life-saving appliance. These cylinders may include installed actuating cartridges (cartridges, power device of Division 1.4C and 1.4S) provided the aggregate quantity of deflagrating (propellant) explosives does not exceed 3.2 grams per unit. When the cylinders are shipped separately, they must be classified as appropriate for the Division 2.2 gas contained and need not be marked, labelled or described as explosive articles;

Secretarial Note.— DGP-WG/05-WP/11.