

DANGEROUS GOODS PANEL

Frankfurt, 16 to 20 September 2002

Agenda Item 3: Resolution, where possible, of the non-recurrent work items identified by the ANC or the panel

3.1: Packing instructions

REPORT OF THE PACKAGING INSTRUCTION WORKING GROUP

(Presented by G. Leach and R. Richard)

1. INTRODUCTION

1.1 At previous Panel working group meetings, informal work to align the Packing Instructions with those in the UN Recommendations and to make them more user friendly was undertaken. At the meeting of the Panel in October 2001 (see 2.10.4 of DGP/18 – WP/56) it was agreed that a small working group should attempt to update and streamline the Packing Instructions. The terms of reference for this work were set out in the report of the Panel.

1.2. The informal packing instruction (PI) working group met twice in Washington, DC in February and May 2002. The results of those meetings are summarised below. Detailed proposals and commentary identifying the implications of the proposed amendments are set out in the Annexes to this report.

2. DISCUSSION

2.1 The PI working group agreed that the current ICAO packing instructions can be significantly simplified and aligned with the UN packing instructions. During their evaluation, the group concentrated on maintaining the guidelines established by the panel by addressing two main goals:

2.1.1 Rationalize or verify authorized packaging and inner packaging quantity limits while maintaining an appropriate level of safety. The review lead to a minimal number of changes in authorized packaging and inner quantity limits. Changes to the authorized packaging are aligned with the UN Model Regulations. Changes to inner packaging limits were few and only done to align with similar substances where differences could not be justified. A conservative approach was used and in many cases the proposed amendments should result in a higher degree of safety. These changes are detailed in Annexes 1-3.

2.1.2 Maintain or improve on ease of customer use. The PI working group discussed in detail the

current format of the ICAO TI packing instructions, evaluating the advantages and disadvantages from a user perspective. As was discussed at the meeting of the Panel in October 2001, the group identified significant consolidation and streamlining that could be done to ease use. The recommendations were developed to improve the clarity of the packing instructions, particular packaging requirements, and the Dangerous Goods List.

- a) Packing Instructions. Currently, the TI provides separate instructions for a substance depending on its assigned packing group, whether it is authorized for transport on passenger or cargo aircraft, or in limited quantities. Therefore, a single proper shipping name could be assigned multiple packing instructions. A worst case example would be Flammable Liquids, n.o.s., which will direct the user to choose from one of eight different packing instructions (PIs 302, 303, 305, Y305, 307, 309, Y309, or 310). A study of these instructions shows that the majority of the information is repeated and could easily be consolidated allowing the user to choose and identify requirements from one, maybe two, instructions rather than eight. In most cases, an effort to consolidate will provide the user with all packing requirements in one packing instruction location, simplifying the procedure for looking up packaging requirements. This simple consolidation will provide an approximate 40% reduction in the number of packing instructions and reduce the length of the Dangerous Goods List (DGL) by eliminating separate entries for different packing groups and limited quantities.
- b) Particular Packaging Requirements (PPR). The PI working group further proposes simplifying the means in which PPRs are conveyed. Annex 2 identifies the current PPRs in Classes 3, 4, 5, and 9 and the group's decisions on each. These requirements could be simplified by the modifications as explained in the Annex and assigning the PPR to the individual substance in the DGL.
- c) Dangerous Goods List (DGL). Annex 4 provides a sample page with a proposed modified layout incorporating the combined packing instructions and PPR designators. The proposed layout provides the advantage of a single column for packing instructions, identifying the relevant PPRs by substance, and aligning the quantity limits side-by-side.

2.2 Preliminary evaluation was done on Class 6.1 and Class 8 but is not submitted as part of this report. The PI working group did not consider the Packing Instructions for the following groups of dangerous goods:

Class 1	already aligned to UN
Class 2	will align to UN in 2003/4
Class 6.2	largely aligned to UN likely to need revision for 2005
Class 7	follows current UN text.

2.3 The PI working group considers that it has met the objective set down in Appendix A of the Panel Report. The following summarizes the progress to date on each principle:

- a) Principle 1.1. "As far as practical, the packing instructions should be aligned with those in the UN recommendations in content and in layout. The numbering of packing instructions should be reviewed as the work progresses to ensure that there can be no confusion between the packing instructions for the surface modes of

transport and those used in air transport.” The Packing Instructions are aligned in layout, as far as possible with the UN. The numbering system has not been agreed except that where a Packing Instruction exactly mirrors that in the UN it should retain the same number allocated by the UN.

- b) Principle 1.2. “The packing instructions should be clear and provide as a wide choice of packagings as possible, whilst providing an adequate level of safety for air transport.” The new Packing Instructions have where appropriate, been expanded to permit as a wide a range of packagings as possible. A number of the restrictions usually listed in Particular Packing Requirements (PPR) have been removed or edited to reflect the UN format. As a general rule where the Packing Instruction restricted the use of a particular type of packaging on the basis of compatibility, this has been removed. The reasoning is based on the fact that the data behind the decisions is almost always at least 25 years old. New methods of coating metal and many new types of plastic material including special coatings have been introduced which overcome compatibility problems. In addition, the current compatibility provisions are not all encompassing and it was felt that this could lead to a false sense of security on the part of shippers that would serve to detract from their understanding that they must ensure that the dangerous goods are compatible with the packaging materials as specified in the general packing requirements of Part 4; Chapter 1 and in the packing instructions.
- c) Principle 1.3. “The packing instructions should consist of (a) a small number of general instructions covering the majority of the dangerous goods; and (b) a limited number of more specific instructions for particularly hazardous goods or specialized articles and substances.” This principle was followed.
- d) Principle 1.4. “A rationalized approach should be used for allocating packing instructions to specific substances.” This principle was followed.
- e) Principle 1.5. “A rationalized approach should be used for establishing the types of inner packagings and outer packagings permitted.” The rationalisation of inner packages has led to a small number of additions and deletions to inner packagings authorized. Inner and outer packagings authorized were harmonized with the UN Model Regulations to the extent they did not require air unique restrictions.
- f) Principle 1.6. “The quantities per packaging (inner and outer) should not substantially vary from the current provisions of the Technical Instructions.” Quantities per outer package for passenger and cargo aircraft have not been changed. The rationalization of inner packaging quantity limits led to some inner quantity limit changes (some upwards but most downwards). These are listed in Annex 3.

3. PROPOSAL

3.1 The Panel is invited to discuss and evaluate the results of the PI working group’s efforts to harmonize and simplify use of the ICAO TI Packing Instructions. The PI working group requests comments and further direction on proceeding with this project. Additional issues for consideration by the Panel Working Group include:

- a) How should the PPRs be conveyed to users? The UN includes special packing provisions in the Dangerous Goods List (DGL). If the new packing instructions cover both passenger and cargo aircraft requirements in a single packing instruction then reformatting of the DGL may be necessary and warranted. Annex 5 illustrates an additional column for PPRs.

- b) Should further validation and possible rationalization of inner quantity limits be pursued? Those packing instructions where it is necessary to list an inner packaging quantity limit by UN# (i.e., proposed 3X3) could be subjected to an additional detailed technical review to determine if the limits can be further rationalized based on alignment with similar hazards. Result would likely raise and/or lower quantities for some of these substances. The Panel working group should carefully consider the inner packaging quantity changes that are highlighted in the Annexes in relation to safety and potential economic impacts to industry.

3.3

The Annexes to this document are as follows:

Annex 1	Draft Packing Instructions.
Annex 2	Modifications to Particular Packing Requirements
Annex 3	Proposed Changes to Quantity Limits
Annex 4	Restructured Dangerous Goods List
Annex 5	Cross Reference of Current and Proposed Packing Instructions

Annex 1
Reformatted
Packing Instructions for
Classes 3, 4, 5 and 9

Class 3
Reformatted Packing
Instructions

301**PACKING INSTRUCTION 301****301**

The general packing requirements of Part 4, Chapter 1 must be met.

Aircraft hydraulic power unit fuel tanks containing a mixture of anhydrous hydrazine and methyl hydrazine (M86 fuel) and designed for installation as complete units in aircraft are acceptable, subject to either of the following conditions:

- a) the unit must consist of an aluminium pressure vessel made from tubing and having welded heads. Primary containment of the fuel within this vessel must consist of a welded aluminium bladder having a maximum internal volume of 46 L. The outer vessel must have a minimum design gauge pressure of 1 275 kPa and a minimum burst gauge pressure of 2 755 kPa. Each vessel must be leak-checked during manufacture and before shipment and must be found leakproof. The complete inner unit must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 L; or
- b) the unit must consist of an aluminium pressure vessel. Primary containment of the fuel within this vessel must consist of a welded hermetically sealed fuel compartment with an elastomeric bladder having a maximum internal volume of 46 L. The pressure vessel must have a minimum design gauge pressure of 2 860 kPa and a minimum burst gauge pressure of 5 170 kPa. Each vessel must be leak-checked during manufacture and before shipment and must be found leakproof. The complete inner unit must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 L.

Notes: Unchanged from current PI 301.

311**PACKING INSTRUCTION 311****311**

Nitroglycerin solution in alcohol may be shipped as UN 3064 only if packed in IP.3 metal cans (other than aluminium) of not more than 1 L capacity each, overpacked in a wooden box (4C1, 4C2, 4D or 4F) containing not more than 5 L. Metal cans must be completely surrounded with absorbent cushioning material. Wooden boxes must be completely lined with a suitable material impervious to water and nitroglycerin. The general packing requirements of Part 4, Chapter 1 must be met.

Notes: Added to authorized outer package, wooden box 4D and 4F to be consistent with the UN Model Regulation P300.

A polyester resin kit and a fibreglass repair kit consist of two components: a base material in Class 3, Packing Group II or III, and an activator (organic peroxide).

The general packing requirements of Part 4, Chapter 1 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

The activator must be in IP.2 plastic packagings or metal or plastic tubes. The quantity must not exceed 125 ml per inner packaging if liquid, and 500 grams per inner packaging if solid.

The flammable liquid must be in IP.1 glass or earthenware, IP.2 plastic, IP.3 metal packagings.

The components may be placed in the same outer packaging provided they will not interact dangerously in the event of leakage. The inner packagings must be packed in an outer:

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
aluminium (4B)	aluminium (1B2)	aluminium (3B2)
fibreboard (4G)	fibre (1G)	steel (3A2)
plywood (4D)	plywood (1D)	plastic (3H2)
reconstituted wood (4F)	steel (1A2)	
expanded plastic (4H1)	plastic (1H2)	
solid plastic (4H2)	other metal (1N2)	
steel (4A)		
wooden (4C1, 4C2)		

The following requirements apply to polyester resin kits (UN3269) transported as limited quantity:

The requirements of Part 3, Chapter 4 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

The activator (organic peroxide) must be in IP.2 plastic packagings or metal or plastic tubes and the quantity must not exceed 30 mL or 100 g. The net quantity of activator per package must not exceed 125 mL or 500 g.

The flammable liquid must be in IP.1 glass or earthenware, IP.2 plastic, IP.3 metal packagings.

The components may be placed in the same outer packaging provided they will not interact dangerously in the event of leakage. The inner packagings must be packed in an outer:

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
aluminium	aluminium	aluminium
fibreboard	fibre	steel
plywood	plywood	plastic
reconstituted wood	steel	
expanded plastic	plastic	
solid plastic	other metal	
steel		
wooden		

Notes on 312:

- Harmonized with UN Model Regulation P302.
- Deleted reference to IP.9. Provide one quantity limit for inner packagings
- Deleted quantity limit for flammable liquid. Request the working group consider adding a gross limit to the Dangerous Goods List.
- Added additional authorized outer packagings to standardize with the new generalized Class 3 instruction.
- Request the working group consider modifying Special Provision A66 to harmonize with UN Model Regulation Special Provision 236 and determine quantity limitation for the base material.

3X1	PACKING INSTRUCTION 3X1	3X1
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The general packing requirements of Part 4, Chapter 1 must be met. Substances must be compatible with their packaging as required by 4;1.1.3.

Combination packagings with inner plastic packagings and single outer plastic packagings are not permitted for PG I liquid.

COMBINATION PACKAGINGS:

The following inner packagings are authorized for the indicated volumes of liquid for passenger or cargo aircraft.

	<i>Passenger Aircraft</i>			<i>Cargo Aircraft</i>		
	<i>PG I</i>	<i>PG II</i>	<i>PG III</i>	<i>PG I</i>	<i>PG II</i>	<i>PG III</i>
Glass or earthenware (IP.1)	0.5	1 L	2.5 L	1 L	2.5 L	5 L
Plastic (IP.2)	1	5 L	10 L	5 L	5 L	10 L
Metal (IP.3, IP.3A)	1	5 L	10 L	5 L	10 L	25 L

The following outer packagings are authorized for all inner packagings permitted above:

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
aluminium (4B)	aluminium (1B2)	aluminium (3B2)
fibreboard (4G)	fibre (1G)	steel (3A2)
plywood (4D)	plywood (1D)	plastic (3H2)
reconstituted wood (4F)	steel (1A2)	
expanded plastic (4H1)	plastic (1H2)	
solid plastic (4H2)	other metal (1N2)	
steel (4A)		
wooden (4C1, 4C2)		

SINGLE PACKAGINGS:

The following single packagings are permitted on cargo aircraft for all packing groups and on passenger aircraft for PG III liquids only.

- Composites (plastic)
 - plastics receptacle in steel or aluminium drum (6HA1, 6HB1)
 - plastics receptacle in fibre, plastics, or plywood drum (6HG1, 6HH1, 6HD1)
 - plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6H2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)
- Cylinders, as permitted in Packing Instruction 200
- Drums
 - aluminium (1B1, 1B2), plastic (1H1, 1H2), steel (1A1, 1A2), other metal (1N1, 1N2)
- Jerricans
 - plastic (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Additional Requirement:

1. Open-head drums (1B2, 1H2, 1A2, 1N2) and jerricans (3H2, 3A2, 3B2) are permitted for packing group III substances only.
2. For PG III substances, if the substance has a subsidiary corrosive risk, packagings must meet PG II performance requirements.

Notes on 3X1:

- This instruction consolidates PI 302/303/305/307/309/310.
- Inner package quantity limits were not changed.
- Removed restrictions on inner packaging type based on material compatibility.
- Positive: Realize considerable consolidation.
- Allows for new material technologies within the outlined requirement of material compatibility in 4;1.1.3.
- Negative: Eliminates easy reference for shippers.
- Inner packaging IP8 removed, now included in IP1 definition.
- Added outer packagings to harmonize with UN Model Regulations: Boxes, Expanded Plastic (4H1), Drums Other Metal (1N2), Drums Plastic (1H2), Jerricans Plastic (3H2).
- Added specification codes for composite plastic single packagings.

3X2 PACKING INSTRUCTION 3X2 3X2

The general packing requirements of Part 4, Chapter 1 must be met. Substances must be compatible with their packaging as required by 4;1.1.3.

Combination packagings with inner plastic packagings and single outer plastic packagings are not permitted for PG I liquid.

COMBINATION PACKAGINGS:

The following inner packagings are authorized for passenger or cargo aircraft. A dash indicates the packaging is not authorized.

	<i>Passenger Aircraft</i>			<i>Cargo Aircraft</i>		
	<i>PG I</i>	<i>PG II</i>	<i>PG III</i>	<i>PG I</i>	<i>PG II</i>	<i>PG III</i>
Glass or earthenware (IP.1)	0.5	1 L	1 L	1 L	2.5 L	2.5 L
Plastic (IP.2)	-	1 L	1 L	-	2.5 L	2.5 L
Metal (IP.3, IP.3A)	1	1 L	1 L	2.5 L	2.5 L	2.5 L

The following outer packagings are authorized for all inner packagings permitted above:

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
aluminium (4B)	aluminium (1B2)	aluminium (3B2)
fibreboard (4G)	fibre (1G)	steel (3A2)
plywood (4D)	plywood (1D)	plastic (3H2)
reconstituted wood (4F)	steel (1A2)	
expanded plastic (4H1)	plastic (1H2)	
solid plastic (4H2)	other metal (1N2)	
steel (4A)		
wooden (4C1, 4C2)		

SINGLE PACKAGINGS:

The following single packagings are permitted on cargo aircraft for all packing groups and on passenger aircraft for PG III liquids only:

- Composites (plastic)
 - plastics receptacle in steel or aluminium drum (6HA1, 6HB1)
 - plastics receptacle in fibre, plastics, or plywood drum (6HG1, 6HH1, 6HD1)
 - plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6H2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)
- Cylinders, as permitted in Packing Instruction 200
- Drums
 - aluminium (1B1, 1B2), plastic (1H1, 1H2), steel (1A1, 1A2), other metal (1N1, 1N2)
- Jerricans
 - plastic (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Additional Requirements:

1. Open-head drums (1B2, 1H2, 1A2, 1N2) and jerricans (3H2, 3A2, 3B2) are permitted for packing group III substances only. Plastic single packagings are not permitted for packing group I substances.
2. Plastic or glass inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings. Inner packagings must be packed with absorbent material as required by 4;1.1.10.1.

Notes on 3X2:

- This instruction consolidates parts of PI 304/306/308.
- Removed restrictions on inner packaging type based on material compatibility.
Positive: Realize considerable consolidation. Allows for new material technologies within the outlined requirement of material compatibility in 4;1.1.3.
Negative: Eliminates easy reference for shippers.
- Removed inner packaging IP8, now included in IP1 definition.
- Deleted PPR 3 - compatibility issue more appropriately addressed in Part 4, Chapter 1.
- Deleted PPR 5 – compatibility issue more appropriately addressed in Part 4, Chapter 1.
- Deleted PPR 6 - glass ampoules are covered under the combined PPR 2 and 13.
- Deleted PPR 8 – applies only to UN2883 and UN1302. The working group is requested to consider how this requirement should be addressed for these two UN numbers.
- Combined PPR 2 and 13. The working group is requested to consider how to assign this PPR requirement to the affected UN numbers.
- Added outer packagings to harmonize with UN Model Regulations: Boxes, Expanded Plastic (4H1), Drums Other Metal (1N2), Drums Plastic (1H2), Jerricans Plastic (3H2).
- Added specification codes for composite plastic single packagings.
- Changed some inner quantities limits based on a rationalized approach of comparison with similar materials:

UN #	PG	Inner packaging	Change in quantity	Amount	Passenger (P) or CAO
UN1154	II	IP2 IP3	reduce	5L to 2.5L	CAO
UN1184	II	IP2 IP3	reduce	5L to 2.5L 10L to 2.5L	CAO
UN1277	II	IP3	reduce	5L to 2.5L	CAO
UN1278	II	IP3	reduce	5L to 2.5L	CAO
UN1279	II	IP2 IP3 IP2 IP3	reduce reduce	5L to 1L 5L to 1L 5L to 2.5L 10L to 2.5L	P P CAO CAO
UN1280	I	IP3	increase	1L to 2.5L	CAO
UN1305	I	IP3	increase	1L to 2.5L	CAO
UN2363	II	IP3	increase	1L to 2.5L	CAO
UN2486	II	IP2	increase	1L to 2.5L	CAO

The general packing requirements of Part 4, Chapter 1 must be met. Substances must be compatible with their packaging as required by 4;1.1.3.

Combination packagings with inner plastic packagings and single outer plastic packagings are not permitted for PG I liquids.

COMBINATION PACKAGINGS:

The following inner packagings are authorized for PG I liquids at the indicated volumes for passenger or cargo aircraft. A dash indicates the packaging is not authorized.

UN No.	Glass or Earthenware (IP1)		Plastic (IP2)		Metal (IP3)	
	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo
1089	-	.5 L	-	-	-	2.5 L
1250	-	.5 L	-	-	-	1.0 L
1921	.5 L	.5 L	-	-	.5 L	1.0 L
2356	.5 L	.5 L	-	-	1.0 L	2.5 L
2456	.5 L	.5 L	-	-	1.0 L	2.5 L

The following inner packagings are authorized for PG II and PG III liquids at the indicated volumes for passenger or cargo aircraft. A dash indicates the packaging is not authorized.

Un No.	Glass or Earthenware (IP1)		Plastic (IP2)		Metal (IP3)	
	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo
1196	.5 L	1.0 L	.5 L	1.0 L	.5 L	1.0 L
1204	.5 L	1.0 L	.5 L	1.0 L	.5 L	1.0 L
1298	.5 L	1.0 L	.5 L	1.0 L	.5 L	1.0 L
1723	.5 L	1.0 L	.5 L	1.0 L	-	-
2270	.5 L	1.0 L	-	-	.5 L	2.5 L
2478	.5 L	1.0 L	.5 L	1.0 L	.5 L	2.5 L

The following outer packagings are authorized for all inner packagings permitted above:

Boxes

- aluminium (4B)
- fibreboard (4G)
- plywood (4D)
- reconstituted wood (4F)
- expanded plastic (4H1)
- solid plastic (4H2)
- steel (4A)
- wooden (4C1, 4C2)

Drums

- aluminium (1B2)
- fibre (1G)
- plywood (1D)
- steel (1A2)
- plastic (1H2)
- other metal (1N2)

Jerricans

- aluminium (3B2)
- steel (3A2)
- plastic (3H2)

SINGLE PACKAGINGS:

The following single packagings are permitted on cargo aircraft for all packing groups and on passenger aircraft for PG III liquids only:

Composites (plastic)

- plastics receptacle in steel or aluminium drum (6HA1, 6HB1)
- plastics receptacle in fibre, plastics, or plywood drum (6HG1, 6HH1, 6HD1)
- plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6H2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Cylinders, as permitted in Packing Instruction 200

Drums

- aluminium (1B1, 1B2), plastic (1H1, 1H2), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

- plastic (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Additional Requirements:

1. Open-head drums (1B2, 1H2, 1A2, 1N2) and jerricans (3H2, 3A2, 3B2) are permitted for packing group III substances only. Plastic single packagings are not permitted for packing group I substances or UN 2270.
2. Plastic or glass inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings. Inner packagings must be packed with absorbent material as required by 4;1.1.10.1.

Notes on 3X3:

- This instruction consolidates parts of PI 304/306/308.
- Inner package quantity limits were not changed.
- Removed restrictions on inner packaging type based on material compatibility.
 - Positive: Realize considerable consolidation. Allows for new material technologies within the outlined requirement of material compatibility in 4;1.1.3.
 - Negative: Eliminates easy reference for shippers.
- Removed inner packaging IP8, now included in IP1 definition.
- Deleted PPR 3 - compatibility issue more appropriately addressed in Part 4, Chapter 1.
- Deleted PPR 5 – compatibility issue more appropriately addressed in Part 4, Chapter 1.
- Deleted PPR 6 - glass ampoules are covered under the combined PPR 2 and 13.
- Deleted PPR 8 – applies only to UN2883 and UN1302. The working group is requested to consider how this requirement should be addressed for these two UN numbers.
- Combined PPR 2 and 13. The working group is requested to consider how to assign this PPR requirement to the affected UN numbers.
- Added outer packagings to harmonize with UN Model Regulations: Boxes, Expanded Plastic (4H1), Drums Other Metal (1N2), Drums Plastic (1H2), Jerricans Plastic (3H2).
- Added specification codes for composite plastic single packagings.
- These materials were separated into a separate instruction due to the significant differences in inner quantity limits from those materials assigned to PI 3X2. However, further review could lead to additional consolidation through rationalizing the limits based on similar hazards.

3X4	PACKING INSTRUCTION 3X4		3X4																																							
<p>The requirements of Part 3, Chapter 4 must be met. Substances must be compatible with their packaging as required by 4;1.1.3. Single packagings are not permitted.</p>																																										
<p>COMBINATION PACKAGINGS:</p> <p>The following inner packagings are authorized for passenger or cargo aircraft:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">PG II</th> <th style="text-align: center;">PG III</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Glass or earthenware (IP.1)¹</td> <td style="text-align: center;">0.5 L</td> <td style="text-align: center;">2.5 L</td> </tr> <tr> <td style="text-align: center;">Plastic (IP.2)²</td> <td style="text-align: center;">0.5 L</td> <td style="text-align: center;">5 L</td> </tr> <tr> <td style="text-align: center;">Metal (IP.3, IP.3A)</td> <td style="text-align: center;">0.5 L</td> <td style="text-align: center;">5 L</td> </tr> </tbody> </table> <p>The following outer packagings are authorized for all inner packagings permitted above:</p> <table style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td style="vertical-align: top;"><i>Boxes</i></td> <td style="vertical-align: top;"><i>Drums</i></td> <td style="vertical-align: top;"><i>Jerricans</i></td> </tr> <tr> <td>aluminium</td> <td>aluminium</td> <td>aluminium</td> </tr> <tr> <td>fibreboard</td> <td>fibre</td> <td>steel</td> </tr> <tr> <td>plywood</td> <td>plywood</td> <td>plastic</td> </tr> <tr> <td>reconstituted wood</td> <td>steel</td> <td></td> </tr> <tr> <td>expanded plastic</td> <td>plastic</td> <td></td> </tr> <tr> <td>solid plastic</td> <td>other metal</td> <td></td> </tr> <tr> <td>steel</td> <td></td> <td></td> </tr> <tr> <td>wooden</td> <td></td> <td></td> </tr> </tbody> </table>					PG II	PG III	Glass or earthenware (IP.1) ¹	0.5 L	2.5 L	Plastic (IP.2) ²	0.5 L	5 L	Metal (IP.3, IP.3A)	0.5 L	5 L	<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>	aluminium	aluminium	aluminium	fibreboard	fibre	steel	plywood	plywood	plastic	reconstituted wood	steel		expanded plastic	plastic		solid plastic	other metal		steel			wooden		
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<p>Particular Packing Requirements:</p> <p>PPXX: For UN 1111, UN 1228, UN 2347, UN 2402, UN 2478, UN 2486, or any substance containing a Class 8 subsidiary risk, glass or earthenware inner packagings must be packed with absorbent material in tightly closed metal or rigid plastic receptacles before packing in outer packagings.</p> <p>PPXY: For UN 1111, UN 1220, UN 1717, UN 1723, UN 2347, and UN 2402, plastic inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings.</p>																																										

Notes on 3X4:

- This instruction consolidates PI Y305/Y306/Y309.
- Inner package quantity limits were not changed.
- Removed restrictions on inner packaging type based on material compatibility.
 - Positive: Realize considerable consolidation. Allows for new material technologies within the outlined requirement of material compatibility in 4;1.1.3.
 - Negative: Eliminates easy reference for shippers.
- Removed inner packaging IP8, now included in IP1 definition.
- Deleted PPR 3 - compatibility issue more appropriately addressed in Part 4, Chapter 1.
- Deleted PPR 5 – compatibility issue more appropriately addressed in Part 4, Chapter 1.
- Deleted PPR 6 - glass ampoules are covered under the combined PPR 2 and 13.
- Combined PPR 2 and 13. The working group is requested to consider how to assign this PPR requirement to the affected UN numbers.
- Added outer packagings to harmonize with UN Model Regulations: Boxes, Expanded Plastic, Drums Other Metal, Drums Plastic, Jerricans Plastic.
- If the sample reformatted DG List is adopted, PPRs would simply be listed in Table 3-1 in a PPR column (see sample table layout) and the PPR itself would be identified in the PI but the UN numbers would not need to be indicated in the PI.

Class 4
Reformatted Packing
Instructions

The general requirements of Part 4 Chapter 1 must be met. Substances must be compatible with packagings as required by Part 4; 1.1.3

COMBINATION PACKAGINGS

The following inner packagings are permitted for passenger and cargo aircraft:

	Passenger	Cargo
Glass or earthenware (IP.1)	0.5kg	1kg
Plastics (IP.2)	0.5kg	1kg
Metal (IP.3)	-	1kg

The following outer packagings are permitted for all inner packagings permitted above

Boxes

aluminium (4B)
fibreboard (4G)
plywood (4D)
reconstituted wood (4F)
expanded plastics (4H1)
solid plastics (4H2)
steel (4A)
wooden (4C1, 4C2)

Drums

aluminium (IB2)
fibre (1G)
plywood (1D)
steel (1A2)
plastics (1H2)
other metal (1N2)

Jerricans

aluminium (3B2)
steel (3A2)
plastics (3H2)

SINGLE PACKAGINGS

Single packagings are permitted on cargo aircraft only

Boxes (4A, 4C1, 4C2, 4D, 4F, 4G and 4H2)

Composite (plastics)

Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)

Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)

Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Drums

Aluminium (1B1, 1B2), fibre (1G), plastics (1H1, 1H2), plywood (1D), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Additional Requirements:

1. Packagings shall be designed and constructed to prevent the loss of water or alcohol content or the content of the plegmatizer.
2. Packagings shall be so constructed and closed so as to avoid an explosive over pressure or pressure build-up of more than 300 kPa (3 bar)
- 3 The type of packaging and maximum permitted quantity per packaging are limited by the provisions of 2.1.3.5.
4. If the substance is dispersion in organic liquid, the organic liquid must have a flashpoint above 50°C
5. Plastic or glass inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings. Inner packagings must be packed with absorbent material as required in 4;1.1.10.1
6. Metal packagings are not permitted for substances of Division 4.1

Particular Packing requirements

PP26 For UN Nos. 1310, 1320, 1321, 1322, 1344, 1348, 1349, 1517, 3317 and packaging shall be lead free.

PPXX For UN 1310, 1410 and 1419 glass inner packagings are not permitted

PPXY For UN1310, 1354, 1355, 1356 and 1571 inner packagings are limited to 0.5Kg

PPXZ For UN 2852 inner packagings of glass only are limited to 0.25Kg

PP1A For UN 1360,1381, 1392, 1419, 1420, 1422, 1423, 1428 and 1870 metal inner packagings must not exceed 2.5kg

PP1B For UN 1420, 1422, 1423, 1428, and 2257 plastics packagings (inners or singles) are not permitted

Notes on PI 4X1:

- This packing instruction (4.1 PGI) addresses the following UN numbers.

1320	1354	1397	1419	1432	2011	3317
1321	1355	1404	1420	1433	2012	
1322	1356	1407	1422	1517	2013	
1326	1357	1409	1423	1571	2257	
1336	1360	1410	1426	1714	2463	
1337	1389	1413	1427	1870	2852	
1344		1414				

- If adopted this packing instruction would lead to the following changes. For UN 1336, 1344 and 1357 the quantity per inner plastic packaging for cargo aircraft will be reduced from 2.5Kg to 1 Kg.
- The relevant ICAO PIs are 412 and 416. The relevant UN PI is P406
- Should additional requirements 1 - 3 be retained? They originate from UN P406
- Should additional requirement 4 be retained?
- If an organic liquid is being used, then surely a liquid packaging is required in which case this packing instruction is incorrect and some amendment to the TIs is required.
- In Particular Packing Requirements there is no equivalent to UN PP26 in ICAO - propose it is retained.

The general requirements of Part 4 Chapter 1 must be met. Substances must be compatible with packagings as required by Part 4; 1.1.3

COMBINATION PACKAGINGS

The following inner packagings are permitted for passenger and cargo aircraft:

	Passenger			Cargo		
	<i>PGI</i>	<i>PGII</i>	<i>PGIII</i>	<i>PGI</i>	<i>PGII</i>	<i>PGIII</i>
Glass or earthenware (IP.1)	-	1kg	5kg	1kg	2.5kg	5kg
Plastics (IP.2)	-	2.5k g	10kg	2.5kg	5kg	10kg
Metal (IP.3)	-	2.5kg	10kg	2.5kg	5kg	10kg
Plastics bags (IP.5)	-	1kg	5kg	2.5kg	2.5kg	5kg

The following outer packagings are permitted for all inner packagings permitted above

Boxes

aluminium (4B)
fibreboard (4G)
plywood (4D)
reconstituted wood (4F)
expanded plastics (4H1)
solid plastics (4H2)
steel (4A)
wooden (4C1, 4/C2)

Drums

aluminium (IB2)
fibre (1G)
plywood (1D)
steel (1A2)
plastics (1H2)
other metal (1N2)

Jerricans

aluminium (3B2)
steel (3A2)
plastics (3H2)

SINGLE PACKAGINGS

Single packagings are permitted on cargo aircraft only

Boxes (4A, 4C1, 4C2, 4D, 4F, 4G and 4H2)

Composite (plastics)

Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)

Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)

Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Drums

Aluminium (1B1, 1B2), fibre (1G), plastics (1H1, 1H2), plywood (1D), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Additional Requirements:

- Boxes (4A, 4C1, 4D, 4G and 4H2) and fibre (1G), plastics (1H2) and plywood (1D) drums must be fitted with a water resistant inner bag, plastics film lining or water resistant coating.
- Glass, plastic, or earthenware inner packagings must be packed with cushioning material in tightly closed metal or rigid plastic receptacles before packing into outer packagings.

Particular Packing requirements

- PPAA** For UN 1339, 1341, 1343 inner plastics packagings (IP.2 and IP.5) are not permitted
- PPAB** For UN 1369 1382, 1384, 1385, 1409,1437, 1871, 2004 and 3182 plastics bag (IP.5) not permitted
- PPDB** For UN 1384, 1923, 1929, the maximum capacity of glass or earthenware 0.5Kg for passenger or 1 kg for cargo aircraft.
- PPDC** For UN 2318, 3205 and 3206. Inner packaging for passenger aircraft are limited to 1Kg and 2.5Kg for cargo aircraft. Bags (IP.5) are not permitted.
- PPDD** For UN 1378 only glass or earthenware or metal inner packagings are permitted and shall not exceed 1Kg
- PPXA** For UN2004 glass or earthenware inner packagings must be packed with absorbent material in tightly closed metal or rigid plastic receptacles before packing into outer packagings.
- PPBA** For UN 1324, 2000 there is not limit to the size of inner packagings
- PPEA** For UN 2008, 2545 and 2546 inner packagings quantities are as follows:
 IP.1 Passenger 0.5 kg Cargo 1 kg
 IP.2 Passenger 1 kg Cargo 2.5 kg
 IP.3 Passenger 2.5 kg Cargo 5 kg
 Bags IP.5 are not permitted
- PPEB** For UN 3205 and 3206 inner packaging quantities are as follows:
 IP.1 Passenger 2.5 kg Cargo 5 kg
 IP.2 Passenger 2.5 kg Cargo 5 kg
 IP.3 Passenger 2.5 kg Cargo 10 kg
 Bags IP.5 are not permitted
- PPEC** For UN 2881 inner packagings quantities are as follows:
 IP.1 Passenger 1 kg Cargo 2.5 kg
 IP.3 Passenger 1 kg Cargo 2.5 kg
 IP.2 and IP.5 are not permitted
- PPXXX** For UN 1408 the inner packaging limits are:

Passenger	Cargo
IP.1 1	2.5
IP.2 1	2.5
IP.3 5	10
- PPYYY** For UN 1418, 1436, 2806, 2813, 3131, 3132, 3134 and 3135 in Packing Group I inner packagings shall have threaded closures.
- PPYYA** For UN1350 there is no limit to package sizes.

Notes to 4X2

1309	1345	1394	1435	2010	2813	3078	3179
1312	1346	1395	1436	2213	2830	3088	3180
1323	1350	1396	1437	2318	2844	3089	3181
1324	1352	1398	1868	2538	2858	3126	3182
1325	1353	1400	1869	2545	2878	3128	3189
1328	1358	1401	1871	2546	2881	3131	3190
1330	1362	1402	1923	2623	2907	3132	3191
1332	1369	1405	1929	2687	2925	3134	3192
1333	1378	1408	2000	2714	2926	3135	3205
1334	1382	1409	2001	2715	2940	3170	3206
1339	1384	1418	2004	2717	2950	3174	3313
1341	1385	1431	2008	2793	2968	3175	3341
1343	1393	1433	2009	2806	2989	3178	3342

This packing instruction applies to the following UN numbers in Class 4 PGII and PGIII:

- The relevant ICAO PIs are PI 411, 415, 416 417, 418, 419 and 420.

- The relevant UN PI is UN P002, 403, 406 and 410.
- For UN 1339, 1341 and 1343 inner plastics packagings are not permitted on passenger aircraft but are on cargo - propose to prohibit on cargo.
- For UN 1871 bags are permitted on passenger aircraft but not on cargo. No bags to be permitted at all.
- For UN 1352, 3182, 1358 the limit on bags is 0.5Kg propose to increase to 1 Kg.
- For UN1326, 1339, 1341, 1343, 1352, 1358, 1369, 1384,1437, 1871, 1923, 1929, 2004, 2008, 2545, 2546 and 3182 propose to increase glass (IP1) from 0.5kg to 1kg for passenger and from 1 kg to 2.5 kg for cargo. Other PGII solids are already given 1 Kg and 2.5 Kg.
- It is noticeable that some N.O.S. entries e.g. 3126, 3128 get more generous treatment than known substances. Consider
 - a) deleting PPDA as it appears to be a compatibility issue
 - b) deleting PPDB by aligning inner quantity provisions
- For UN1431 propose to increase plastics (IP.2) and metal (IP.3) form 1 kg to 2.5 kg for passenger and from 2.5 kg to 5 kg for cargo aircraft.
- For UN1437, 1923 and 1929 (all PGII) propose to increase plastics (IP.2) from 0.5 kg to 2.5 kg for passenger and from 2.5 kg to 5 kg for cargo aircraft. .
- For UN3182 PGII propose to increase glass (IP.1) from 0.5 kg to 1 kg and plastics (IP.2) form 0.5 kg to 2.5 kg for passenger and glass from 1 kg to 2.5 kg and plastics from 1 kg to 5 kg for cargo aircraft.
- For UN 3182 PGIII propose to increase glass (IP.1) from 1 kg to 2.5 kg, plastics (IP.2) from 1 kg to 10 kg and metal from 5 kg to 10 kg for passenger aircraft and plastics from 5 kg to 10 kg for cargo aircraft.
- Could PPEA, PPEB, and PPEC be aligned to remaining entries? These cover:

1324	Fibrous nitrocellulose
2000	Celluloid in blocks
3205	Alkaline earth metal alcoholates
3206	Alkali earth metal alcoholates self-heating corrosive
2881	Metal Catalyst dry
- UN1408 (Ferrosilicon) PGIII is it necessary to maintain these low quantities?
- PPYYY is taken from UN PI 403 and is not a current ICAO requirement – propose adoption.

The general requirements of Part 4 Chapter 1 must be met. Substances must be compatible with packagings as required by Part 4; 1.1.3

COMBINATION PACKAGINGS

The following inner packagings are permitted for passenger and cargo aircraft:

	Passenger	Cargo
Glass or earthenware (IP.1)	1 kg	1 kg
Plastics (IP.2)	1 kg	1 kg
Metal (IP.3)	1 kg	1 kg
Plastics bags (IP.5)	0.1 kg	2.5 kg

The following outer packagings are permitted for all inner packagings permitted above

Boxes

aluminium (4B)
fibreboard (4G)
plywood (4D)
reconstituted wood (4F)
expanded plastics (4H1)
solid plastics (4H2)
steel (4A)
wooden (4C1, 4C2)

Drums

aluminium (IB2)
fibre (1G)
plywood (1D)
steel (1A2)
plastics (1H2)
other metal (1N2)

Jerricans

aluminium (3B2)
steel (3A2)
plastics (3H2)

SINGLE PACKAGINGS

Single packagings are permitted on cargo aircraft only

Boxes (4A, 4C1, 4C2, 4D, 4F, 4G and 4H2)

Composite (plastics)

Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)

Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)

Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Drums

Aluminium (1B1, 1B2), fibre (1G), plastics (1H1, 1H2), plywood (1D), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

- This packing instruction applies to UN2555, 2556 and 2557
- No changes to quantities, but why allow 2.5kg for plastics bag and only 1kg for a plastics bottle? This appears to be inconsistent.

The general requirements of Part 4 Chapter 1 must be met. Substances must be compatible with packagings as required by Part 4; 1.1.3

COMBINATION PACKAGINGS

The following inner packagings are permitted for passenger and cargo aircraft:

	Passenger	Cargo
Glass or earthenware (IP.1)	1 kg	2.5 kg
Plastics (IP.2)	1 kg	2.5 kg
Metal (IP.3)	5 kg	10 kg

The following outer packagings are permitted for all inner packagings permitted above

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
aluminium (4B)	aluminium (IB2)	aluminium (3B2)
fibreboard (4G)	fibre (1G)	steel (3A2)
plywood (4D)	plywood (1D)	plastics (3H2)
reconstituted wood (4F)	steel (1A2)	
expanded plastics (4H1)	plastics (1H2)	
solid plastics (4H2)	other metal (1N2)	
steel (4A)		
wooden (4C1, 4C2)		

SINGLE PACKAGINGS

Single packagings are permitted on cargo aircraft only

Boxes (4A, 4C1, 4C2, 4D, 4F, 4G and 4H2)

Composite (plastics)

Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)

Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)

Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Drums

Aluminium (1B1, 1B2), fibre (1G), plastics (1H1, 1H2), plywood (1D), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Particular Packing Requirements

PPCA For UN 3241 No metal packagings is permitted (inner or outers) and glass earthenware inner packagings are limited to 0.5Kg, Plastics bags (IP.5) up to 0.5Kg are also permitted.

PPCB For UN 1338 glass or earthenware inner packagings are limited to 0.5Kg for passenger aircraft and 1Kg for cargo aircraft.

Notes on PI 4X7:

- This packing instruction applies to the following numbers: 1313 1314 1318 1338 3241
- No overall changes to quantities. However, it is proposed to permit inner plastics packagings on passenger aircraft as they are permitted in cargo as inners and singles
- The relevant ICAO PIs are PI 422, 421 and 434. The relevant UN PI is P002

The general requirements of Part 4 Chapter 1 must be met. Substances must be compatible with packagings as required by Part 4; 1.1.3

COMBINATION PACKAGINGS

The following inner packagings are permitted for passenger and cargo aircraft:

	Passenger			Cargo		
	<i>PGI</i>	<i>PG II</i>	<i>PGIII</i>	<i>PGI</i>	<i>PGII</i>	<i>PGIII</i>
Glass or earthenware (IP.1)	-	1L	2.5L	1L	2.5L	5L
Plastics (IP.2)	-	1L	2.5L	-	2.5L	5L
Metal (IP.3)	-	1L	5L	1L	5L	10L

The following outer packagings are permitted for all inner packagings permitted above

Boxes

aluminium (4B)
 fibreboard (4G)
 plywood (4D)
 reconstituted wood (4F)
 expanded plastics (4H1)
 solid plastics (4H2)
 steel (4A)
 wooden (4C1, 4C2)

Drums

aluminium (IB2)
 fibre (1G)
 plywood (1D)
 steel (1A2)
 plastics (1H2)
 other metal (1N2)

Jerricans

aluminium (3B2)
 steel (3A2)
 plastics (3H2)

SINGLE PACKAGINGS

Single packagings for substances of Packing Group II and III are permitted on cargo aircraft only

Composite (plastics)

Plastics receptable in steel or aluminium drum (6HA1, 6HB1)

Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)

Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Drums

Aluminium (1B1, 1B2), plastics (1H1, 1H2), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Additional Requirements:

Glass, plastic, or earthenware inner packagings must be packed with cushioning material in tightly closed metal or rigid plastic receptacles before packing into outer packagings.

Particular Packing requirements

PPXXW UN 3207, 3208 and 3209 plastics packaging are not permitted.

PPXXY For UN 3207, 3208 and 3209 glass or earthenware inner packagings must be packed with absorbent material in tightly closed metal or rigid plastic receptacles before packing into outer packagings

Notes on PI 4X8:

- This packing instruction applies to the following UN numbers:
 1183 1242 1389 1391 1411 1421 1928 2965 2988 3129 3130 3148
 3183 3184 3185 3186 3187 3188 3207 3208 3209
- No change to quantities.
- Note no requirement for glass to be protected for all of the substances but it is a requirement for equivalent solid entries. The working group propose its insertion.

- The relevant ICAO PI is PI 408, 414, 425, 431 and 432.
- The relevant UN PI is UN P001, 401 and P402
- UN3207 in 432 is permitted in cylinders as single packagings. In UN P401 and P402 a cylinder is required for all the substances allocated to 4X8. Why is it only the N.O.S entry is permitted in a cylinder and not the pure substances, which appear to be allowed in ordinary single packagings? Most of the substances allocated to this PI would not be permitted in ordinary UN packagings as singles (i.e. cylinders are mandatory).

The general requirements of Part 4 Chapter 1 must be met. Substances must be compatible with packagings as required by Part 4; 1.1.3

COMBINATION PACKAGINGS

The following inner packagings are permitted for passenger and cargo aircraft:

	Passenger	Cargo
Glass or earthenware (IP.1)	1 kg	2.5 kg
Plastics (IP.2)	1 kg	2.5kg
Metal (IP.3)	1 kg	5 kg

The following outer packagings are permitted for all inner packagings permitted above

Boxes

aluminium (4B)
fibreboard (4G)
plywood (4D)
reconstituted wood (4F)
expanded plastics (4H1)
solid plastics (4H2)
steel (4A)
wooden (4C1, 4C2)

Drums

aluminium (IB2)
fibre (1G)
plywood (1D)
steel (1A2)
plastics (1H2)
other metal (1N2)

Jerricans

aluminium (3B2)
steel (3A2)
plastics (3H2)

SINGLE PACKAGINGS

Single packagings are permitted on cargo aircraft only

Boxes (4A, 4C1, 4C2, 4D, 4F, 4G and 4H2)

Composite (plastics)

Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)

Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)

Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Drums

Aluminium (1B1, 1B2), fibre (1G), plastics (1H1, 1H2), plywood (1D), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Additional Requirements:

Glass or earthenware inner packagings must be packed with absorbent material in tightly closed metal or rigid receptacles before packing into outer packagings.

Notes on PI4X15:

- This packing instruction applies to UN1390, 1394, 1402, 2805, and 2835
- Propose to increase UN2805 to 5kg in metal inner packagings.
- ICAO PI 416 and 418. UN P410.

The general requirements of Part 4 Chapter 1 must be met. Substances must be compatible with packagings as required by Part 4; 1.1.3

COMBINATION PACKAGINGS

The following inner packagings are permitted for passenger and cargo aircraft:

	Passenger	Cargo
Glass or earthenware (IP.1)	0.5 kg	1 kg
Plastics (IP.2)	0.5 kg	1 kg
Metal (IP.3)	0.5 kg	1 kg

The following outer packagings are permitted for all inner packagings permitted above

Boxes

aluminium (4B)
fibreboard (4G)
plywood (4D)
reconstituted wood (4F)
expanded plastics (4H1)
solid plastics (4H2)
steel (4A)
wooden (4C1, 4C2)

Drums

aluminium (1B2)
fibre (1G)
plywood (1D)
steel (1A2)
plastics (1H2)
other metal (1N2)

Jerricans

aluminium (3B2)
steel (3A2)
plastics (3H2)

SINGLE PACKAGINGS

Single packagings are permitted on cargo aircraft only

Boxes (4A, 4C1, 4C2, 4D, 4F, 4G and 4H2)

Composite (plastics)

Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)
Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)
Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)

Drums

Aluminium (1B1, 1B2), fibre (1G), plastics (1H1, 1H2), plywood (1D), steel (1A1, 1A2), other metal (1N1, 1N2)

Jerricans

Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)

Particular Packaging Requirements

PPWA For UN 1340:

Passenger aircraft

IP.2 (plastic) Forbidden

IP.3 (metal) 2.5 Kg

Cargo aircraft

IP.1 (glass) 0.5 Kg

IP.2 (plastic) 5 Kg

Notes on PI 4X16:

- This packing instruction applies to UN 1340, 1417 and 2624
- No changes to quantities. Propose that UN 1340 is reviewed and aligned with the other substances. Plastic inners very strange forbidden PAX and 5 Kg CAO.
- The relevant ICAO PIs are 412, 416 and 418.
- The relevant UN PI is P410
- If the DGP were to agree to some rationalization of inner packaging quantities it might be possible to place these substances in 4X2.

General Notes:

Note following each Packing Instruction is a list of UN numbers that have been allocated to it. It should be remembered that the same UN number can appear in more than one Packing Instruction as they can be PGI, II or III. In addition a few substances can be liquid or solid with the same UN number (this is currently being addressed in Geneva).

4X1 4.1 and 4.3 PGI

4X2 4.1,4.2 and 4.3 PGII and III

4X5 4.1 PGII (Nitrocellulose entries)

4X7 4.1 PGIII

4X8 4.2 PGII N.O.S entries with subsidiary risks and 4.3 PG I

4X15 4.3 PGII

4X16 4.3 PGII

The following existing PIs would be retained and updated as appropriate with the UN Instructions:

400, 401, 404, 433.

The limited quantity (Y) packing instructions will be aligned appropriately if the structure is adopted.

UN 3319 is a substance allocated to UN packing instruction P099 (only with competent authority approval). The TIs permit shipment under 435. It is proposed that this substance becomes Forbidden for passenger and cargo.

UN3207 in cylinders needs special attention see 4X8.

Class 5
Reformatted Packing
Instructions

Packing Instruction for Certain Division 5.2 Liquid and Solid Organic Peroxides

5X1	PACKING INSTRUCTION 5X1	5X1															
<p>The general requirements of Part 4 Chapter 1 must be met. [Substances must be compatible with the packagings used according to 4; 1.1.3]</p>																	
<p>COMBINATION PACKAGINGS:</p> <p>Single packagings are not permitted.</p> <p>Plastic inner packagings conforming to IP.2 are permitted for passenger and cargo aircraft not exceeding the following quantities:</p>																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 35%; text-align: center;"><i>Passenger Aircraft</i></th> <th style="width: 35%; text-align: center;"><i>Cargo Aircraft</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><i>For UN 3103, UN 3105</i></td> <td style="text-align: center;">.5 L</td> <td style="text-align: center;">1 L</td> </tr> <tr> <td style="text-align: center;"><i>For UN 3107, UN 3109</i></td> <td style="text-align: center;">1 L</td> <td style="text-align: center;">2.5 L</td> </tr> <tr> <td style="text-align: center;"><i>For UN 3104, UN 3106</i></td> <td style="text-align: center;">.5 kg</td> <td style="text-align: center;">1 kg</td> </tr> <tr> <td style="text-align: center;"><i>For UN 3108, UN 3110</i></td> <td style="text-align: center;">1 kg</td> <td style="text-align: center;">2.5 kg</td> </tr> </tbody> </table>				<i>Passenger Aircraft</i>	<i>Cargo Aircraft</i>	<i>For UN 3103, UN 3105</i>	.5 L	1 L	<i>For UN 3107, UN 3109</i>	1 L	2.5 L	<i>For UN 3104, UN 3106</i>	.5 kg	1 kg	<i>For UN 3108, UN 3110</i>	1 kg	2.5 kg
	<i>Passenger Aircraft</i>	<i>Cargo Aircraft</i>															
<i>For UN 3103, UN 3105</i>	.5 L	1 L															
<i>For UN 3107, UN 3109</i>	1 L	2.5 L															
<i>For UN 3104, UN 3106</i>	.5 kg	1 kg															
<i>For UN 3108, UN 3110</i>	1 kg	2.5 kg															
<p>The following outer packagings are authorized for all inner packagings permitted above:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; text-align: center;"><i>Boxes</i></td> <td style="width: 33%; text-align: center;"><i>Drums</i></td> <td style="width: 33%; text-align: center;"><i>Jerricans</i></td> </tr> <tr> <td style="vertical-align: top;"> aluminium (4B) fibreboard (4G) plywood (4D) solid plastics (4H2) steel (4A) wooden (4C1, 4C2, 4F) </td> <td style="vertical-align: top;"> aluminium (1B2) fibre (1G) plastics (1H2) steel (1A2) wooden (1D) </td> <td style="vertical-align: top;"> aluminium (3A2) plastics (3H2) steel (3B2) </td> </tr> </table>			<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>	aluminium (4B) fibreboard (4G) plywood (4D) solid plastics (4H2) steel (4A) wooden (4C1, 4C2, 4F)	aluminium (1B2) fibre (1G) plastics (1H2) steel (1A2) wooden (1D)	aluminium (3A2) plastics (3H2) steel (3B2)									
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>															
aluminium (4B) fibreboard (4G) plywood (4D) solid plastics (4H2) steel (4A) wooden (4C1, 4C2, 4F)	aluminium (1B2) fibre (1G) plastics (1H2) steel (1A2) wooden (1D)	aluminium (3A2) plastics (3H2) steel (3B2)															
<p>Additional requirements:</p> <ol style="list-style-type: none"> 1. Packaging should comply with the provisions for medium danger (Packing Group II). 2. Organic peroxides presenting an explosive subsidiary risk must comply with the provisions of Part: 3.2.2 and 3.2.3. 3. Cushioning materials shall not be readily combustible. 																	

Notes on 5X1:

- This PI applies to UN 3103, 3105, 3107 and 3109 (liquid organic peroxides) and 3104, 3106, 3108 and 3110 (solid organic peroxides)
- No changes to quantity limits.
- New outer packagings have been added to align with UN authorized packagings.
- The relevant ICAO PIs are PI 500 (passenger) and 502 (cargo) for liquids and 510 (passenger) and 513 (cargo) for solids.
- The relevant UN PI is P520.

Packing Instruction for Certain Division 5.1 Solid Oxidizing Substances

5X2	PACKING INSTRUCTION 5X2						5X2
<p>The general packing requirements of Part 4, Chapter 1 must be met. Substances must be compatible with their packaging as required by 4;1.1.3.</p>							
<p>COMBINATION PACKAGINGS:</p> <p>The following inner packagings are authorized for passenger and cargo aircraft.</p>							
	<i>Passenger Aircraft</i>			<i>Cargo Aircraft</i>			
	<i>PG I</i>	<i>PG II</i>	<i>PG III</i>	<i>PG I</i>	<i>PG II</i>	<i>PG III</i>	
Glass or earthenware (IP.1)	1 kg	1 kg	2.5 kg	2.5 kg	2.5 kg	5 kg	
Plastics (IP.2)	1 kg	1 kg	2.5 kg	2.5 kg	2.5 kg	5 kg	
Metal (IP.3)	1 kg	1 kg	2.5 kg	5 kg	5 kg	5 kg	
Plastics Bag (IP.5)	1 kg	1 kg	2.5 kg	2.5 kg	2.5 kg	5 kg	
Fibre (IP.6)	1 kg	1 kg	2.5 kg	2.5 kg	2.5 kg	5 kg	
<p>The following outer packagings are authorized for all of the inner packagings permitted above:</p>							
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>					
aluminium (4B)	aluminium (1B2)	aluminium					
expanded plastics (4H1)	fibre (1G)	(3B2)					
fibreboard (4G)	plastics (1H2)	plastics (3H2)					
plywood (4D)	plywood (1D)	steel (3A2)					
reconstituted wood (4F)	steel (1A2)						
solid plastics (4H2)	other metal (1N2)						
steel (4A)							
wooden (4C1, 4C2)							
<p>SINGLE PACKAGINGS:</p> <p>Single packagings are permitted on cargo aircraft for all packing groups.</p>							
<p>Boxes</p> <p>Boxes (4A, 4B, 4C1, 4C2, 4D, 4F, 4G and 4H2)</p>							
<p>Composite Plastics</p> <p>Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)</p> <p>Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)</p> <p>Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)</p>							
<p>Drums</p> <p>Aluminium (1B1, 1B2), fibre (1G), plastics (1H1, 1H2), plywood (1D), steel (1A1, 1A2), other metal (1N1, 1N2)</p>							
<p>Jerricans</p> <p>Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)</p>							
<p>Additional Requirements:</p> <p>Single packagings consisting of boxes (4C1, 4C2, 4D, 4F, 4G, 4H2) and drums (1D, 1G) must be fitted with a water resistant inner bag, plastics film lining or water resistant coating.</p>							
<p>Particular Packing Provisions:</p> <p><i>PPXX</i> For UN1458, 1459 and 1483 PGIII the limit per inner packaging is 1 kg for passenger and cargo aircraft and fibre inner packagings (IP.6) shall not be used.</p> <p><i>PPYY</i> For UN1511 the limit per inner packaging is 0.5 Kg for passenger and cargo aircraft.</p>							

Notes on PI 5X2:

- This packing instruction applies to the following UN numbers:

UN1439	UN1442	UN1444	UN1445	UN1446	UN1447	UN1448
UN1449	UN1450	UN1451	UN1452	UN1453	UN1454	UN1455
UN1456	UN1457	UN1458	UN1459	UN1461	UN1462	UN1463
UN1465	UN1466	UN1467	UN1469	UN1470	UN1471	UN1472
UN1473	UN1474	UN1475	UN1476	UN1477	UN1479	UN1481
UN1482	UN1483	UN1484	UN1485	UN1486	UN1487	UN1488
UN1489	UN1490	UN 1491	UN1492	UN1493	UN1494	UN1495
UN1496	UN1498	UN1499	UN1500	UN1502	UN1503	UN1504
UN1505	UN1506	UN1507	UN1508	UN1509	UN1511	UN1512
UN1513	UN1514	UN1515	UN1516	UN1748	UN1872	UN1942
UN2067	UN2068	UN2069	UN2070	UN2072	UN2208	UN2464
UN2465	UN2466	UN2468	UN2469	UN2547	UN2573	UN2627
UN2719	UN2720	UN2721	UN2722	UN2723	UN2724	UN2725
UN2726	UN2728	UN2741	UN2880	UN3085	UN3087	UN3212
UN3215	UN3247					

- The inner packaging quantities for some oxidizers (e.g. UN 1442, 1445, 1449, 1452, 1453, 1458, 1459...3212) that are currently assigned to PI 509 would increase from 0.5 kg to 1 kg. This proposed packing instruction assigns all PGI solid oxidizers an inner packaging limit of 1 kg with the exception of those that are F/F.
- In the current PI 509, UN1462, 1479 and 1483 have prohibitions on plastic bags. The PI working group could not determine why this prohibition exists for these three substances. The DGP working group should consider whether this prohibition is a valid safety issue. The proposed reformatted PI authorizes bags for these substances.
- The DGP working group should consider whether PPXX is necessary.
- PPYY is probably based on the fact that UN1511 has a Class 8 sub-risk and the TI treats Class 8 substances more restrictively. The DGP working group should consider whether PPYY is necessary.
- The working group should consider whether it would be useful to include an indication in the PIs when a substance is forbidden on passenger aircraft if the PI addresses both passenger and cargo aircraft. This carries through all of the packing instructions which address passenger and cargo limits.
- The working group should consider how to address whether the compatibility statement is necessary in the header (see square bracketed text). This carries through all of the packing instructions.
- PIs 508, 511, and 516 allow paper bags (IP.4). The working group should consider whether this packaging would be suitable as an authorized inner packaging for all substances covered by this instruction.
- PI 509 does not allow Fibre inner packagings (IP.6). The working group should consider whether this packaging would be suitable as an authorized inner packaging for all substances covered by this instruction.
- PI 512 has some restrictions on single packagings but the working group should consider whether these individual restrictions are necessary.
- PIs 518 and 519 require PG II packaging for PG III substances. A PPR would need to be applied to these substances to maintain the requirement.
- Single packaging authorizations for some substances have been expanded to allow boxes.
- The relevant ICAO PIs are PIs 508, 509, 511, 512, 516, 517, 518 and 519.
- The relevant UN PI is P002.

Packing Instruction for Certain 5.1 Liquid Substances

5X3	PACKING INSTRUCTION 5X3					5X3
The general packing requirements of Part 4, Chapter 1 must be met. Substances must be compatible with their packaging as required by 4;1.1.3.						
COMBINATION PACKAGINGS:						
The following inner packagings are authorized for passenger and cargo aircraft.						
	<i>Passenger Aircraft</i>		<i>Cargo Aircraft</i>			
	<i>PG II</i>	<i>PG III</i>	<i>PG I</i>	<i>PG II</i>	<i>PG III</i>	
Glass or earthenware (IP.1)	1 L	2.5 L	2.5 L	5 L	5L	
Plastics (IP.2)	1 L	2.5 L	2.5 L	5 L	5L	
Metal (IP.3)	1 L	2.5 L	5 L	2.5 L	5L	
The following outer packagings are authorized for all inner packagings permitted above:						
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>				
aluminium (4B)	aluminium (1B2)	aluminium (3B2)				
expanded plastics (4H1)	fibre (1G)	plastics (3H2)				
fibreboard (4G)	other metal (1N2)	steel (3A2)				
plywood (4D)	plastics (1H2)					
reconstituted wood (4F)	plywood (1D)					
solid plastics (4H2)	steel (1A2)					
steel (4A)						
wooden (4C1, 4C2)						
SINGLE PACKAGINGS:						
Single packagings are permitted on cargo aircraft for packing group III substances only.						
Boxes						
Boxes (4A, 4C1, 4C2, 4D, 4F, 4G and 4H2)						
Composite Plastics						
Plastics receptacle in steel or aluminium drum (6HA1, 6HB1)						
Plastics receptacle in fibre, plastic or plywood drum (6HG1, 6HH1, 6HD1)						
Plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood fibreboard, or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2, or 6HH2)						
Drums						
Aluminium (1B1, 1B2), plastics (1H1, 1H2), steel (1A1, 1A2), other metal (1N1, 1N2)						
Jerricans						
Plastics (3H1, 3H2), steel (3A1, 3A2), aluminium (3B1, 3B2)						
Particular Packing Provisions:						
[PPXX For UN 2014, 2429, 3098, 3099, 3210 and 3211 (PG II) inner packagings shall not exceed 0.5 L for passenger aircraft and 1 L for cargo aircraft.]						

This instruction applies to the following UN numbers:

2014, 2427, 2428, 2429, 2984, 3098, 3099, 3139, 3149, 3210, 3211, 3213, 3214, 3216, 3218, 3219.

- The inner packaging quantities for UN 2014, 2429, 3098, 3210 and 3211 would increase from 0.5 L to 1 L for passenger and from 1 L to 2.5 L for CAO for the PG II entries. This could be addressed by PPXX or by

developing a PI for this group of PG II substances. The working group should consider whether the more restrictive limits are necessary and whether this group of substances possesses unique hazard characteristics.

- The DGP working group should consider whether open head single packagings should be allowed for liquid oxidizing substances.
- UN2495, Iodine pentafluoride was amended to indicate that it is forbidden on both passenger and cargo aircraft at DGP 18. The UN Model Regulations only permits transport in cylinders.
- The DGP working group should consider adopting PP29 from the UN Model Regulations which deals with ullage.
- PIs 501, 503, 505, 506 and 507 do not currently allow expanded plastic boxes as outer packages. The working group should consider whether these packages would be suitable for all substances covered by this instruction.
- For some substances currently assigned to PI 501, P506 and PI 507 metal inner packagings would no longer be prohibited. The PI working group viewed this as a compatibility issue.
- PI 507 which applies to three substances (aqueous solutions of calcium chlorate and aqueous solutions of n.o.s. inorganic chlorates and perchlorates) restricts single packagings to composite plastics and requires PG II packaging. The working group did not feel that special consideration was needed for these substances. Merging them into the new 5X3 will allow a wider selection of single packagings on cargo aircraft and authorize the use of metal inner receptacles for combination packagings.
- The relevant ICAO PIs are PI 501, 503, 505, 506, 507, 514, and 515.
- The relevant UN PIs are P501, 502, P503 and P504.

Reformatted Packing Instruction for Limited Quantities of Division 5.1 Solid Substances

Y5XX	PACKING INSTRUCTION Y5XX		Y5XX
<p>The general packing requirements of Part 4, Chapter 1 must be met. Substances must be compatible with their packaging as required by 4;1.1.3.</p>			
<p>COMBINATION PACKAGINGS:</p> <p>The following inner packagings are authorized for passenger and cargo aircraft.</p>			
	<i>Passenger and Cargo Aircraft</i>		
	<i>PG II</i>	<i>PG III</i>	
Glass or earthenware (IP.1)	.5 kg	1 kg	
Plastics (IP.2)	.5 kg	1 kg	
Metal (IP.3)	.5 kg	1 kg	
Plastics Bag (IP.5)	.5 kg	1 kg	
Fibre (IP.6)	.5 kg	1 kg	
<p>The following outer packagings are authorized for all inner packagings permitted above:</p>			
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>	
aluminium	aluminium	aluminium	
fibreboard	fibre	plastics	
plastics	other metal	steel	
plywood	plastics		
reconstituted	plywood		
wood	steel		
steel			
wooden			
<p>Particular Packing Provisions:</p> <p><i>PPXX</i> For UN1458, 1459 and 1483 PGIII the limit per inner packaging is 0.5 Kg. Fibre inner packagings (IP.6) shall not be used.</p> <p><i>PPYY</i> For UN1511 the limit per inner packaging is 0.5 Kg</p>			

Notes on PI Y5XX:

This packing instruction applies to the following UN numbers:

UN1439	UN1442	UN1444	UN1445	UN1446	UN1447	UN1448
UN1449	UN1450	UN1451	UN1452	UN1453	UN1454	UN1455
UN1456	UN1457	UN1458	UN1459	UN1461	UN1462	UN1463
UN1465	UN1466	UN1467	UN1469	UN1470	UN1471	UN1472
UN1473	UN1474	UN1475	UN1476	UN1477	UN1481	UN1482
UN1483	UN1484	UN1485	UN1486	UN1487	UN1488	UN1489
UN1490	UN 1491	UN1492	UN1493	UN1494	UN1495	UN1496
UN1498	UN1499	UN1500	UN1502	UN1503	UN1504	UN1505
UN1506	UN1507	UN1508	UN1509	UN1511	UN1512	UN1513
UN1514	UN1515	UN1516	UN1748	UN1872	UN1942	UN2067
UN2068	UN2069	UN2070	UN2208	UN2464	UN2465	UN2466
UN2468	UN2469	UN2547	UN2573	UN2627	UN2719	UN2720
UN2721	UN2722	UN2723	UN2724	UN2725	UN2726	
UN2728	UN2741	UN2880	UN3212	UN3215	UN3247	

The list of applicable UN numbers is the same as that for 5X2 except that UN 1479, 2072, 3085 and 3087 are not permitted as limited quantities.

- No quantity changes.
- The working group should consider whether PPXX is necessary.
- UN1483 has a prohibition on plastics bags but in the current PI Y509 but this has not been proposed.
- The relevant ICAO PIs are Y508, Y509, Y516 and Y517.
- There is no relevant UN PI - see Dangerous goods list column 7 and Chapter 3.4

Packing Instruction for Limited Quantities of Division 5.1 Substances

Y5XY	PACKING INSTRUCTION Y5XY		Y5XY
<p>The general packing requirements of Part 4, Chapter 1 must be met. Substances must be compatible with their packaging as required by 4;1.1.3.</p>			
<p>COMBINATION PACKAGINGS:</p> <p>The following inner packagings are authorized for passenger and cargo aircraft:</p>			
	<i>Passenger and Cargo Aircraft</i>		
	<i>PG II</i>	<i>PG III</i>	
Glass or earthenware (IP.1)	.1 kg/.1L	.5 kg/.5L	
Plastics (IP.2)	.1 kg/.1L	.5 kg/.5L	
Metal (IP.3)	.1 kg/.1L	.5 kg/.5L	
<p>The following outer packagings are authorized for all inner packagings permitted above:</p>			
<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>	
aluminium	aluminium	aluminium	
expanded plastics	fibre	plastics	
fibreboard	other metal	steel	
plywood	plastics		
reconstituted wood	plywood		
solid plastics	steel		
steel			
wooden			

Notes on Y5XY:

- This instruction applies to limited quantities of the following UN numbers: UN2014, UN2427, UN2428, UN2429, UN 2984, UN3098, UN3139, UN3149, UN3210, UN3211, UN3213, UN3214, UN3216, UN3218 and UN3219.
- No quantity changes.
- The relevant ICAO PIs are Y501, Y503, Y506 and Y514.
- There is no relevant UN PI - see Dangerous goods list column 7 and Chapter 3.4

Class 9
Reformatted Packing
Instructions

900**PACKING INSTRUCTION 900****900**

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

- a) except as otherwise provided for in this Packing Instruction, fuel tanks must be drained of fuel and tank caps fitted securely. Special precautions are necessary to ensure complete drainage of the fuel system of vehicles, machines or equipment incorporating internal combustion engines, such as lawn mowers and outboard motors, where such machines or equipment could possibly be handled in other than an upright position. When it is not possible to handle in other than an upright position, vehicles, except those with diesel engines, must be drained of fuel as far as practicable, and if any fuel remains, it must not exceed one-quarter of the tank capacity. Vehicles equipped with diesel engines are excepted from the requirement to drain the fuel tanks, provided that a sufficient ullage space has been left inside the tank to allow fuel expansion without leakage, and the tank caps are tightly closed. A careful check must be made to ensure there are no fuel leakages;
 - b) for flammable gas-powered vehicles, machines or equipment, pressurized vessels containing the flammable gas must be completely emptied of flammable gas. Lines from vessels to gas regulators, and gas regulators themselves, must also be drained of all trace of flammable gas. To ensure that these conditions are met, gas shut-off valves must be left open and connections of lines to gas regulators must be left disconnected upon delivery of the vehicle to the operator. Shut-off valves must be closed and lines reconnected at gas regulators before loading the vehicle aboard the aircraft;
 - c) if non-spillable batteries, as defined in Packing Instruction 806, are installed, they must be securely fastened in the battery holder of the vehicle, machine or equipment and be protected in such a manner as to prevent damage and short circuits;
 - d) if spillable batteries are installed, they must be securely fastened in the battery holder of the vehicle, machine or equipment and be protected in such a manner as to prevent damage and short circuits. However, if it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 433 or 800 as applicable;
 - e) dangerous goods required for the operation of the vehicle, machine or equipment, such as fire extinguishers, tire inflation canisters, safety devices, etc., must be securely mounted in the vehicle, machine or equipment. Aircraft may also contain other articles and substances which would otherwise be classified as dangerous goods but which are installed in that aircraft in accordance with the pertinent airworthiness requirements and operating regulations. If fitted, life-rafts, emergency escape slides and other inflation devices must be protected such that they cannot be activated accidentally. Vehicles containing dangerous goods identified in Table 3-1 as forbidden on passenger aircraft may only be transported on cargo aircraft; and
 - 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.
- + h) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational system must have such devices, equipment or system disabled.
- + Replacements for the dangerous goods permitted in paragraphs a) to e) must not be carried under this packing instruction.

Notes: No change.

902**PACKING INSTRUCTION 902****902**

Magnetized material will be accepted only when:

- a) devices, such as magnetrons and light meters have been packed so that the polarities of the individual units oppose one another;
- b) permanent magnets, where possible, have keeper bars installed;

- c) the magnetic field strength at a distance of 4.6 m from any point on the surface of the assembled consignment:
 - 1) does not exceed 0.418 A/m; or
 - 2) produces a magnetic compass deflection of 2 degrees or less.

Determination of shielding requirements

≠ The magnetic field strength of magnetized materials must be measured using measuring devices having a sensitivity sufficient to measure magnetic fields greater than 0.0398 A/m within a tolerance of plus or minus 5 per cent, or with a magnetic compass sensitive enough to read a 2 degree variation, preferably in 1 degree increments or finer. If the maximum field strength observed at a distance of 2.1 m is less than 0.159 A/m or there is no significant compass deflection (less than 0.5 degree), the article is not restricted as a magnetized material. Methods of determining if a magnetized article meets the definition of a magnetized material include:

- a) When an oersted meter is used, it is placed on one of two points positioned 4.6 m apart and located in an area that is free from magnetic interference other than the earth's magnetic field. The oersted meter is then aligned with the second point and "balanced" to a zero reading. The magnetic article is then placed on the other point and the magnetic field strength is measured by reading the meter while rotating the package 360 degrees in its horizontal plane. If the maximum field strength observed is 0.418 A/m or less, the article is acceptable for air transport. When the maximum field strength exceeds 0.418 A/m, shielding should be applied until a reading of 0.418 A/m or less has been attained.
- b) When a magnetic compass is used as a sensing device, it should be placed on one of two points positioned 4.6 m apart which are aligned in an East/West direction and in an area that is free from any magnetic interference other than the earth's magnetic field. The packaged item to be tested is placed on the other point and rotated 360 degrees in its horizontal plane for indication of compass deflection. When the maximum compass deflection observed is 2 degrees or less, the article is acceptable for air transport. When the maximum compass deflection of an item exceeds 2 degrees, shielding must be applied until the maximum deflection is not more than 2 degrees.

>

Note.— For loading restrictions, see Part 7;2.10.

Notes: No change.

PI 904

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 4, Chapter 1 are not applicable provided alternative documentation containing the information required by 5;4.1, excluding the packing instruction number and packing group, is supplied.

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

Notes: No change.

PI 905

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 as permitted in Packing Instruction 200; these may be connected to the life-saving appliance;
- b) signal devices (Class 1), which may include smoke and illumination signal flares; signal devices must be packed in plastic or fibreboard inner packagings;
- c) small quantities of flammable substances, corrosive solids and organic peroxides (Class 3, Class 8, Division 4.1 and 5.2), which may include a repair kit and not more than 30 strike-anywhere matches. The organic peroxide may only be a component of a repair kit and the kit must be packed in strong inner packaging. The strike-anywhere matches must be packed in a cylindrical metal or composition packaging with a screw-type closure and be cushioned to prevent movement;
- d) electric storage batteries (Class 8) and lithium batteries (Class 9); and

e) first aid kits which may include flammable, corrosive and toxic articles or substances.

≠ The appliances must be packed, so that they cannot be accidentally activated, in strong outer packagings and, except for life vests, the dangerous goods must be in inner packagings packed so as to prevent movement. The dangerous goods must be an integral part of the appliance without which it would not be operational and in quantities which do not exceed those appropriate for the actual appliance when in use.

> Passenger restraint systems consisting of a cylinder charged with a non-liquefied, non-flammable compressed gas and no more than two actuating cartridges per passenger restraint system that meet the requirements of the State of Manufacture must be packed in strong outer packagings so they cannot be accidentally activated.

Life-saving appliances may also include articles and substances not subject to these Instructions which are an integral part of the appliance.

Notes: No change.

PI 906

906	PACKING INSTRUCTION 906	906
The general packing requirements of Part 4, Chapter 1 must be met.		

Notes: No change. Recommend the DGP working group consider harmonizing with UN P002. P002 requires UN packaging for UN1841, UN1931, and UN2969.

PI 908

908	PACKING INSTRUCTION 908	908
The general packing requirements of Part 4, Chapter 1 must be met.		
Polymeric beads or granules, expandable, impregnated with flammable gas or liquid as a blowing agent and plastic moulding materials in dough, sheet or extruded rope form must be packed in wooden (4C1, 4C2), plywood (4D), fibreboard (4G) or reconstituted wood (4F) boxes with sealed inner plastic liner, plywood drums (1D), fibre drums (1G) with sealed inner plastic liner or in metal (1A1, 1A2, 1B1, 1B2) packagings.		
<i>Note.— For loading restrictions see Part 7;2.12.</i>		

Notes: No change.

909	PACKING INSTRUCTION 909	909
The general packing requirements of Part 4, Chapter 1 must be met.		
Ammonium nitrate fertilizers (UN 2071) must be carried in:		
<ul style="list-style-type: none"> a) rigid, sift-proof packagings (1A2, 1B2, 3A2, 1D, 1G, 1H2, 3H2 or 4C2); or b) 5L2, 5L3, 5H2, 5H3 or 5H4 bags. 		
White asbestos (UN 2590) must be carried in:		
<ul style="list-style-type: none"> a) rigid, sift-proof packagings (1A2, 1B2, 3A2, 1D, 1G, 1H2, 3H2, 4C2, 4D, 4G, 4F, 4H1 or 4H2); or b) 5L2, 5L3, 5H2, 5H3 or 5H4 bags, which must be palletized and unitized by methods such as shrink-wrapping in plastic film or wrapping in fibreboard secured by strapping. 		

Notes: No change.

The requirements of Part 3, Chapter 4 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

INNER:

Glass or earthenware (IP.1)	5 kg
Plastic (IP.2)	5 kg
Metal (IP.3, IP.3A)	5 kg
Paper (IP.4)	5 kg
Plastic bag (IP.5)	5 kg
Fibre (IP.6)	5 kg
Paper, plastic/aluminium (IP.10)	5 kg

OUTER:

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
aluminium	aluminium	aluminium
fibreboard	fibre	plastic
plastic	plastic	steel
plywood	plywood	
reconstituted wood	steel	
steel		
wooden		

Notes: No change.

PI 910

Consumer commodities are materials that are packaged and distributed in a form intended or suitable for retail sale for purposes of personal care or household use. These include items administered or sold to patients by doctors or medical administrations. Except as otherwise provided below, dangerous goods packed in accordance with this Packing Instruction do not need to comply with Part 4, Chapter 1 or Part 6 of these Instructions; they must, however, comply with all other applicable requirements.

- a) Each packaging must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during air transport.
- b) Inner packagings that are breakable (such as earthenware, glass or brittle plastic) must be packed to prevent breakage and leakage under conditions normally incident to transport. These completed packagings must be capable of withstanding a 1.2 m drop on solid concrete in the position most likely to cause damage.
- c) When filling receptacles for liquids, sufficient ullage (outage) must be left to ensure that neither leakage nor permanent distortion of the receptacle will occur as a result of an expansion of the liquid caused by temperatures likely to prevail during transport. Unless specific requirements are prescribed in national rules or international agreements, liquids must not completely fill a receptacle at a temperature of 55°C. At this temperature a minimum ullage of 2 per cent should be left. The primary packaging (which may include composite packaging), for which retention of the liquid is a basic function, must be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than 75 kPa or a pressure related to the vapour pressure of the liquid to be conveyed, whichever is the greater. The pressure related to the vapour pressure must be determined by the method shown in Part 4;1.1.6.1. Tests on sample receptacles must be carried out to demonstrate the capability of the primary packaging to withstand the above pressure.
- d) Stoppers, corks or other such friction-type closures must be held securely, tightly and effectively in place by positive means. The closure device must be so designed that it is extremely improbable that it can be incorrectly or incompletely closed and must be such that it may be easily checked to determine that it is completely closed.

- e) Inner packagings must be tightly packed in strong outer packagings and must be so packed, secured or cushioned as to prevent any breakage, leakage or significant movement within the outer packaging(s) during normal conditions of transport. Absorbent material must be provided for glass or earthenware inner packaging(s) containing consumer commodities in Class 2 or 3 or liquids of Division 6.1, in sufficient quantity to absorb the liquid contents of the largest of such inner packagings contained in the outer packaging. Absorbent and cushioning material must not react dangerously with the contents of the inner packagings. Notwithstanding the above, absorbent material may not be required if the inner packagings are so protected that breakage of the inner packagings and leakage of their contents from the outer packaging will not occur during normal conditions of transport.
- f) Packagings (including closures) in direct contact with dangerous goods must be resistant to any chemical or other action of such goods; the materials of the receptacles must not contain substances which may react dangerously with the contents, form hazardous products or significantly weaken the receptacles.
- g) Each completed package as prepared for shipment must not exceed a gross mass of 25 kg.
- h) Class 2 substances must be further limited to aerosol products containing non-toxic compressed or liquefied gas(es) that are necessary to expel liquids, powders or pastes, packed in inner non-refillable non-metal receptacles not exceeding 120 mL capacity each, or in inner non-refillable metal receptacles not exceeding 820 mL capacity each (except that flammable aerosols must not exceed 500 mL capacity each), subject in either case to the following provisions:
 - 1) the pressure in the aerosol must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;
 - 2) if the pressure in the aerosol exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an inner IP.7, IP.7A or IP.7B metal receptacle must be used;
 - 3) if the pressure in the aerosol exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;
 - 4) if the pressure in the aerosol exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;
 - 5) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in 1), 2), 3) or 4) above do not apply to the pressure within the capsule. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into an aerosol.
 - 6) the liquid contents must not completely fill the closed receptacle at 55°C;
 - 7) each aerosol exceeding 120 mL capacity must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect; and
 - 8) the valves must be protected by a cap or other suitable means during transport.
- i) For aerosols containing a biological or medical preparation which will be deteriorated by a heat test and which are non-toxic and non-flammable, packed in inner non-refillable receptacles not exceeding 575 mL capacity each, the following provisions are applicable:
 - 1) the pressure in the aerosol must not exceed 970 kPa at 55°C;
 - 2) the liquid contents must not completely fill the closed receptacle at 55°C;
 - 3) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect; and
 - 4) the valves must be protected by a cap or other suitable means during transport.
- j) Except for aerosols, inner packagings must not exceed:
 - 1) 500 mL for liquids; and
 - 2) 500 g for solids.
- k) Consumer commodities shipped according to these provisions may be shipped in a unit load device prepared by a single shipper provided that no other dangerous goods are included in the unit load device.
- l) The gross mass on the dangerous goods transport document must be shown as:
 - 1) for one package, the actual gross mass of the package;
 - 2) for more than one package, either the actual gross mass of each package or as the average mass of the packages. (For example, if there are 10 packages and the total gross mass of them is 100 kg, the dangerous goods transport document may show this as 'average gross mass per package 10 kg'.)

Notes: No change.

911**PACKING INSTRUCTION 911****911**

The general packing requirements of Part 4, Chapter 1 must be met.

COMBINATION PACKAGINGS:*INNER:*

Glass or earthenware (IP.1)	5 kg
Plastic (IP.2)	10 kg
Metal (IP.3, IP.3A)	10 kg
Paper (IP.4)	5 kg
Plastic bag (IP.5)	5 kg
Fibre (IP.6)	5 kg
Glass ampoule (IP.8)	0.5 kg
Paper, plastic/aluminium (IP.10)	5 kg

*OUTER:**Boxes*

aluminium (4B)
fibreboard (4G)
plastic (4H1, 4H2)
plywood (4D)
reconstituted wood (4F)
steel (4A)
wooden (4C1, 4C2)

Drums

aluminium (1B2)
fibre (1G)
other metal (1N1, 1N2)
plastic (1H2)
plywood (1D)
steel (1A2)

Jerricans

aluminium (3B2)
plastic (3H2)
steel (3A2)

SINGLE PACKAGINGS:

- Bags
 - paper (5M2)
 - plastic film (5H4)
- + textile (5L3)
- ≠ woven plastic (5H3)
- + Boxes
 - aluminium (4B)
 - fibreboard (4G)
 - plastic (4H2)
 - plywood (4D)
 - reconstituted wood (4F)
 - steel (4A)
 - wooden (4C1, 4C2)
- Composites
 - plastics receptacle in steel or aluminium drum (6HA1, 6HB1)
 - plastics receptacle in fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)
 - plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)
- Drums
 - aluminium (1B1, 1B2)
 - ≠ fibre (1G)
 - plastic (1H1, 1H2)
 - other metal (1N1, 1N2)
 - ≠ plywood (1D)
 - steel (1A1, 1A2)
- Jerricans
 - + aluminium (3B1, 3B2)
 - plastic (3H1, 3H2)
 - steel (3A1, 3A2)

Notes: Added 1N2 drums as authorized outer packaging for combination packagings.
Added 1N1 and 1N2 drums as authorized single packagings.
Added composites with plastic inner packagings allowed in P001.

913**PACKING INSTRUCTION 913****913**

The general packing requirements of Part 4, Chapter 1 must be met.

Genetically modified micro-organisms must be packed according to Packing Instruction 602, except that the packagings need not be tested as provided for in Part 6, Chapter 6. The maximum quantity in a primary receptacle must not exceed 100 mL or 100 g.

Notes: No change.

915**PACKING INSTRUCTION 915****915**

The general packing requirements of Part 4, Chapter 1 must be met except that the requirements of Part 4;1.1.8 and 1.1.16 do not apply.

The kits may contain dangerous goods which require segregation according to Table 7-1. The packing group assigned to the kit as a whole must be the most stringent packing group assigned to any individual substance contained in the kit.

Inner packagings must not exceed 250 mL for liquids or 250 g for solids and must be protected from other materials in the kit. The total quantity of dangerous goods in any one kit must not exceed 1 L or 1 kg. The total quantity of dangerous goods in any one package must not exceed 10 kg.

Kits must not be packed with other dangerous goods in the same outer packaging.

Kits must be packed in one of the following:

- metal boxes (4A, 4B)
- wooden boxes (4C1, 4C2)
- plywood boxes (4D)
- reconstituted wood boxes (4F)
- fibreboard boxes (4G)
- plastic boxes (4H1, 4H2).

Notes: No change.

Y915**PACKING INSTRUCTION Y915****Y915**

The requirements of Part 3, Chapter 4 must be met except that Part 3;4.3.3 does not apply.

Single packagings are not permitted.

Kits may contain dangerous goods which require segregation according to Table 7-1.

Inner packagings must not exceed 30 mL for liquids or 100 g for solids and must be protected from other materials in the kit. The total quantity of dangerous goods in any one kit and in any one package must not exceed 1 kg.

Kits must not be packed with other dangerous goods in the same outer packaging.

Kits must be packed in metal, wooden, plywood, reconstituted wood, fibreboard or plastic boxes.

Notes: No change.

916**PACKING INSTRUCTION 916****916**

The general packing requirements of Part 4, Chapter 1 must be met except that the requirements of Part 4;1.1.2, 1.1.8, 1.1.10, 1.1.13 and 1.1.16 do not apply.

- a) For other than fuel system components, machinery or apparatus may only contain dangerous goods permitted under Part 3;4.1.2. If the machinery or apparatus contains more than one item of dangerous goods, the individual substances must not be capable of reacting dangerously together.

'Package orientation' labels (Figure 5-25), or pre-printed orientation labels meeting the same specification as either Figure 5-25 or ISO Standard 780-1985 must be affixed on at least two opposite vertical sides with the arrows pointing in the correct direction only when required to ensure liquid dangerous goods remain in their intended orientation.

The nature of the containment must be such that:

- 1) damage to receptacles containing the dangerous goods during air transport is unlikely; and
- 2) in the event of damage to receptacles containing the dangerous goods, no leakage of the dangerous goods from the machinery or apparatus is possible. A leakproof liner may be required.

In addition:

- i) Dangerous goods in machinery or apparatus must be packed in strong outer packagings unless the receptacles containing the dangerous goods are afforded adequate protection by the construction of the machinery or apparatus.
- ii) Receptacles containing dangerous goods must be so secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the machinery or apparatus during normal conditions of transport. Cushioning material must not react dangerously with the contents of the receptacles. Any leakage of the contents must not substantially impair the protective properties of the cushioning material.
- iii) For Division 2.2 gases, the inner cylinder or pressure vessel for gases, their contents and filling densities must conform to the requirements of the State in which the cylinders or pressure vessels are filled.
- iv) The total net quantity of dangerous goods contained in one package must not exceed the following:
 - 1) 1 kg in the case of solids;
 - 2) 0.5 L in the case of liquids;
 - 3) 0.5 kg in the case of Division 2.2. gases,
 or any combination thereof.

>

- + b) Fuel system components must be emptied of fuel as far as practicable and all openings must be sealed securely. They must be packed:
 - i) in sufficient absorbent material to absorb the maximum amount of liquid which may possibly remain after emptying. Where the outer packaging is not liquid tight, a means of containing the liquid in the event of leakage must be provided in the form of a leakproof liner, plastic bag or other equally efficient means of containment;
 - ii) in strong outer packagings.

Notes: No change.

PI 917

917

PACKING INSTRUCTION 917

917

The general packing requirements of Part 4, Chapter 1 must be met.

Air bag inflators, air bag modules and seat-belt pretensioners must be packed in steel drums (1A2), aluminium drums (1B2), plywood drums (1D) or fibre drums (1G), plastic drums (1H2), plastic jerricans (3H2), steel jerricans (3A2), wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G), solid plastic boxes (4H2), steel or aluminium boxes (4A, 4B).

Air bag inflators, air bag modules and seat-belt pretensioners may also be transported unpackaged on cargo aircraft in dedicated handling devices when transported from where they are manufactured to vehicle assembly plants. When transported in handling devices, the following conditions must be met:

- a) air bag inflators, air bag modules or seat-belt pretensioners as fitted in the handling device must be capable of meeting the test criteria prescribed in Special Provision A56;
- b) the handling device must be completely enclosed; and
- c) each air bag inflator, air bag module or seat-belt pretensioner unit must be secured within the handling device to prevent movement in transport.

Notes: No change.

9X1**PACKING INSTRUCTION 9X1****9X1****Lithium Batteries (UN 3090)**

The following requirements apply to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries:

The general packing requirements of Part 4, Chapter 1 must be met.

Lithium cells and batteries may only be transported under this Packing Instruction if they meet the following requirements:

- a) each cell or battery type has been determined to meet the criteria for assignment to Class 9 on the basis of tests carried out in accordance with the *Manual of Tests and Criteria*, Part III, subsection 38.3;
- b) each cell and battery must incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport;
- c) each cell and battery must be equipped with an effective means of preventing external short circuits;
- d) each battery containing cells or series of cells connected in parallel must be equipped with an effective means as necessary to prevent dangerous reverse current flow (e.g. diodes, fuses, etc.);
- e) cells and batteries must be packed in the inner packagings to effectively prevent short circuits and to prevent movement which could lead to short circuits;
- f) cells and batteries must be packed in steel drums (1A2), aluminium drums (1B2), plywood drums (1D) or fibre drums (1G), plastic drums (1H2), plastic jerricans (3H2), steel jerricans (3A2), wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G), solid plastic boxes (4H2), steel or aluminium boxes (4A, 4B) of Packing Group II.

Cells assigned to Class 9 which have been discharged to the extent that the open circuit voltage is less than the lower of:

- a) 2 volts; or
- b) two-thirds of the voltage of the undischarged cell; or batteries containing one or more such cells, are forbidden from transport.

Lithium Batteries Contained in Equipment (UN 3091)

The following requirements apply to cells and batteries in any form, including lithium polymer and lithium ion cells and batteries, when contained in equipment:

Lithium batteries (liquid or solid cathode) contained in equipment must meet all the requirements for authorized lithium cells and batteries as identified in a- d above, other than those related to packaging, be protected against short circuits and be securely held in place. Cells must not be capable of being discharged during transport to the extent that the open circuit voltage is less than the lower of:

- a) 2 volts; or
- b) two-thirds of the voltage of the undischarged cell.

Equipment containing lithium batteries must be packed in accordance with the general packing requirements of Part 4, Chapter 1 and be contained in strong outer packaging. The outer packaging must be waterproof or made waterproof through the use of a liner, such as a plastic bag unless the equipment is made waterproof by nature of its construction. The equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.

The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

Not more than 5 kg of lithium batteries may be contained in any piece of equipment.

Lithium Batteries Packed With Equipment (UN 3091)

The following requirements apply to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries, when packed with equipment:

Lithium cells or batteries packed with equipment must meet the requirements for authorized cells and batteries as identified in a- d above other than those related to packaging. Lithium cells and batteries must be packed in fibreboard boxes (4G) or fibre drums (1G) of Packing Group II and in such a manner as to effectively prevent movement which could lead to short circuits. Such packages must not exceed 5 kg gross mass for passenger aircraft or 35 kg gross mass for cargo aircraft.

The equipment and the packages of lithium cells or batteries must be overpacked.

For the purposes of this packaging instruction, 'equipment' means apparatus requiring the lithium batteries with which it is packed for its operation.

9X2

PACKING INSTRUCTION 9X2

9X2

The general packing requirements of Part 4, Chapter 1 must be met.

COMBINATION PACKAGINGS:

INNER:

Glass or earthenware (IP.1)	5 L
Plastic (IP.2)	5 L
Metal (IP.3, IP.3A)	10 L

OUTER:

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
aluminium (4B)	aluminium (1B2)	aluminium (3B2)
fibreboard (4G)	fibre (1G)	plastic (3H2)
plastic (4H1, 4H2)	other metal (1N2)	steel (3A2)
plywood (4D)	plastic (1H2)	
reconstituted wood (4F)	plywood (1D)	
steel (4A)	steel (1A2)	
wooden (4C1, 4C2)		

SINGLE PACKAGINGS:

- Composites
 - plastics receptacle in steel or aluminium drum (6HA1, 6HB1)
 - plastics receptacle in fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)
 - plastics receptacle in steel or aluminium crate or box or plastic receptacle in wood, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)
- Cylinders, as permitted in Packing Instruction 200
- Drums
 - ≠ aluminium (1B1, 1B2)
 - other metal (1N1, 1N2)
 - ≠ plastic (1H1, 1H2) — not permitted for UN 1941
 - steel (1A1, 1A2)
- Jerricans
 - + aluminium (3B1, 3B2)
 - ≠ plastic (3H1, 3H2) — not permitted for UN 1941
 - ≠ steel (3A1, 3A2)

- Notes:
- Consolidated PI 907 and 914.
 - Added 1N2 drums as authorized outer packaging for combination packagings.
 - Added 1N1 and 1N2 drums as authorized single packagings.
 - Added composites with plastic inner packagings allowed in P001.
 - Added 3B2 aluminum jerricans as an authorized single packaging.
 - Deleted glass ampoule IP.8
 - PI 907 did not include 4H1 Box, the merged instruction does.

Y9X3

PACKING INSTRUCTION Y9X3

Y9X3

The requirements of Part 3, Chapter 4 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

INNER (for liquids):

Glass or earthenware (IP.1)	1 L
Plastic (IP.2)	1 L
Metal (IP.3, IP.3A)	2 L

INNER (for solids):

Glass or earthenware (IP.1)	1 kg
Plastic (IP.2)	2 kg
Metal (IP.3, IP.3A)	2 kg
Paper (IP.4)	1 kg
Plastic bag (IP.5)	1 kg
Fibre (IP.6)	1 kg
Paper, plastic/aluminium (IP.10)	1 kg

OUTER:

Boxes

aluminium
fibreboard
plastic
plywood
reconstituted wood
steel
wooden

Drums

aluminium
fibre
other metal
plastic
plywood
steel

Jerricans

aluminium
plastic
steel

Notes: Notes: Consolidated PI Y907, Y911, and Y914. No change to requirements.
Added other metal as an authorized drum.
Y914 also did not include aluminum or steel boxes or aluminum jerricans. The merged instruction does.
Deleted glass ampoule IP.8

ANNEX 2

**Particular Packaging Requirements (PPRs) in the 2001-2002 ICAO TI
Decisions Made during Packing Instruction Consolidation Working Group Meetings**

PPR	Working Group Decision	Affected Packing Instructions
2 Plastic inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings.	Combine with PPR 13 and revise to read: "Plastic or glass inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings. Inner packagings must be packed with absorbent material as required by 4;1.1.10.1."	304 418 306 501 Y306 Y501 308 506 412 416 Y416
3 Pure aluminium or aluminium alloys are permitted only for halogenated hydrocarbons that will not react with aluminium.	Deleted - compatibility issues should be addressed in Part 4, Chapter 1.	304 306 Y306 308
4 Plastic bags must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings.	Add this into the new packing instruction P5X1 as an additional requirement.	509 Y509 512 517 519
5 Steel packagings must be corrosion-resistant or with protection against corrosion.	Deleted - compatibility issues should be addressed in Part 4, Chapter 1.	304 421 306 422 Y306 Y422 308 509 409 Y509 412 512 416 517 Y416 519 418
6 Glass ampoules must be packed with absorbent material in tightly closed metal or rigid plastic receptacles before packing in outer packagings.	Deleted - glass ampoules are now considered glass receptacles and will be covered under the revised PPR combining PPR 2 and 13.	304

PPR	Working Group Decision	Affected Packing Instructions
8 When metal inner packagings are permitted, only appropriate gas cylinders or other pressure vessels may be used.	Recommend assignment of this requirement harmonize with the UN. Where substances are assigned to P200 in the UN, they should also be assigned that PI in ICAO. Other substances may require further review.	304 501 306 409 431 432
9 Glass or earthenware inner packagings and glass ampoules must be packed with cushioning material in tightly closed metal or rigid plastic receptacles before packing in outer packagings.	Add this provision into the new packing instructions as an additional requirement using the same wording as the combined 2/13.	412 416 Y416 418 421 422
10 Copper cartridges only permitted when the substance is not in dispersion.	Delete. The packing instruction working group was unsure of it's current applicability but believes if it is still relevant, it is a compatibility issue better addressed by Part 4, Chapter 1.	412
13 Glass or earthenware inner packagings and glass ampoules must be packed with absorbent material in tightly closed metal or rigid plastic receptacles before packing in outer packagings.	Combine with PPR 2 and revise to read: "Plastic or glass inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings. Inner packagings must be packed with absorbent material as required by 4;1.1.10.1."	304 Y501 306 506 Y306 308 409 431 432 501
22 If the substance is in dispersion in organic liquid, the organic liquid must have a flashpoint above 50 deg. C.	Propose the DGP working group delete the PPR and consider a more appropriate means to address this concern. This PPR assigns a requirement for a liquid to a solid type packaging, current PI's would not be suitable as Part 4;1.1.17 must apply. This may partially be resolved once the new UN solid/liquid entries are adopted.	412 416 Y416 418 421 422 Y422

ANNEX 3
Proposed Changes to Quantity Limits or Other Restrictions

Proposed Changes for Class 3			
Class 3 PGI UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
1280	304	From 1.0 - 2.5 L - IP.3 CAO Align with similar substances	
1305	304		
Class 3 PGII UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
1154	308		From 5.0 - 2.5 L - IP.2 and IP.3 CAO Align with similar substances
1184	308		From 5.0 - 2.5 L - IP.2 CAO From 10.0 - 2.5 L - IP.3 Align with similar substances
1277 1278	308		From 5.0 - 2.5 L - IP.3 CAO Align with similar substances
1279	306 308		From 5.0 - 1.0 L - IP.2 and IP.3 PAX From 5.0 - 2.5 L - IP.2 CAO From 10.0 - 2.5 L - IP.3 CAO Align with similar substances
2363	308	From 1.0 - 2.5 L - IP.3 CAO Align with similar substances	
2486	308	From 1.0 - 2.5 L - IP.2 CAO Align with similar substances	
3064	311	Added 4D and 4F packaging to harmonize with P300	
3269	312	Deleted activator IP.9 reference and inner quantity limit -provides one inner quantity limit. Deleted Class 3 base material quantity limit - recommend standardize with P302. Recommend adding a gross limit to the DGL. Added additional outer packaging to harmonize with UN Model.	
Proposed changes for Class 4			
Division 4.1 PGI UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction

2852	416	From 0.25 - 0.5 kg Align with similar substances	
1336 1344 1357	412 416		From 2.5 - 1 kg Align with similar substances in the same UN PI
Division 4.1 PGII UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
1339 1341 1343	416 418		Prohibit inner plastics packagings on cargo aircraft to align with passenger instruction
1871	416 418		Prohibit bags as inner packagings. They are permitted on passenger but not cargo aircraft
3182	421 422	From 0.5 - 1.0 kg	
Division 4.1 PGIII UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
General		Propose to permit plastic inners on passenger aircraft as they are permitted as inners on cargo and plastic drums are permitted	
Division 4.2 PGII Liquid UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
General			There is no requirement for glass to be protected but there is for the equivalent solid entries, propose to include a provision
Division 4.2 PGII Solids UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
3126 3128	415 417		These N.O.S. entries get more generous provisions than pure substances, reduce to align with similar substances
1369 1382 1384	416 418	It appears that plastic inner packagings are not permitted without rationale. Propose to permit	

1326 1437 1339 1871 1341 1923 1343 1929 1352 2008 1358 2545 1369 2546 1384 3182	416 418	Inner glass packagings limited to 0.5 kg while similar substances have a 1.0 kg limit. Propose increase to 1.0 kg to align the similar substances	
2002	421 422 Sup		
Division 4.3 PGIII Solids UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
1408	421 422	Increase inner packaging to align with similar substances in same PI	
2805	416 418	Increase inner packaging limits for metal on cargo aircraft to 5 kg	
Proposed changes of Class 5			
Division 5.1 PGI Liquids UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
2495	501		Make forbidden both PAX and CAO. UN only permits in cylinders P200
Division 5.1 PGII Solids UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
1471 1496 1472 1506 1483 1513 1485 1748 1495 2741	509	0.5 - 1.0 kg PAX. Align with similar substances. CAO limits are aligned	
Division 5.1 PGII Solids LTD QTY UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
1459	Y509	Remove prohibition on plastic bags - all other substances allowed in bags	
Proposed changes for Class 9			

Class 9 PGII and III Liquids UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
General	907 914 Y914	Added additional outer packagings to harmonize with P001	
Class 9 PGII and III Solids UN#	PI	Increase in quantity or restriction relaxation	Decrease in quantity or increase in restriction
General	911	Added additional outer packagings to harmonize with P001	

Annex 5 - Correlation between Current and Proposed PIs

Current PI	Proposed PI
312, Y312	312
302, 303, 305, 307, 309, and 310	3X1
304, 306, and 308	3X2, 3X3
Y305, Y306, and Y309	3X4
412, 416	4X1
411, 415, 416, 417, 418, 419, 420	4X2
416, 418	4X5
421, 422, and 434	4X7
408, 414, 425, 431, 432	4X8
416, 418	4X15
412, 416, 418	4X16
500, 502, 510, 513	5X1
508, 509, 511, 512, 516, 517, 518, 519	5X2
501, 503, 505, 506, 507, 514, 515	5X3
Y508, Y509, Y516, Y517	Y5XX
Y501, Y503, Y506, Y514	Y5XY
903, 912, and 918	9X1
907, 914	9X2
Y907, Y911, Y914	Y9X3