It is important to note that amendments proposed in this report cannot be considered final until after the report is reviewed and approved by the ICAO Air Navigation Commission and Council.

TWENTY FIRST MEETING OF THE
DANGEROUS GOODS PANEL (DGP) (2007)

LETTER OF TRANSMITTAL

To: President, Air Navigation Commission

From: Chairman, Dangerous Goods Panel (DGP) (2007)

I have the honour to submit the report of the twenty first meeting of the Dangerous Goods Panel (DGP) which was held in Montréal, from 5 to 16 November 2007

Geoff Leach
Chairman

Montréal, 16 November 2007

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- 5.2: Reformatting of the packing instructions
- 5.3: Review of provisions for dangerous goods carried by passengers and crew
- 5.4: Review of provisions for dangerous goods relating to lithium batteries
- 5.5: Review of amendment process for the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284)

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DANGEROUS GOODS PANEL (DGP)

TWENTY-FIRST MEETING

Montréal, 5 to 16 November 2007

HISTORY OF THE MEETING

1. DURATION

1.1 The twenty-first meeting of the Dangerous Goods Panel (DGP/21) was opened by Mr. Björn Ramfjord, President of the Air Navigation Commission (ANC) in Montréal, at 1000 hours on 5 November 2007. The meeting ended on 16 November 2007.

2. ATTENDANCE

2.1 The meeting was attended by members and observers nominated by seventeen Contracting States and eleven international organizations, as well as by fifty-six advisers and others as shown in the list below :

Members	Advisers	Nominated By
R. Timmins		Australia
K. Vermeersch	R. Joss	Belgium
P.C. Guerreiro Lima	J.F. Salles	Brazil
	T. Vieira	
G. Branscombe	D. Evans	Canada
	W. Gouveia	
	R. Lessard	
	D. Sylvestre	
R. Jiang	J. Abouchaar	China
	E. Chim	
	A. Chung	
	Z. Qui	
	P. Tse	(Hong Kong)
	R. Xiao	
	S. Yan	

Members	Advisers	Nominated By
J. Le Tonqueze	M. Plassart	France
H. Brockhaus	R. Auschra	Germany
	P. Blümel	
	E. Fahlbusch	
	M. Marx	
	M. Philippi	
	T. Seemann	
M. Gelsomino	C. Carboni	Italy
	K. Moriwaki	Japan
	J. Nishimura	
	M. Nogami	
	Y. Watanabe	
D. Raadgers	W. Hoogerhout	Netherlands
	T. Muller	
	S. Oosterhoff	
M. Evans		New Zealand
D. Mirko	D. V. Kourdchenko	Russian Federation
	D. Shiyan	
L. C. Bárcena	A. Ruiz de la Cuesta	Spain
O. Al Ameri	P. Balasubramanian	United Arab Emirates
	P. King	
G. Leach	J. Hart	United Kingdom
	M. Castle	
	R. McLachlan	
	S. Pinnock	
R. Richard	J. McLaughlin	United States
	D. Pfund	

Members	Advisers	Nominated By
D. Brennan	M. Molina Toledo	IATA
	P. Oppenheimer	
	B. Sullivan	
	L. Willoughby	
M. Rogers	D. Gierlings	IFALPA
Observers		
P. Seok-Won		Republic of Korea
K. Seung Ho		
Advisers		
E. Sigrist		CEFIC
A. Altemos	S. Burkhart	DGAC
	A. Curello	
	R. Jessop	
	S. Linehan	
	N. McCulloch	
	J. Paterson	
	A. Stukas	
V. Krampe		FEA
A. McCulloch		GEA
M.E. Wangler		IAEA
C. Updyke		NEMA
G. Kerchner	P. De Metz	PRBA
	C. Monahan	
R. Wichert		USFCC
B. Bonnardel-Azzarelli		WNTI

3. OFFICERS AND SECRETARIAT

3.1 Mr. Geoff Leach (United Kingdom) was elected Chairman of the meeting and Ms. D. Raadgers was elected Vice-Chairman.

3.2 The Secretary of the meeting was Dr. Katherine Rooney, Technical Officer of the Flight Safety Section, who was assisted by Mr. L. Mortimer and Ms. L. McGuigan.

3.3 Interpretation and translation were provided in English, French, Russian and Spanish.

4. AGENDA OF THE MEETING

4.1 The agenda for the meeting shown hereunder was approved by the Air Navigation Commission on 21 June 2007.

Agenda Item 1: Development of proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*

Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009-2010 Edition

Agenda Item 3: Development of recommendations for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009-2010 Edition

Agenda Item 4: Amendments to the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) for incorporation in the 2009-2010 Edition

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel

- 5.1: Principles governing the transport of dangerous goods on cargo only aircraft
- 5.2: Reformatting of the packing instructions
- 5.3: Review of provisions for dangerous goods carried by passengers and crew
- 5.4: Review of provisions for dangerous goods relating to lithium batteries
- 5.5: Review of amendment process for the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284)

5. WORKING ARRANGEMENTS

5.1 The panel met as a single body, with ad hoc drafting groups as required. Discussions in the main meeting were conducted in English, French, Russian and Spanish. Some working papers were presented in English only. The report was issued in English, French, Russian and Spanish.

6. OPENING REMARKS BY THE PRESIDENT OF THE AIR NAVIGATION COMMISSION

Good morning ladies and gentlemen.

This is the twenty-first meeting of the Dangerous Good Panel.

On behalf of the Air Navigation Commission, it is my pleasure to welcome you again to Montreal and to ICAO Headquarters.

Subsequent to the twentieth meeting of the panel held in October 2005, the Commission considered your report and recommended to the Council the acceptance of all your recommendations. The Council adopted Amendment 9 to Annex 18 on 19 February 2007; the amendment became effective on 16 July 2007 and will become applicable on 20 November 2008. In addition the Council approved the amendments for the 2007-2008 Edition of the Technical Instructions to be applicable from 1 January 2007, as well as an Addendum / Corrigendum dated 1 August 2007, dealing primarily with lithium batteries. The Commission awaits with interest the outcome of your continuing discussions on this issue.

I know you will be interested to hear some of the findings of the safety oversight audits. Of the 53 States that were audited as of 31 May 2007, more than 60 per cent did not conduct dangerous goods surveillance inspections. More than 40 per cent did not adequately review and approve dangerous goods training programmes that air operators provide to employees and 40 per cent did not require State approval before air operators carry dangerous goods nor did they have requirements for air operators to develop acceptance procedures and checklists in the event of in-flight emergencies. Although there have been improvements, it is evident much remains to be done in this safety area.

Since the twentieth meeting, there have been a number of changes in membership. Messrs. Abouchaar, Calcaterra, Okayama, Schuurmann, Steele and Code have left the panel, and the Commission is grateful for the contribution they made. In their places, you have been joined by Mr. Brennan nominated by IATA, Mr.Gelsomino nominated by Italy, Mr. Yoshizawa nominated by Japan, Mr. Rogers nominated by IFALPA, Mr. Timmins nominated by Australia and Mr. Branscombe nominated by Canada. In addition, you have a new member, Mr. Rui nominated by China.

During the next days you will be meeting in a panel framework. I would like, as usual, to remind each member that you are here in a personal expert capacity representing your own professional views, which may not necessarily be the same as those of your Administration or Organization. Although you have been nominated by your Government or Organization, you have been accepted by the Air Navigation Commission as an expert in the field of dangerous goods, and, therefore, you are expected to express your own professional opinions. Moreover, the success of any ICAO panel meeting is determined by the ability of the participants to settle the technical issues in a cooperative manner and, although consensus is not an absolute requirement, it is, without any doubt, a warranty of success.

Your first task is to develop proposals for any necessary amendments to Annex 18. Many national aviation administrations feel strongly that the Annexes to the Convention should be stable documents. Accordingly, the ICAO Council has directed that, with the exception of overriding issues such as safety and CNS/ATM systems, there should be a minimum three-year cycle between Annex amendments.

The second task of this meeting is to recommend necessary revisions to the Technical Instructions for incorporation into the 2009-2010 Edition. Please, remember the word “necessary” and I ask you all to bear in mind that every change imposes some burden on those who have to use this document. Having said that, I realize that the vast majority of amendments arise from aligning the Technical Instructions with the United Nations Recommendations which, in the interests of multimodal harmonization, is essential. The outcome of your discussions on ways to strengthen the harmonized approach between the Technical Instructions and the other modal regulations will be viewed with interest because of the potential benefit to all involved in dangerous goods transport.

The final agenda item concerns the various non-recurrent tasks which have been identified by the Commission and by the panel. I look forward to hearing the outcome of your discussions, especially on the reformatting of the packing instructions and on the transport of dangerous goods on cargo-only aircraft. With regard to future work items, I would like to inform you that the Commission has developed a management framework that provides the Commission and the Secretariat with a working tool in the maintenance of the objectives, concentration on productive programmes, and continuity of effort by the Organization in the air navigation field. Under this framework, all potentially new tasks must first be identified as issues and then undergo an evaluation before they can be approved as tasks and added to your work programme. More detailed information regarding this framework will be provided by the Secretariat during the course of this meeting.

The Air Navigation Commission and the Council have, with Annex 18 and the Technical Instructions, set the broad structure for ensuring that dangerous goods are transported safely. To collect and organize the myriad details of the Technical Instructions is your task; this requires that you ensure that they are accurate, complete, understandable and practical. The Commission is confident that you will maintain the high standards you have shown in your previous meetings. If you should require any advice or assistance in your work, I trust your chairman will not hesitate to call upon the Secretariat, myself, or any member of the Commission. We will anyway meet again towards the end of your meeting for an informal debriefing on your achievements. I understand that should take place in the afternoon of the last Thursday and the Commissioners and I look forward to listening to your chairman on that occasion.

It remains for me to declare open, then, the Twenty-first Meeting of the Dangerous Goods Panel, to wish you every success in your work and to express my hope that you will enjoy a pleasant stay in Montreal.

7. STATEMENTS BY MEMBERS

7.1 Two members stated they were having difficulties in discussing some papers because of a lack of translation into their (ICAO official) languages.

7.2 In response the Secretary noted that some of the papers concerned had been received after the deadline for the receipt of papers for DGP/21. She pointed out that the timing of DGP/21 meant that it had had to compete for ICAO’s language resources with preparations for ICAO’s triennial Assembly.

ICAO's budgetary situation was such that its language resources were under stress and the Air Navigation Commission (ANC) was encouraging the use of working group meetings (for which language services were not provided) instead of panel meetings wherever possible. The only alternative, especially in Assembly years, would be a much earlier deadline for papers — which was probably impractical — it would, for example, not allow the Secretary to present papers arising from the latest changes to the UN Model Regulations.

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Agenda Item 1: Development of proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*

1.1 CARRIAGE OF DANGEROUS GOODS ON CARGO AIRCRAFT ONLY (DGP/21-WP/54)

1.1.1 A member drew attention to paragraph 8.9 of Annex 18 — *The Safe Transport of Dangerous Goods by Air*. It was noted the current requirement of Part 7;2.4.1 of the Technical Instructions duplicated the Standard and consequently, as a result of the work done in revising those requirements pertaining to the transport of dangerous goods on cargo aircraft, the Standard needed to be reviewed. It was also suggested the wording of 8.9 was unusually specific, when compared to other paragraphs, many of which simply refer to the corresponding requirement in the Technical Instructions, thus providing for future changes to be made to the Technical Instructions without the need to also amend Annex 18. An amended wording for 8.9 was consequently proposed.

1.1.2 The meeting agreed to the proposed amendment without further change. The amendment is shown in the appendix to the report on Agenda Item 1.

1.1.3 **Recommendation 1/1**

1.1.3.1 In light of the foregoing, the meeting developed the following recommendation:

RSPP

Recommendation 1/1 — Amendment to Annex 18

That Annex 18 — *The Safe Transport of Dangerous Goods by Air* be amended as shown in the appendix to the report on this agenda item.

1.2 SAFETY MANAGEMENT SYSTEMS (DGP/21-WP/51)

1.2.1 The Secretary recalled that the subject of safety management systems (SMS) had been discussed at WG/07 and there had been strong general support for the concept. Documentation on systems already in place in three States was provided to the meeting.

1.2.2 The meeting was further advised that proposals to amend Annex 1 — *Personnel Licensing*, Annex 6 **—** *Operation of Aircraft*, Annex 8 — *Airworthiness of Aircraft*, Annex 11 — *Air Traffic Services*, Annex 13 — *Aircraft* Accident *and Incident Investigation* and Annex 14 — *Aerodromes* in respect of SMS had been discussed by the Air Navigation Commission and the proposed text for inclusion in Annex 6 was presented for the meeting's information. It was suggested that the panel consider if these provisions would be sufficient to cover the need for safety management for dangerous goods, recognizing that the latter was included frequently as a component part of operations. It was further suggested that DGP could defer further consideration until the reaction of States to the Annex 6 provisions to ensure that they included a consideration of dangerous goods.

1.2.3 There was general agreement with this course of action. It was stressed that a safety management system needed to apply to all aspects of an enterprise's operations and it would not be sensible (for an operator) to have a system which applied only to the transport of dangerous goods.

1.2.4 It was pointed out that many of the problems arising in the transport of dangerous goods could be traced back to shippers and ways needed to be found to ensure that at least large shippers had their own SMS. It was suggested that DGP might consider developing guidance material for shippers on the establishment of SMS.

1.3 THE SCOPE OF INSPECTION SYSTEMS ENVISAGED BY ANNEX 18 (DGP/21-WP/55)

1.3.1 A member noted that paragraph 11.1 of Annex 18 states:

> "Each Contracting State shall establish inspection, surveillance and enforcement procedures with a view to achieving compliance with its dangerous goods regulations."

and it was queried whether this paragraph is intended to place a responsibility on States to inspect and survey foreign operators operating to and from their State. It could be interpreted that if a State's "dangerous goods regulations" apply to such operators, then paragraph 11.1 would require them to be so inspected. However, this appears to be at variance with other aspects of aviation; for example, in the United Kingdom, foreign operators are not routinely inspected by the UK Civil Aviation Authority for compliance with the requirements of Annexes 1, 6 and 8, although they may be under special circumstances (e.g. EC SAFA ramp checks).

1.3.2 A member of the Secretariat's Legal Bureau (LEB) gave his opinion that the paragraph implied it did require inspection of all operators, and that if the DGP considered it should be interpreted otherwise, this needed to be clearly stated in the Annex. A number of members noted that in their States, international laws took precedence over national laws, though it was questioned whether Annex 18 provisions could be considered as international law.

1.3.3 A common interpretation among members was that the provision carried with it no obligation for a State to inspect foreign operators, but that it could carry out inspections if it so wished.

1.3.4 It was agreed to discuss this matter further after DGP/21.

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APPENDIX A

PROPOSED AMENDMENT TO ANNEX 18

ANNEX 18

THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

. . .

CHAPTER 8. OPERATOR'S RESPONSIBILITIES

. . .

8.9 Loading on cargo aircraft

~~Except as otherwise provided in the Technical Instructions, p~~Packages of dangerous goods bearing the "Cargo aircraft only" label shall be loaded in~~ such a manner that a crew member or other authorized person can see, handle and, where size and weight permit, separate such packages from other cargo in flight.~~ accordance with the provisions in the Technical Instructions.

. . .

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Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009-2010 Edition

2.1 APPROVAL OF WORKING GROUP REPORTS (DGP/21 - WP/2 AND WP/3)

2.1.1 The meeting reviewed the narrative parts of the reports of the meetings of the Working Groups of the Whole, WG06 (Beijing, China, 25 October to 3 November 2006) and WG07 (Memphis, United States, 30 April to 4 May 2007). The narratives were approved without comment apart from corrections to the list of attendees. It affirmed the proposals for amendments of the Technical Instructions at those meetings, subject to any subsequent changes made at this meeting.

2.2 AMENDMENTS TO THE TECHNICAL INSTRUCTIONS TO ALIGN WITH THE UN RECOMMENDATIONS (DGP/21-WP/5, 6, 7, 8, 9, 10, 11 AND 13)

2.2.1 The meeting reviewed amendments to the Technical Instructions to reflect the decisions taken by UN Sub-Committee of Experts on the Transport of Dangerous Goods (subsequently referred to in the report for the sake of brevity, as “the UN Sub-Committee) and on the Globally Harmonized System of Classification and Labelling of Chemicals at its third session (Geneva, 15 December 2006). It was noted that these changes had already been reviewed and modified at the meeting of the DGP Working Group of the Whole in Memphis (DGP-WG07, 30 April to 4 May 2007). Further discussions on amendments to the individual parts of the Technical Instructions were as indicated in the following paragraphs. The meeting was advised that changes to the Technical Instructions relating to the transport by air of radioactive materials had arisen as a result of a harmonization process that had been carried out between the UN Model Regulations and the IAEA transport document. The changes were generally editorial in nature and not substantive.

2.2.2 Part 1 — General (DGP/21-WP/5)

2.2.2.1 Two members pointed out that the proposed new note to follow paragraph 2.3.2 referred to the domestic transport of dangerous goods by mail. Since ICAO provisions related only to international aviation and since States might apply different regulations to domestic mail, it was suggested that this note was not appropriate for the Technical Instructions. The meeting consequently agreed not to include the note.

2.2.2.2 It was agreed that the addition to Note 1 following Table 1-4 should be rephrased in positive rather than negative language. It was also agreed that the headings for Tables 1-4 and 1-5 should be better aligned. It was further suggested that Note 2 to Table 1-4 should also apply to Table 1-5. A consolidation of these proposals was presented to the meeting and agreed.

2.2.2.3 It was mentioned that there was concern in at least one State about the continuing presence of Chapter 5, dealing with security matters, in the Technical Instructions. It was recalled that this was only intended to be a temporary measure until a more suitable location for the material could be agreed and the Secretary reminded the meeting about some of the difficulties surrounding this issue. It

was agreed that a more formal proposal to move this material out of the Technical Instructions was needed and the member raising the issue was invited to present a working paper for future consideration by the DGP.

2.2.2.4 A member noted the use of the word “consignor” in relation to the transport of radioactive materials instead of the normal Technical Instructions usage of “shipper”. It was recalled that this subject had been discussed before and a decision had been taken to continue the use of “consignor” in the radioactive materials context to maintain alignment with IAEA usage. The meeting agreed that the time was now right to change to the use of “shipper” so that the Technical Instructions would be internally consistent in this respect.

2.2.2.5 A member questioned why paragraph 6.1.4 in the Technical Instructions did not include the UN Model Regulations condition referring to radioactive materials forming part of the structure or equipment of an aircraft. It was pointed out that this requirement had been excluded since it was considered to be covered by the general exceptions of paragraph 2.2 of Part I.

2.2.2.4 Another member pointed out the unusual character of the new paragraph 6.1.5.2 which listed provisions which did not apply to excepted packages of radioactive materials; the more usual practice was to list provisions which did apply. Another member explained that this was a difficult area and that the list in question was valuable for those concerned and he recommended retaining it. The meeting agreed.

2.2.3 **Part 2 — Classification of Dangerous Goods (DGP/21-WP/6)**

2.2.3.1 It was noted that the opening words of the note following 6.3.2.3.6 c) i.e. “In determining … are present” had been deleted by the UN Sub-Committee, but were not deleted in DGP/21-WP/6. In response, several members recalled that this text had been deliberately retained by DGP and one member mentioned that his authority frequently received calls for clarification of this specific issue. The meeting consequently agreed to retain the current test in the Technical Instructions, as indicated in DGP/21-WP/6.

2.2.3.2 It was agreed to change the title of Chapter 8 to read: “CLASS 8 — CORROSIVE SUBSTANCES”, to align with the corresponding chapter heading in the UN Recommendations.

2.2.3.3 Attention was drawn to the UN Sub-Committees’ text concerning substances hazardous to the environment. It was recalled that it had been agreed at DGP/20 not to adopt text on this subject because of intermodal considerations (it had not been adopted by IMO). However, in order to harmonize with the UN Model Regulations and noting that other modes would be including similar texts in the next editions of their regulations, a member proposed amendments to Part 2;9.2.1; Part 3, Special Provision A97; and Part 5 (new 2.4.9, including the new environmentally hazardous materials symbol). The member proposing the changes noted that subsequent to preparing the proposals it had become evident that ADR and IMDG would not in fact be fully aligned with the UN Model Regulations. It was nevertheless agreed that the Technical Instructions should follow the UN Model Regulations and it was agreed to make the proposed amendments.

2.2.4 **Part 3 — Dangerous Goods List and Limited Quantities Exceptions (DGP/21-WP/7, WP/13 and WP/75)**

2.2.4.1 A member noted the proposed change to the title of Part 3 which would delete the words "limited quantities" but leave the word "exceptions". Since this latter word had a specific connotation in the Technical Instructions, it was agreed to replace it by "limited and excepted quantities".

2.2.4.2 In the new special provision A163 it was agreed, for consistency, to change "dangerous substances" to "dangerous goods".

2.2.4.3 A proposal was made to change the text for the new sub-paragraph f) to more positive language. The meeting preferred to retain the UN-Sub Committee's text however.

2.2.4.4 It was recalled (in DGP/21-WP/75) that at WG07 it had been agreed to divide Table 3-2 (Special provisions) into two tables — one containing provisions completely aligned with the UN Model Regulations and one containing provisions applying only to air transport. Further reflection however suggested that this would not be a user-friendly arrangement, bearing in mind that the normal procedure would be to consult the tables for a specific special provision number obtained from the dangerous goods list. With two separate lists to consult, it could not be immediately obvious which list should be consulted and in some cases it would be necessary to consult both lists. Members agreed that the previous plan to divide Table 3-2 should be abandoned, and the accompanying introductory text was amended as a consequence.

2.2.4.5 A member noted that the UN dangerous goods list did not contain an entry for nitric acid with not more than 20% nitric acid (UN 2031) which appeared in the Technical Instructions. It was queried whether this Technical Instructions entry should therefore be deleted. Another member recalled that the not more than 20% nitric acid entry was deliberately included since it was the only form of nitric acid permitted on passenger aircraft.

2.2.4.6 DGP-WG07 had agreed that the UN text on excepted quantities (excluding paragraph 3.5.1.6) would be adopted except that the additional column in Table 3-1 and the use of E-codes would not be incorporated until the 2011/2012 edition of the Instructions, at which time the new alphanumeric numbering system for the packing instructions would be incorporated. However, since the new packing instructions being proposed to DGP/21 retain a numbering system similar to the current one, it was suggested that there is no need to amend the format of columns 9 to 12 of Table 3-1. After editorial amendments to special provision A66, Figure 3-1 and paragraph 5.5, the proposal was agreed.

2.2.4.7 The proposal to add Special Provisions A157, A161 and A162 relating to fuel cells to align with the UN Model Regulations was agreed to subject to the addition of clarifying text in A146. The new text ensures that fuel cell cartridge design types installed in or integral to a fuel cell system can pass a drop test. It was noted that the secretary would draw the amendment to the attention of the UN.

2.2.5 **Part 4 — Packing Instructions (DGP/21-WP/8)**

2.2.5.1 For clarification, it was agreed to replace the phrase "and filled with a ullage" by "with an ullage" and "to the extent of" by "with" in new paragraph w) of Packing Instruction 200.

2.2.5.2 It was agreed that "Packing Group II performance standards" in paragraph 1) of new Packing Instruction 215 be replaced with "Packing Group II performance requirements" for the sake of

consistency. It was further agreed that this suggestion would also be relevant when the panel discussed fuel cell provisions at a later point in the meeting.

2.2.5.3 It was noted that new special packing provision PP48 had been added to the UN Model Regulations but was not reflected in the proposed amendments to the Technical Instructions. It was agreed that it should be incorporated in Packing Instruction 416.

2.2.5.4 A proposal to add to Packing Instruction 602 the exception for quantities of 30 ml or less of other required dangerous goods which currently exists in Packing Instruction 650 was agreed.

2.2.5.5 It was agreed to change the title of Chapter 10 to read: "CLASS 8 — CORROSIVE SUBSTANCES", to align with the corresponding chapter heading in the UN Recommendations and with the proposal already agreed to in Part 2, Chapter 8.

2.2.6 **Part 5 — Shipper's Responsibilities (DGP/21-WP/9)**

2.2.6.1 One panel member requested that further discussion be held on whether or not the existing cargo aircraft only label (Figure 24) needed to be modified. He suggested that the benefits in having the new label, which did not differ significantly from the current one, may not be worth the cost associated with shippers having to purchase new labels. Others argued, however, that the panel had agreed that the current label makes no direct reference to "cargo aircraft only" and that a change would be helpful. It was agreed that the subject would be revisited when the panel discussed responsibilities of the operator at a later point in the meeting.

2.2.6.2 A member queried whether the ISO reference in the proposed new 5;3.5.2 b) should be retained on the basis that this standard permitted smaller sizes. It was explained that a reference to the ISO standard existed elsewhere in the Technical Instructions and that this amendment simply linked the two references together. Difficulty in including ISO references in the Technical Instructions was expressed, since the documents are not readily available to the public. It was suggested that the length of the ISO standard be determined and the contents, if not too lengthy, could be reproduced in the Instructions. Another member noted that the ISO standard is being used by other modes and therefore, should be acceptable in air transport as well.

2.2.6.3 A member suggested that sub-paragraph a) of 5;2.4.5.1 was redundant and could be deleted. The meeting agreed.

2.2.7 **Part 6 — Packaging nomenclature, marking and tests (DGP/21-WP/10)**

2.2.7.1 The proposed amendments were agreed without comment.

2.2.8 **Part 7 — Operator's responsibilities (DGP/21-WP/11)**

2.2.8.1.1 It was confirmed that the proposed note to 7;4.4 requiring incidents involving those dangerous goods not fully subject to all of the Technical Instructions to be reported, would be adopted.

2.2.8.1.2 It was questioned whether a transition period should be added to the new provision in 7;5 which specifies that notices warning passengers of the types of dangerous goods they are forbidden to transport aboard an aircraft contain visual examples. It was suggested that while many existing notices in

passenger terminals currently show visual examples, a great many do not. It was therefore proposed that a transitional period to allow operators and airport authorities sufficient time to develop and introduce new signage be given in the form of a note. It was commented that, on the basis notes have no legal status, the transition period should be included in the regulatory text. It was agreed to adopt the note as proposed and revisit the issue during the next biennium if necessary.

2.3 PART 1 — GENERAL

2.3.1 Application of dangerous goods training (DGP/21-WP/41)

2.3.1.1 A proposal to remove any ambiguity as to who is required to receive training was made. Category 5 is described as persons "*involved* in the handling, storage, and loading of cargo …:"and Category 8 is described as persons "*responsible* for the handling, storage, and loading of cargo …". Since the job function is the same, only the employer differs, it was suggested that the wording should be identical. The meeting agreed that the word "involved" should be used to describe both categories.

2.3.2 Table 1-4 — content of training courses (DGP/21-WP/70)

2.3.2.1 At DGP/20, changes were made to Table 1-4 to extend the training requirement to those engaged in the transport of mail and stores (i.e. staff of category 5 and 8). It was noted, however, that there was no indication in the table to show that such staff should be familiar with Limitations. It was suggested this should have been done because the provisions for dangerous goods in air mail (Part 1;2.3) are contained in Chapter 2 "Limitation of dangerous goods on aircraft". A proposal to clarify this requirement was therefore agreed. It was further agreed that a similar amendment be made to the new Table 1-5.

2.3.3 Training Recurrency (DGP/21-WP/17)

2.3.3.1 Attention was drawn to Part 1, Chapter 4, which contains the requirements for dangerous goods training programmes, including a requirement in 1;4.2.3 for 24-month recurrency training. The text of 1;4.2.3 states that "Recurrent training must take place within 24 months of previous training …". This statement means that, for example a person who undertook initial training on 1 July 2005 must undertake recurrent training no later than 30 June 2007. If however, that person then undertook the recurrent training on 24 May 2007, then the date for completion of the next recurrent training becomes no later than 23 May 2009.

2.3.3.2 This results in employers having to provide additional training because of not being able to use the entire 24-month period. This is particularly the case for operator employees on shift work and for whom available training dates may have to coincide with rostered days of work. In addition there are some groups of employees, mainly flight and cabin crew where recurrent dangerous goods training is tied to other recurrent training requirements and where maintenance of a fixed training date becomes critical.

2.3.3.3 The proposed solution to this problem was to allow training that is completed within a defined window prior to the 24-month expiry date to be deemed to have been completed on the expiry date.

2.3.3.4 There was considerable support for this proposal. The system had already been introduced in one State and had eliminated requests for extension of retraining periods. Two members

although sympathizing with the proposal, saw difficulties for their States, which issued training certificates for a fixed two year period. Another potential difficulty was seen in dealing with personnel who failed a currency retraining check and also with the keeping of training records.

2.3.3.5 It was pointed out that the question of failures was not addressed in the Technical Instructions at present and was a separate issue which did not particularly affect this proposal. The issues of certificates and records were thought to be details which could be overcome by procedure changes in individual States. After making some detailed changes to the proposed text, the meeting agreed with the proposal.

2.3.4 **Medical aid (DGP/21-WP/53)**

2.3.4.1 The panel was presented with a proposal to amend Part 1;1.1.3.1 a) to clarify the circumstances under which dangerous goods can be carried on board an aircraft to provide medical aid in flight. It was suggested that the current provision did not make clear that it applied to both dedicated air ambulance flights and temporarily-modified aircraft to accommodate a patient. The proposal was agreed.

2.3.5 **Carriage of hand disinfectants**

2.3.5.1 The Chief of the Secretariat's Medical (MED) Section advised the meeting that, arising from ICAO's work on the spread of communicable diseases, a need was seen to carry on board an aircraft as part of its equipment a supply of hand disinfectant, either as a liquid or as impregnated wipes. The disinfectant would contain up to 62 per cent alcohol and was a flammable liquid in packing group II. It could be considered that the substance was covered by the provisions of 1;1.1.3.1 a), except that this provision appeared to be aimed at the needs of a known patient, and not for the possible use of any passenger. Moreover, the substance was not specified in the list of contents of the first aid kit. The quantities of material involved had not yet been determined, but were expected to be quite small. The agreement of the DGP was being sought in principle to the understanding that hand disinfectants would be covered by the provisions of 1;1.1.3.1a).

2.3.5.2 The meeting in general saw no difficulty in agreeing that this substance would be covered by 1;1.1.3.1 a). Sealed wipes were considered to be already covered by SP A46.

2.4 **PART 2 — CLASSIFICATION OF DANGEROUS GOODS**

2.4.1 **ISO standards (DGP/21-WP/63)**

2.4.1.1 The DGP Working Group of the Whole Meeting in Memphis, Tennessee (WG07) was advised that several references within the Technical Instructions reflected out-of-date ISO Standards. It was noted that a further review of those references identified a small number of instances where the Instructions were not aligned with the UN Recommendations. It was agreed that these references should be corrected.

2.5 PART 3 — DANGEROUS GOODS LIST AND LIMITED QUANTITIES EXCEPTIONS

2.5.1 Environmentally hazardous substances and aerosols (DGP/21-WP/39)

2.5.1.1 A proposal to add UN numbers 3077 and 3082 to special provision A112 in order to permit them to be carried as consumer commodities (ID 8000, **Consumer commodity**) was discussed. It was explained many substances previously classified as class 3 or division 6.1 had been reformulated and were now classified as environmentally hazardous substances. It was anticipated a large increase in substances classified as UN 3077 and 3082 would occur in the future, largely as a result of GHS work. Products containing such substances when shipped with aerosols, could, if the amendment were agreed, be packed in one combination packaging. The proposal was agreed.

2.5.1.2 It was noted difficulties were encountered in some regions with land transport of consumer commodities following transport by air. It was explained considerable progress had been made on the subject of a multimodal standard for consumer commodities at the recent UN sub-committee meeting.

2.5.2 Class 9 substances — maximum quantities per package (DGP/20-WP/40)

2.5.2.1 It was noted during the reformatting of the packing instructions exercise a number of substances in Class 9 had been identified which should be assigned to the same group of packing instructions, but that having very different maximum net quantities per package prevented such a rationalization. It was suggested that a standardized quantity should be 400 kg for solids and 450 L for liquids for both passenger aircraft and CAO, i.e. the maximum permitted for UN specification packagings. The amendment was made on the basis that for air transport, dangerous goods are not permitted in intermediate bulk containers and therefore this de facto limit applied.

2.5.2.2 Concern was expressed that if accepted, the allowable quantities would, in some instances, be quadrupled. Although there was general appreciation for the rationalization behind the proposal, it was questioned whether there was any safety justification for the amendment. The proposal was therefore not supported.

2.5.3 Special Provision A153 and Packing Instruction 203 (DGP/20-WP/67)

2.5.3.1 Inconsistencies between provisions in Packing Instructions 203/Y203 and special provision A153 were addressed. It was noted that A153 specifies that plastic aerosols of a capacity greater than 120 mL are permitted only when the propellant is non-flammable and non-toxic and the contents are not classified as dangerous goods. However, Packing Instructions 203 and Y203 allow such aerosols when containing non-flammable and non-toxic gas and contents. It was suggested that this would mean that these packing Instructions are less restrictive than special provision A153. A proposal was therefore made to delete special provision A153 and to amend the existing text concerning quantity limitations for plastic aerosols in that Packing Instructions.

2.5.3.2 While there was agreement that inconsistencies exist between the packing instructions and special provisions, agreement on whether the amendments proposed to correct the inconsistencies,

particularly with the deletion of “when containing flammable and/or toxic gas and contents” in paragraph b) of the packing instructions, could not be reached. It was suggested that the intent of the proposal was simply to harmonize the requirements and that the concerns raised by panel members addressed a separate issue, i.e. limitation of the contents. The meeting agreed with the proposal in principle and a revised text was also agreed.

2.5.4 **Limited quantity provisions for aerosols (DGP/21-WP/68)**

2.5.4.1 A proposal to address inconsistencies between limited quantity provisions for UN 1950 as indicated in Part 3;4.1.2 and Table 3-1 was made. It was noted that Part 3;4.1.2 only allows aerosols of Division 2.1 and 2.2 without subsidiary risk to be transported under the limited quantities provisions. The relevant substances from Table 3-1 were identified and it was suggested that the limited quantity provisions in Table 3-1 should be deleted for these substances. Although there was agreement that there were inconsistencies, there were differing opinions on how they should be addressed. A revised text was developed in view of the comments made, which the meeting then accepted.

2.5.5 **Prescribed conditions for substances and articles to be considered as non-restricted (DGP/21-WP/73)**

2.5.5.1 A member recalled that the working group of the whole (DGP-WG07) had considered a proposal to require shippers to indicate on the air waybill when a substance or article was exempted from the requirements of the ICAO Technical Instructions by the prescribed conditions of a special provision. Taking into account comments from the working group, a revised proposal was being made which addressed only special provisions which require some action on the part of the shipper in order to ensure that the substance or article as prepared for transport meets the prescribed conditions of the Technical Instructions. If the shipper was required to *perform an action* to ensure that prescribed conditions were met, a statement to that effect on the air waybill or other transport document was a reasonable requirement and would serve as an additional check and balance to ensure compliance. Substances which were not subject to the Instructions based on their inherent composition were not included in this proposal. In addition, the proposal had been revised to clarify that the requirements only applied to substances and articles carried as cargo. This clarification was made by stating that the requirement only applied when an air waybill was issued. Similar language was employed in the Technical Instructions in 1;2.4.7 in relation to the requirements for excepted quantities.

2.5.5.2 It was suggested the proposed requirement would benefit both the shipper and the operator and enhance safety by ensuring that non-restricted substances or articles were prepared appropriately when accepted for transport. By including the statement on the air waybill, the shipper would be indicating compliance with the special provision’s prescribed requirements that qualify the substance or article for transport as non-restricted.

2.5.5.3 Several members spoke in favour of the proposal which was already in common use by industry. A problem was foreseen however in that the shipper did not normally prepare the air waybill. The meeting was reassured that this point was already successfully covered in practice by requiring the shipper to prepare a letter of instruction to accompany the consignment which the freight forwarder would normally use in preparing the air waybill. The meeting subsequently agreed with the proposal, including the addition of Special Provision A152 to the list of special provisions to which the proposal would apply.

2.5.6 **Substances assigned to UN Packing Instruction P099 (DGP/21-WP/81)**

2.5.6.1 A member noted that during the reformatting of the packing instructions a review had been made of those packing instructions assigned to substances in the UN Model Regulations to ensure, where applicable, that the packagings assigned in the Technical Instructions were consistent with those in the UN Model Regulations. In conducting this verification it was identified that a number of substances assigned to "regular" packing instructions in the Technical Instructions were assigned to Packing Instruction P099 in the UN Model Regulations. P099 states that: "Only packagings which are approved by the competent authority for these goods may be used. A copy of the competent authority approval shall accompany each consignment or the transport document shall include an indication that the packaging was approved by the competent authority." Moreover, a number of the substances were assigned to more general packing instructions in ADR for road transport.

2.5.6.2 Based on the UN Model Regulations restriction and bearing in mind that all substances must at least move by road prior to and following air transport it was believed that the substances identified should be restricted in line with the provisions of the UN Model Regulations. As there was no equivalent to UN P099 in the Technical Instructions it was suggested that the best approach would be to apply the packaging approval requirements by way of a special provision. After reviewing the existing special provisions, it was believed that the assignment of SP A109 against the applicable substances would address the requirements to ensure that the competent authority approved packagings and that appropriate quantity limits were applied.

2.5.6.3 In addition, it was also identified that there is a single packing instruction, PI 435, that is similar to UN P099 and it was proposed that the entry in Table 3-1 for UN 3319 — **Nitroglycerin mixture desensitized, solid, n.o.s.*** be amended to delete reference to PI 435 and instead assign A109 to this substance.

2.5.6.4 The meeting agreed that for the three substances (UN 1222, 1261 and 1865) assigned to P099 by the UN Model Regulations, but assigned to a standard packing instruction by ADR, no change to the Technical Instruction was required. For several other substances assigned to a regular packing instruction by the Technical Instructions, but not by other modes, it was suggested that they should be considered as forbidden, but referred to Special Provision A109. It was noted that many of the substances involved were n.o.s. entries and covered substances with combinations of properties which may well not exist in practice. Many members felt that this would be an arbitrary course of action, not based on technical facts, and consequently were reluctant to agree. The member proposing the change developed alternative text with which members agreed.

2.5.7 **UN 3291 (DGP/21-WP/33)**

2.5.7.1 A request to clarify the applicable proper shipping names for UN 3291 was presented to the panel. It was noted that three proper shipping names for UN 3291 are presented in a note to 2;6.3.5.2, while Table 3-1 contains four proper shipping names. It was agreed that the four proper shipping names listed in Table 3-1 are accurate and that note in 2;6.3.5.2 should include reference to **"Biomedical waste, n.o.s."** and **"Medical waste, n.o.s"**.

2.6 PART 4 — PACKING INSTRUCTIONS

2.6.1 Compressed Gas as Dangerous Goods in Machinery or Apparatus (DGP/21-WP/74)

2.6.1.1 A member recalled that at the DGP Working Group of the Whole Meeting in 2005, it had been agreed to remove reference to division 2.2 gases in Part 3;4.1.2, since their carriage was not permitted under the limited quantity provisions. However, an unintended consequence of this action was to remove the ability to ship UN 3363 — **Dangerous goods in machinery** or **Dangerous goods in apparatus**, containing gas cylinders, since only dangerous goods permitted in limited quantities can be shipped under this entry. Indeed, in Packing Instruction 916 e), and f) 3), reference was made to gases. It was suggested that a slight amendment to Packing Instruction 916 would address this issue.

2.6.1.2 The meeting agreed with the proposal.

2.6.2 Chemical Kits / First Aid Kits (DGP/21 – WP/18)

2.6.2.1 At DGP-WG07 it had been agreed to amend Packing Instruction 915 to permit dry ice as a refrigerant to be packed in the same outer packaging as the chemical kit or first aid kit. A member suggested that a similar revision should be made to the limited quantity packing instruction for chemical kits and first aid kits in Packing Instruction Y915. In addition both Packing Instruction 915 and Packing Instruction Y915 placed a limit on the quantity of liquid and solid that may be contained in any single inner packaging. As presently written it was not explicit that these quantity limits apply only to inner packagings that contain dangerous goods. The subsequent sentences did clearly state that the limit per kit and per package applies only to the dangerous goods. It was suggested that the text referring to the inner packagings be revised to include the words “containing dangerous goods” as stated in Part 1;2.3.4 a) for dangerous goods in excepted quantities.

2.6.2.2 The meeting agreed with the proposals.

2.6.3 Enhanced Requirements for the Transport of Oxidizing Gases (DGP/21-WP/72)

2.6.3.1 During the recent working group of the whole meeting (DGP-WG07), the working group had considered an information paper related to the transport of oxygen, oxygen generators, and oxidizing gases. The working group had been presented with information relating to a recent rulemaking amending the United States Hazardous Materials Regulations to enhance the requirements for the transport of oxygen generators and oxidizing gases in cylinders. Detailed information including testing which led to these changes was provided as an appendix to the current working paper to facilitate DGP’s review.

2.6.3.2 The United States regulations had consequently been amended in a number of ways and it was being suggested that the Technical Instructions should also be amended in one case at present. It was proposed that the Instructions be amended to specify that when a pressure relief device was used on a cylinder containing one of a specified list of oxidizing gases, the specified settings must be used. This would help to ensure that the pressure relief device did not function prematurely and pose an unreasonable risk of enhancing a fire aboard an aircraft to the extent that the fire could not be suppressed by typical aircraft fire suppression systems. Currently, Packing Instruction 200 deferred to the competent authority to establish when pressure relief devices are required for cylinders, and only required pressure

relief devices for select gases. No changes were proposed in this regard, and it would still remain at the discretion of the competent authority whether a pressure relief device would be required.

2.6.3.3 Some members expressed interest in the proposal but were reluctant to agree before consulting with the appropriate industrial experts. Furthermore, some members considered that the matter should be discussed by the UN Sub-Committee before DGP took action. It was agreed to hold informal discussions on the matter among interested members before deciding on a course of action.

2.6.4 Proposed amendment to general packing requirements (DGP/21-WP/46)

2.6.4.1 A proposal was made to change the requirements in 4;1.1.8 to permit those dangerous goods where the quantity limit is a gross mass per package to be packed together with other dangerous goods where the quantity limit is a net quantity. Noting the proposal could cause difficulties in those instances where the calculated Q would be greater than 1 when the gross mass of an article was used but would be less than 1 when the net quantity of the article was used, a modified proposal stating the gross mass per package need not be taken into account was agreed.

2.7 PART 5 — SHIPPERS RESPONSIBILITIES

2.7.1 Emergency contact telephone numbers (DGP/21 – WP/29)

2.7.1.1 An advisor pointed out that seven States and twenty-eight operators had filed variations to the Technical Instructions which required that a “24-hour emergency response telephone number” which must be provided on the dangerous goods transport document, and he believed that further airlines were likely to take similar action. It seemed that there was an increasing need to impose such variations. Furthermore, many shippers already provided their emergency telephone numbers on transport documents for *all* airfreight shipments of dangerous goods. He therefore proposed to introduce this requirement in the ICAO Technical Instructions by a way of a new sub-paragraph f) to 5;4.1.5.8.1.

2.7.1.2 A number of members commented in favour of this proposal. Several noted that they already had this provision in their requirements and that it had not caused any difficulties. Other members however did not agree with it. They considered that it might be workable in developed States and for large shippers, but for many developing States and for small shippers and individuals, the provision of a twenty-four hour emergency response service was not possible. Added to this would be the inevitable language difficulties if all States in the world were to be involved. Moreover they believed that sufficient information in the form of UN number, labels and markings, etc. was already available to enable emergency services to perform their functions in the event of an accident or incident. Furthermore, the unreasonableness of having to provide an emergency response number for a shipment of dry ice, cosmetics, paint and similar substances was pointed out. It was also pointed that an aircraft might well be carrying more than a hundred shipments of different dangerous goods from different shippers and it would clearly be impractical to contact them all in the case of a large scale incident/accident.

2.7.1.3 In response it was pointed out that States which already required telephone numbers usually also had exceptions to the requirement which excluded low risk items such as those mentioned. As for the difficulty shippers might face in providing an emergency response service, a common practice, which appeared to work satisfactorily, was to contract the task to a specialist organization which could provide round-the-clock expertise.

2.7.1.4 It was suggested that this topic needed to be raised again at the UN Sub-Committee to ensure a multi-modal approach, although it was also noted that no requirement currently existed for European road transport. It was also mentioned that while it may not be realistic to try to make contact with an expert in the early, truly emergency, phases of response, during subsequent clean-up phases there would be more time to do so.

2.7.1.5 Following this thorough discussion of the issue, the meeting decided not to make any change to the Technical Instructions.

2.7.2 **Cargo aircraft only label (DGP/21-WP/35 and WP/9)**

2.7.2.1 DGP-WG06 had supported a proposal to amend the design of the cargo aircraft only label. At that time it had been pointed out that pictograms with minimal or no words might be best since any difficulty pertaining to language would then be reduced or eliminated. A proposed new version was presented at DGP-WG07 which, although it contained both pictograms and text, was adopted. In WP/35, DGP/21 was invited to adopt a new label which contained only pictograms. Although there was some support, many felt that the intent still left doubt. Others questioned the value in significantly changing the current label. The proposal was not supported and the panel agreed that the label proposed at WG07 would be adopted.

2.7.2.2 A transition period before the new label becomes mandatory was also adopted at WG07. It was suggested that extending the transition period would provide an opportunity for shippers to exhaust their supplies of the current label. It was therefore agreed to extend the transition date to 31 December 2012.

2.7.3 **Marking requirement for limited quantity packagings (DGP/21-WP/76)**

2.7.3.1.1 The DGP was invited to reconsider the decision taken at DGP/20 to add a note indicating a limited quantity marking would become mandatory from 1 January 2009. Following discussions at the last UN Subcommittee meeting (July 2007) which may result in amendments to the 16th edition of the Model Regulations, it was suggested that the mandatory date should be deferred until 1 January 2011. This was agreed. It was further agreed members would submit feedback on the development of multimodal provisions for limited quantities and consumer commodities to the secretary in advance of the next UN meeting.

2.7.4 **Transport of radioactive material — electronic dangerous goods transport data (DGP/21-WP/28)**

2.7.4.1 It was suggested that when consignments are undeliverable e.g. due to a wrong address, the operator must place the consignment in a safe place which as a rule is located in the customs area. In the case of radioactive material, this area may not be equipped to store radioactive material and may not be accepted unless there was documentary evidence confirming that the shipment was safe. It was further noted that work carried out by the Word Customs Organization to enhance the safety of the delivery chain makes the unloading of radioactive material without advance notification in the form of necessary documents problematic. It was suggested that adding a new paragraph to 5;1.2.3 permitting consignor's information to be transmitted by the operator to the competent authority by means of electronic transmission of the required documents would alleviate this problem.

2.7.4.2 Although there was sympathy for this proposal, it was suggested that this was a customs issue and not a regulatory one; the issue related more to security and to facilitation. In terms of security, the adviser from the International Atomic Energy Agency (IAEA) felt that the problem could be interpreted as illicit trafficking and that he could raise the issue in the IAEA Office of Nuclear Security. In terms of facilitation, it was suggested that the proposer could raise the issue at the next meeting of the Facilitation Panel (FALP).

2.8 PART 7 — OPERATOR'S RESPONSIBILITIES

2.8.1 Acceptance of Electronic Dangerous Goods Transport Data (DGP/21-WP/45)

2.8.1.1 A member presented a paper on this topic whose purpose was to propose amendments to the relevant parts of the Technical Instructions to permit the use of electronic data interchange (EDI) or electronic data processing (EDP) methods as an alternative to a physical dangerous goods transport document. No specification of the type of technology, infrastructure, or methodology was stated. Rather a capability requirement was included, which was that the data being transmitted must be able to be produced "without delay" on paper, in the format specified in Part 5;4 of the Technical Instructions.

2.8.1.2 The use of EDI and EDP as alternatives to paper documentation had also been raised at the meeting of the UN Subcommittee of Experts since a movement from paper to data transmission had multi-modal implications. It had been proposed that the UN Subcommittee should coordinate with the UN Centre for Trade Facilitation and Electronic Business (CEFACT). UN CEFACT had been tasked with the development of trade facilitation and e-business standards and tools. The UN Subcommittee, in coordination with UN/CEFACT, was to develop and define the data standards and format for the dangerous goods transport document. This development was to be undertaken in cooperation with the modal organizations.

2.8.1.3 During discussions, it was noted that the Technical Instructions described the data to be transmitted, but did not prescribe the format. It was also mentioned that ADR already permitted electronic transmission of data, but the UN Model Regulations did not. It was suggested that there was now an opportunity to develop a multi-modal Standard for the transmission of this data, which would also be a good opportunity for a critical examination of the data currently required by the Technical Instructions.

2.8.1.4 There was general agreement with the proposals in principle. Some concern was expressed, however over the intent of the requirement to produce a paper document "without delay". It was suggested that this might only be relevant in the content of an audit; in an emergency the tendency was to refer to the NOTOC. A potential problem was also seen in some States concerning the acceptability of electronic signatures.

2.8.1.4.1 Several members mentioned that electronic transmission of data was already commonplace in the aviation industry (e.g. passenger tickets) and would inevitably become more widespread. For the time being electronic transfer was only envisaged as an alternative to paper and it was foreseen that the two methods would coexist for some time.

2.8.1.4.2 While agreeing in principle other members were concerned about the lack of a traditional signature on an electronic document. Even if accepted for an electronic transfer, the lack of a signature might be more of a problem if at some stage in the transport process, reversion to a paper made became

necessary (e.g. due to the lack of electronic system in a small operator). It was however pointed out that the lack of a traditional signature was already catered for in 5;4.1.6.2 of the Technical Instructions.

2.8.1.5 The text was revised in light of the discussions and approved by a large majority.

2.8.2 **Passengers' Exposure Dose Limit (DGP/21-WP/22)**

2.8.2.1 A member recalled that at DGP-WG/07, a potential problem of passengers using portable dosimeters on board an aircraft which had radioactive material in the cargo hold had been raised. It had been suggested that when such passengers see a reading greater than background on the meter, they might panic. It had been explained that the tables of separation distances contained as requirements in the Technical Instructions were presented as guidance by IAEA as one means to limit dose rate. It was further noted that the table was based on a radiation dose rate criterion of 0.02 mSv/h for a passenger. It was suggested that a note could be drafted to explain that the separation distances were based on the aforementioned criterion. This value could also be used as a check to ensure that the proper separation distances in the hold of aircraft were maintained. It was consequently proposed to add a note to 7;2.9.1.3.

2.8.2.2 Several members, while appreciating the proposal, were doubtful of its value. If the objective was to allay passengers' concerns, it was noted that passengers would not normally have access to the Technical Instructions and be aware of the Note. As a matter of detail, it was pointed out that the Note mentioned measurements being made on a passenger seat, whereas the Separation Tables included measurements to the cabin floor.

2.8.2.3 In further support of the proposal, the member suggesting it noted that in his State aircraft loading was carried out by a contract company and not by the airlines themselves. Direct measurements in the cabin would provide an assurance that loading had been carried out properly.

2.8.2.4 Based on the discussions, a revised new note was proposed. It was noted no reference should be made to Table 7-6, which included separation distances for radioactive material carried by cargo aircraft only, while the note referred to passengers. Following removal of the reference to Table 7-6 and a minor editorial amendment, the proposal was agreed.

2.8.3 **Information to the Pilot-in-Command for Radioactive Shipments (DGP/21-WP/24)**

2.8.3.1 A member noted that Part 7;4.2 of the Technical Instructions described the information an operator was required to provide to flight crews and other employees in the operations manual or other appropriate manuals. For the transport of radioactive material there is an additional provision in 7;4.2 b) which requires the operator to provide "instructions on the loading of such dangerous goods based on the requirements of 7;2.9." The information necessary to apply the required separation distances for packages containing radioactive material included dimensions of cargo compartments, the height of the tallest package in a radioactive shipment, the transport index, and a table with the required separation distances.

2.8.3.2 Operations and/or other manuals were suitable for providing long-term information (e.g. dimensions of cargo compartments and minimum separation distances shown in Tables 7-5 and 7-6), whereas the short-term information relevant to a specific consignment or flight (transport index) was provided in the information to the pilot-in-command according to 7;4.1. There was currently no requirement in the provisions of 7;4.1.1 to include the height of the tallest package containing radioactive material in the information to the pilot-in-command. Therefore flight crews were currently not provided

with all the information needed to determine the required separation according to 7;2.9. It was further noted that some operators already provide this information on the NOTOC.

2.8.3.3 Members expressed a number of problems with this proposal. It was felt that flight crews should trust the loading staff to do their jobs properly and it was not clear what action a crew would take if they considered that separation distances were not adequate. It was pointed out that the height of a package was not relevant on a cargo aircraft; moreover packages containing radioactive material could be in unit load devices where they could be stowed on the bottom, in the middle or at the top, which would render knowledge of the package height irrelevant. Flight crews would not normally have copies of the Technical Instructions or separation tables which again would mean that package height information would be of little value. It was also not evident to some members where the information would be placed on the NOTOC and there could also be difficulties with computer generated NOTOC systems.

2.8.3.4 The member making the proposal responded that crews made extensive use of the NOTOC as a final check of the dangerous goods on board and it was by no means unusual to find errors in preparation and loading of shipments. Loading plans often broke down if there was a late change of aircraft type, due to a delay for example. He also stated that some operators do supply crews with separation tables and also already provide the package height on the NOTOC, which did not appear to be a major problem. Nevertheless the member recognized that there was very little support for the proposal and consequently withdrew the paper.

2.8.4 **Securing of dangerous goods (DGP/21-WP/25)**

2.8.4.1 It was noted that 7;2.4.2 requires dangerous goods to be secured “in a manner that will prevent any movement in flight which would change the orientation of the packages”. It was suggested that a movement which does not include a change in orientation is a threat which should also be avoided, specifically when the movement is followed by sudden contact with the surface of a cargo compartment, or with other freight. There was support for the proposal in principle; however, several suggestions were made to simplify the text. It was suggested that deleting the words “in flight which would change the orientation of the package” from the first sentence would remove any ambiguity as to the type of movement the securing of the goods must prevent. This was agreed.

2.8.5 **Protecting dangerous goods packages from damage (DGP/21-WP/26)**

2.8.5.1 The meeting was reminded of the requirement for operators, in 7;2.4.3, to protect packages of dangerous goods from being damaged and that particular attention must be paid so that accidental damage is not caused through dragging or mishandling of the packages. It was reported that during actual operations it had sometimes been observed that even though packages with dangerous goods were secured according to regulations, other freight was left unsecured. It was suggested that movement of this unsecured freight could potentially damage dangerous goods packages. It was therefore proposed to add a new sentence to 7;2.4.3 requiring packages be loaded such that movement of non-dangerous goods would not damage the packages during transport. Although some members felt that this amendment was not necessary since general cargo is secured, several supported the proposal in principle. It was suggested that instead of adding a new sentence to 7;2.4.3, the requirement in the first sentence to protect the packages of dangerous goods from being damaged could be expanded by adding “, including by movement of other cargo”. Following discussions on whether or not “cargo” would cover all types of packages, it was agreed to expand the first sentence by adding the words “, including by the movement of baggage, mail, stores or other cargo”.

2.8.6 **Acceptance (DGP/21-WP/57)**

2.8.6.1 WG07 had already agreed to a proposal to revise text in 7;1 in respect of the acceptance of goods by operators, subject to the resolution of two outstanding issues. The first regarded the proposal for the operator to verify, as part of the acceptance check, that "the specification marking on the package, if applicable, is suitable for the packing group of the dangerous goods contained within." Comments received at WG07 suggested that the wording was open to misinterpretation, with operators possibly believing they had to check elements of the UN specification marking other than the packing group. The second issue concerned the order of the paragraphs in Part 7;1. DGP/21 was presented with revised text (7;1.3.1 d)) to address the first issue and a more logical presentation of paragraphs to address the second.

2.8.6.2 With regard to the new text proposed for 7;1.3.1 d), one member suggested that in the case of overpacks, the specification marking on the package may not be visible. Another suggested it may not be applicable e.g. for limited quantities or for substances of Division 6.2. It was proposed that the words "where required" be inserted at the beginning of d) and that a new sentence reading "This does not apply to overpacks where the specification marking is not visible" would address these issues. The proposal, as modified, was agreed.

2.8.7 **Information to the pilot-in-command in regard to UN 1845 — Carbon dioxide, solid (dry ice) (DGP/21-WP/60)**

2.8.7.1 The meeting was presented with a proposal to change the requirements for information to the pilot-in-command for consignments containing UN 1845 — Carbon Dioxide, solid (Dry ice). Attention was drawn to the provisions of 7;4.1.1 f) which requires that the net quantity or gross mass of each package containing dangerous goods be shown on the information to the pilot-in-command.

2.8.7.2 It was noted that it is very common for perishable non-dangerous goods materials to be shipped with dry ice to ensure temperature control. It was also noted that pharmaceutical and food distributors make many shipments of individual packages containing dry ice to multiple consignees. This can result in an aircraft carrying multiple dry ice shipments requiring a NOTOC that lists the dry ice consignments individually. It was suggested that this can often result in "information overload" and in turn dilute other important information related to dangerous goods packages which could need immediate attention in the event of an emergency.

2.8.7.3 It was therefore proposed that aircraft operators be given the option of showing a total amount of dry ice at each aircraft loading position. It was suggested that in the event of an emergency it would be sufficient for emergency responders to know the location and amount of any dry ice on an aircraft. Abbreviated dry ice information could then lead to better transmission of more detailed information concerning other dangerous goods on board the aircraft. It was suggested that "exact loading location" be replaced with "in each hold". The proposal, as modified, was agreed.

2.8.8 **Magnetized material (DGP/21-WP/62)**

2.8.8.1 It was suggested that a note which currently exists below 2;9.2.1 d) should also appear below 7;2.10. The panel was reminded that 2;9.2.1 d) contains details concerning the classification criteria for magnetized material while 7;2.10 contains the loading requirements for magnetized material that apply to aircraft operators. It was suggested that since those responsible for aircraft loading are more likely to review Part 7 of the Technical Instructions when formulating or carrying out their loading

procedures, the information in the note should appear in Part 7. It was agreed to replicate the note from 2;9.2.1 d) in 7;2.10.

2.8.9 Transport of Dangerous Goods in Non-Pressurized Cargo Holds (DGP/21-WP/27)

2.8.9.1 The meeting was reminded that an amendment to the pressure variation note in the introductory chapter of Part 4 to help distinguish differences in pressure reduction values in pressurized cargo holds versus non-pressurized cargo holds had been proposed at DGP-WG/07. It had been suggested that a preferable location to address the issue would be in Part 7, Chapter 2 where operators could be reminded that consideration should be given to packagings subjected to increased pressure differentials when placed in non-pressurized cargo holds. Two different versions (A and B) of a note to this effect had been prepared and were presented for the meeting's review. The member presenting the proposals noted that there had been a number of incidents of leakage of dangerous goods in unpressurized cargo holds.

2.8.9.2 Some members still had difficulty with the proposal, noting that the shipper would not know whether or not the goods would be placed in an unpressurized hold. It was pointed out that for this reason, the proposed text had now been moved to Part 7 where it would be an operator's and not a shipper's responsibility. An alternative view was that Part 6, under Packaging Tests, would be a preferable location. There was however reluctance to see another new pressure differential figure introduced in the Technical Instructions.

2.8.9.3 It was suggested that this was a problem possibly unique to one State which could be dealt with at the national level, however, it was pointed out that aircraft from other States could also be involved.

2.8.9.4 Based on discussions, a modified note was presented. It was queried whether the text "the pressure differential in a non-pressurized cargo hold may reach 71 kPA" was accurate since Introductory Note 3 in Part 4 referred to 68 kPA. Further amended text to remove reference to a specific value was developed and agreed.

2.8.10 Dry Ice (DGP/21-WP/64)

2.8.10.1 Members agreed that specific guidance to operators regarding the calculation of maximum safe quantities of dry ice should be added to the non-recurrent work items of the DGP, recognizing that this it would need to be processed through the new Air Navigation Integrated Programme (ANIP) process.

2.9 PART 8 — PROVISIONS CONCERNING PASSENGERS AND CREW

2.9.1 Fuel Cells

2.9.1.1 Fuel cell systems containing hydrogen in metal hydrides (DGP/21-WP/30)

2.9.1.1.1 A member reminded the meeting that at DGP/20, provision had been made to permit passengers and crew to carry onboard an aircraft as carry-on baggage portable electronic devices powered by fuel cell systems as well as spare fuel cell cartridges under a new subparagraph r) in Part 8;1.1.2. Only

fuel cell cartridges containing flammable liquids, formic acid and butane had been permitted under the new provisions. It had been generally agreed that other fuels should only be considered for inclusion after the matter had been addressed by the UN Sub-Committee and new proper shipping names and UN numbers assigned. This had now been done and the results were contained in the fifteenth edition of the UN Model Regulations. It was consequently proposed to amend 8;1.1.2 r) of the Technical Instructions.

2.9.1.1.2 There was general support for the proposal to allow fuel cell cartridges other than the ones already agreed to at DGP/20. One member questioned whether the 120 ml limit mentioned in new r) 4) c) referred to water capacity; this was confirmed. It was noted that DGP/21-WP/12 (8;1.1.2 r) 3) d)) contained more suitable text which already included reference to water capacity. The panel agreed to the proposal subject to the replacement of “for hydrogen in metal hydride, 120 ml” with “for hydrogen in metal hydride, the fuel cell cartridges must have a water capacity of 120 mL or less”.

2.9.1.2 **Packing instructions for new entries for fuel cell cartridges (DGP/21-WP/36)**

2.9.1.2.1 An advisor recalled that the development of packing instructions for fuel cell cartridges containing fuels in classes or division 2.1, 4.3 and 8 had been discussed at WG07. It had been agreed that standard terminology referring to PG II standard would be used. Packing instructions which had consequently been developed were presented for the meeting’s review. Unlike some other articles appearing in the Technical Instructions, each of the individual proper shipping names involved covered three different possibilities:

a) fuel cell cartridges (packed on their own);

b) fuel cell cartridges contained in equipment; and

c) fuel cell cartridges packed with equipment.

and the proposed packing instructions address all three of the possibilities. The proposed packing instructions also limit the number of fuel cells that may be contained in or packed with equipment.

2.9.1.2.2 It was proposed that, because the fuel cell packing instructions did not exist in the current Instructions, it would be beneficial to present them in the new packing instruction format. For the purpose of the proposal, letters were given to differentiate the three different packing instructions for each group (e.g. 313A, 313B, 313C), but that these letters would be replaced during editorial review.

2.9.1.2.3 It was explained that subsequent to DGP-WG07, some panel members had raised concerns with the fuel cell industry regarding the wording of Packing Instructions 215, 313, 436 and 827, in particular the number of fuel cell cartridges that would be allowed to be packed with equipment. It was recommended that when fuel cell cartridges are packed with equipment, they must be packed in intermediate packagings together with the equipment they are capable of powering and that the maximum number of fuel cell cartridges in the intermediate packaging must be the minimum number required to power the equipment, plus two spares.

2.9.1.2.4 Another concern was raised regarding the use of the packing instructions rather than the dangerous goods list to limit fuel cell cartridges contained in or packed with equipment. This issue was addressed with consequential amendments to Table 3-1.

2.9.1.2.5 Finally, a proposal made earlier during the meeting to replace “Packing Group II standards” with “Packing Group II requirements” was incorporated.

2.9.1.2.6 There was general support for the changes made to the packing instructions. Several members praised the new format and took the opportunity to thank the Packing Instruction Working Group (PIWG) for their efforts. One member questioned why Packing Instruction 313B (UN 3473, contained in equipment) and 313C (UN 3473 packed with equipment) were presented as two separate packing instructions when the only difference was to the additional requirements. It was explained that they were presented separately for clarity and that it followed a similar approach used for lithium batteries. Several other members expressed support for keeping them as separate instructions as they agreed that this provided much clarity. A member noted that 313B (UN3473 contained in equipment) and 313C (UN 3473 packed with equipment) required strong outer packagings and that reference to the general requirements of 4;1.1.2 should therefore be removed. This was also agreed. It was agreed to add an additional outer packaging (aluminium jerrican, 3B2) in keeping with the UN packagings permitted.

2.9.1.2.7 One panel member raised concerns that additional conditions for the transport of fuel cell cartridges installed in equipment were limited. It was noted that experience had not yet been gained in the transport of these items and that compliance with additional safety provisions available in the IEC standard should be imposed, at least for those fuel cell cartridges transported on passenger aircraft. It was therefore proposed to add two additional requirements to Packing Instructions 313B, 215B, 436B and 827B:

a) fuel cell systems must be of a type that is not capable of charging batteries during transport;

b) each fuel cell system and each fuel cell cartridge must conform to the IEC PAS 62282-6-1 Ed. 1

2.9.1.2.8 The proposal was opposed by one member who believed that the technology had gone through substantial testing and that the additional requirements were unnecessary and would cause undue problems. Another member noted that the fuel cell industry considered the conditions of air transport for their products before manufacturing had even begun and therefore was confident that stringent safety standards were being met. Others noted that the panel’s intention had never been to impede the development of fuel cell cartridges or their transport but to gain experience in the safest way possible. The requirements could be revisited once more experience was gained and there was an established safety record to fall back on.

2.9.1.2.9 In regard to the requirement in a) above, it was clarified that the intent of the proposed text was to prevent fuel cells from charging. Revised text was agreed.

2.9.1.2.10 Some of the members who opposed the introduction of the requirement in b) above stated that they could consider adopting it if it referred to passenger aircraft only. Some members also thought it would be inappropriate to make reference to a consumer safety standard for cargo being transported on aircraft. It was noted that the IEC standard related to micro fuel systems and would not be applicable to larger systems such as those for military use. It was suggested this limitation would be removed by adding reference to a standard approved by the appropriate authority of the State of Origin. The proposal was agreed as modified.

2.9.1.3 **Carriage of Fuel Cells by Passengers and Crew (DGP/21-WP/37)**

2.9.1.3.1 This paper presented a consolidation of decisions made at the DGP-WG/07 for paragraph 8;1.1.2 r) with subsequent proposals and indicated text which still needed to be agreed by DGP.

2.9.1.3.2 The meeting was reminded that WG07 had agreed to the addition of new entries for fuel cell cartridges in order to align with the UN Model Regulations, subject to further consideration of the maximum quantities of UN 3476 and UN 3477 permitted on passenger aircraft. It was reported that the fuel cell industry had considered the proposed limitations for UN 3476 and UN 3477 (5 kg for passenger aircraft), and found these limits to be practical since larger quantities could still be shipped on cargo aircraft. The proposal was agreed.

2.9.1.4 **Spare fuel cell cartridges in checked baggage (DGP/21-WP/38)**

2.9.1.4.1 An advisor noted that the international security restriction on liquids and gels in passenger carry-on baggage and the new ICAO aviation security provisions had limited the usefulness of the provisions of the Technical Instructions (8;1.1.2 r) 8)) for the carriage of fuel cell system spare cartridges in carry-on baggage, as any receptacle containing more than 100 ml of liquid would be confiscated at an airport security check. Because of this security restriction, passengers were encouraged to carry any article or receptacle containing liquid in excess of 100 ml in their checked baggage. Unfortunately, however, placing spare fuel cartridges in checked baggage is prohibited in the Technical Instructions. However, a cartridge was a sophisticated receptacle, manufactured to stringent specifications, containing a specific fuel and did not contain an ignition device or a battery and could not produce electricity on its own. A cartridge was an article that contained the fuel (and activator) only and did not have the ability to be actuated or to short-circuit or to charge batteries on its own. It was therefore being proposed that 8;1.1.2 r) should be amended to allow spare cartridges as checked baggage.

2.9.1.4.2 It was also suggested that SP A146 should be amended to ensure that fuel cell cartridges installed in or integral to a fuel cell system must pass a 1.2m drop test.

2.9.1.4.3 Although there was some sympathy for the proposal to review the panel's decision to prohibit spare fuel cell cartridges in checked baggage, it was suggested the amendment was based on security and not safety. It was further believed that more experience was necessary before the panel could consider reviewing the issue. The proposal was not agreed.

2.9.2 **Coordination between Security and Dangerous Goods Related Activities (DGP/21-WP/48)**

2.9.2.1 A member reported on the activities of the ICAO Secretariat Study Group on the Carriage and Screening of Liquids, Gels and Aerosols which he had attended as the representative of DGP. The Study Group had been formed following the proposed introduction of passenger security measures which, amongst other things, would limit receptacles of liquids in hand baggage to a capacity of 100 mL. The group consisted of members of the Aviation Security (AVSEC) Panel, the Facilitation Panel and the representative of DGP. Three working papers had been submitted to the group by the member. Although these papers were presented, they had been subject to minimal discussion and had been forwarded to AVSEC Panel members for comment.

2.9.2.2 The member considered it extremely unlikely that passengers would ever again be allowed to carry the kinds of quantities of liquids which were currently allowed by the Technical

Instructions and it was therefore suggested that the meeting consider proposals to change the Technical Instructions to align them with the security requirements. Proposals for appropriate amendments to 8;1.1.2 were presented for the meeting's review.

2.9.2.3 The meeting was joined by the Chief of the Specifications and Guidance Material Section (C/SGM) for the discussion of this topic. In his introductory remarks, C/SGM mentioned that the differences between the dangerous goods and security requirements in respect of passenger carry-on commodities were confusing for passengers and threatened the credibility of both systems in the eyes of passengers. The requirements needed to be logical, credible and as far as possible coordinated. Both dangerous goods and security regulators needed to work towards this end.

2.9.2.4 Several members indicated that they did not support the proposed amendment to 8;1.1.2 for a number of reasons. It was considered that the Technical Instructions should not be used as the vehicle for imposing security requirements. There was also the problem that in some States the international security requirements were not applied to domestic operations, whereas the dangerous goods requirements were, and this caused difficulty at transfers between domestic and international flights. Another problem was that security authorities were able to change their requirements much more quickly than was the case for dangerous goods regulations and this would be difficult if security requirements were embedded in dangerous goods regulations. It was suggested that a general text indicating that the dangerous goods based limits were subject to being overridden by security regulations was as far as the Technical Instructions should go. It was noted that such text had already been agreed at the WG06 meeting.

2.9.2.5 Other members did support the proposal, at least in principle. There was clearly a need for alignment between the requirements and some action by DGP was necessary.

2.9.2.6 After further extensive discussion, the meeting decided, by a significant majority, not to agree with the proposal. Nevertheless it was acknowledged that some further study of the matter was needed. The meeting therefore agreed that the ICAO should be requested to arrange for a coordinated review of this question by experts from AVSEC and DGP.

2.9.2.7 Some members drew attention to efforts in their States to familiarize passengers with the security and dangerous goods requirements in order to avoid frustration because of a lack of understanding. Some methods in use included public websites and printed material and these methods appeared to be reasonably successful. It was also noted that a lack of coordination of security and dangerous goods activities at State level was sometimes an unhelpful factor.

2.10 RECOMMENDATIONS

2.10.1 In light of the foregoing, the meeting developed the following recommendation:

Recommendation 2/1 — Amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284)

That the Technical Instructions be amended as indicated in Appendix A to the report on this agenda item.

2.10.2 In light of the discussions in paragraph 2.9.2 of the report on this agenda item, the meeting developed the following recommendation:

Recommendation 2/2 — Coordinated review of dangerous goods and security requirements for carry-on liquids, gels and aerosols

That ICAO initiate a coordinated review by dangerous goods and security experts of the quantities of liquids, gels and aerosols in carry-on baggage.

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APPENDIX A

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Part 1

GENERAL

Chapter 1

SCOPE AND APPLICABILITY

. . .

1.1.3.1 Except for 7;4.2, these Instructions do not apply to dangerous goods carried on an aircraft where the dangerous goods are:

a) ~~placed on board with the approval of the operator~~ to provide, during flight, medical aid to a patient ~~providing that~~ when those dangerous goods:

1) have been placed on board with the approval of the operator; or

2) form part of the permanent equipment of the aircraft when it has been adapted for specialized use;

providing that:

1) gas cylinders have been manufactured specifically for the purpose of containing and transporting that particular gas;

2) equipment containing wet cell batteries is kept and, when necessary, secured in an upright position to prevent spillage of the electrolyte;

Note.— For dangerous goods that passengers are permitted to carry as medical aid, see 8;1.1.2.

. . .

1.3 DANGEROUS GOODS PACKAGES OPENED BY CUSTOMS AND OTHER AUTHORITIES

Any package opened during an inspection must, before being forwarded to the consignee, be restored by qualified persons to a condition that complies with these Instructions.

Editorial Note.— Section 1.4 moved to new Chapter 6:

~~**1.4 TRANSPORT OF RADIOACTIVE MATERIAL**~~

~~**1.4.1 General**~~

1.4.1.1 These Instructions establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment that are associated with the transport of radioactive material. These Instructions are based on the IAEA *Regulations for the Safe Transport of Radioactive Material* (ST-1), IAEA, Vienna (1996). Explanatory material on TS-R-1 can be found in *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* (1996 Edition), Safety Standard Series No. ST-2, IAEA, Vienna.

1.4.1.2 The objective of these Instructions is to protect persons, property and the environment from the effects of radiation during the transport of radioactive material. This protection is achieved by requiring:

a) containment of the radioactive contents;

b) control of external radiation levels;

c) prevention of criticality; and

d) prevention of damage caused by heat.

These requirements are satisfied firstly by applying a graded approach to the limits of the contents for packages and aircraft and to the performance standards, which are applied to package designs depending upon the hazard of the radioactive contents. Secondly, they are satisfied by imposing requirements on the design and operation of packages and on the maintenance of the packagings, including consideration of the nature of the radioactive contents. Finally, they are satisfied by requiring administrative controls including, where appropriate, approval by competent authorities.

1.4.1.3 These Instructions apply to the transport of radioactive material by air, including transport that is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with and involved in the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of the radioactive material and packages. A graded approach is applied to the performance standards in these Instructions that is characterized by three general severity levels:

a) routine conditions of transport (incident free);

b) normal conditions of transport (minor mishaps); and

c) accident conditions of transport.

1.4.2 Radiation protection programme

1.4.2.1 The transport of radioactive material must be subject to a radiation protection programme, which must consist of systematic arrangements aimed at providing adequate consideration of radiation protection measures.

1.4.2.2 The nature and extent of the measures to be employed in the programme must be related to the magnitude and likelihood of radiation exposure. The programme must incorporate the requirements in 1.4.2.3 to 1.4.2.5, 7;2.9.1.1; 7;2.9.1.2 and applicable emergency response procedures. Programme documents must be available, on request, for inspection by the relevant competent authority.

≠ 1.4.2.3 Doses to persons must be below the relevant dose limits. Protection and safety must be optimized in order that the magnitude of individual doses, the number of persons exposed, and the likelihood of incurring exposure must be kept as low as reasonably achievable, economic and social factors being taken into account, with the restriction that the doses to individuals be subject to dose constraints. A structured and systematic approach must be adopted and must include consideration of the interfaces between transport and other activities.

≠ 1.4.2.4 Workers must receive appropriate training concerning radiation protection including the precautions to be observed in order to restrict their occupational exposure and the exposure of other persons who might be affected by their actions.

≠ 1.4.2.5 For occupational exposure arising from transport activities, where it is assessed that the effective dose:

a) is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring must be conducted; and

b) is likely to exceed 6 mSv in a year, individual monitoring must be conducted.

When individual monitoring or workplace monitoring is conducted, appropriate records must be kept.

+ *Note.— For occupational exposure arising from transport activities, where it is assessed that the effective dose is most unlikely to exceed 1 mSv in a year, no special work patterns, detailed monitoring, dose assessment programmes or individual record-keeping need be required.*

1.4.3 Quality assurance

Quality assurance programmes based on international, national or other standards acceptable to the competent authority must be established and implemented for the design, manufacture, testing, documentation, use, maintenance and inspection of all special form radioactive material, low dispersible radioactive material and packages, and for transport and in-transit storage operations to ensure compliance with the relevant provisions of these Instructions. Certification that the design specification has been fully implemented must be available to the competent authority. The manufacturer, consignor or user must be prepared to provide facilities for competent authority inspection during manufacture and use and to demonstrate to any cognizant competent authority that:

a) the manufacturing methods and materials used are in accordance with the approved design specifications; and

b) all packagings are periodically inspected and, as necessary, repaired and maintained in good condition so that they continue to comply with all relevant requirements and specifications, even after repeated use.

Where competent authority approval is required, such approval must take into account and be contingent upon the adequacy of the quality assurance programme.

1.4.4 Special arrangement

≠ 1.4.4.1 Special arrangement means those provisions, approved by the competent authority, under which consignments of radioactive material that do not satisfy all the applicable requirements of these Instructions may be transported.

≠ 1.4.4.2 Consignments for which conformity with any provision applicable to Class 7 is impracticable must not be transported except under special arrangement. Provided the competent authority is satisfied that conformity with the Class 7 provisions of these Instructions is impracticable and that the requisite standards of safety established by these Instructions have been demonstrated through alternative means, the competent authority may approve special arrangement transport operations for a single consignment or a planned series of multiple consignments. The overall level of safety in transport must be at least equivalent to that which would be provided if all the applicable requirements had been met. For consignments of this type, multilateral approval must be required.

1.4.5 Non-compliance

In the event of a non-compliance with any limit in these Instructions applicable to radiation level or contamination:

a) the shipper must be informed of the non-compliance by the operator if the non-compliance is identified during transport;

b) the shipper and the operator must be informed of the non-compliance by the consignee if the non-compliance is identified at receipt;

c) the operator, shipper or consignee, as appropriate, must:

i) take immediate steps to mitigate the consequences of the non-compliance;

ii) investigate the non-compliance and its causes, circumstances and consequences;

iii) take appropriate action to remedy the causes and circumstances that led to the non-compliance and to prevent a recurrence of similar circumstances that led to the non-compliance; and

~~iv) communicate to the relevant competent authority(ies) the causes of the non-compliance and corrective or preventative actions taken or to be taken; and~~

~~d) the communication of the non-compliance to the shipper and relevant competent authority(ies), respectively, must be made as soon as practicable and it must be immediate whenever an emergency exposure situation has developed or is developing.~~

~~1.5~~1.4 RELATIONSHIP TO ANNEX 18

ICAO Standards and Recommended Practices related to the transport of dangerous goods are contained in Annex 18 to the Convention on International Civil Aviation. These Instructions contain the detailed technical material needed to support the broad provisions of Annex 18 (with Amendments 1 to 8) in order to provide a fully comprehensive set of international regulations.

~~1.6~~1.5 REQUESTS FOR AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Any request for an amendment to the Technical Instructions must be submitted to the appropriate national authority. Requests for amendments should include the following information:

a) the text or substance of the amendment proposed or identification of the provision the petitioner seeks to have repealed, as appropriate;

b) a statement of the interest of the petitioner in the action requested; and

c) any information and arguments to support the action sought.

Chapter 2

LIMITATION OF DANGEROUS GOODS ON AIRCRAFT

Parts of this Chapter are affected by State Variations CA 5, CA 9, DQ 3, FR 8, GB 5, JP 23, NL 2, US 2, VC 4; see Table A-1

. . .

2.3 ~~DANGEROUS GOODS IN AIRMAIL~~TRANSPORT OF DANGEROUS GOODS BY POST

2.3.1 In accordance with the Universal Postal Union (UPU) Convention, dangerous goods as defined in these Instructions, with the exception of those listed below, are not permitted in~~ the~~ mail. Appropriate ~~N~~national~~ postal~~ authorities should ensure that the provisions~~ of the UPU Convention~~ are complied with in relation to the transport of dangerous goods by air.

2.3.2 The following dangerous goods may be acceptable in mail for air carriage subject to the provisions of the appropriate national~~ postal~~ authorities concerned and these Instructions which relate to such material:

a) patient specimens as defined in 2;6.3.1.4 provided that they are classified, packed and marked as required by 2;6.3.2.3.6;

b) infectious substances assigned to category B (UN 3373) only, when packed in accordance with the requirements of Packing Instruction 650, and solid carbon dioxide (dry ice) when used as a refrigerant for UN 3373; and

c) radioactive material, the activity of which does not exceed one-tenth of that listed in Table 2-~~12~~15.

2.4 DANGEROUS GOODS IN EXCEPTED QUANTITIES

2.4.1 General

Small quantities of dangerous goods meeting the provisions of this paragraph are not subject to the other provisions of these Technical Instructions except for:

a) the prohibition in airmail in 1;2.3;

b) the definitions in 1;3;

c) the classification and packing group criteria in Part 2;

d) the loading restrictions in 7;2.1;

e) the reporting of dangerous goods accidents, incidents and other occurrences in 7;4.4 and 7;4.5;

f) the training requirements in Chapter 4; and

g) in the case of radioactive material, the requirements for radioactive material in excepted packages in~~ 2;7.7.1.2 and 2;7.9.1~~2;7.2.4.1.2.

. . .

Chapter 3

GENERAL INFORMATION

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

3.1 DEFINITIONS

3.1.1 The following is a list of definitions of commonly used terms in these Instructions. Definitions of terms which have their usual dictionary meanings or are used in the common technical sense are not included. Definitions of additional terms used solely in conjunction with radioactive material are contained in 2;~~7.2~~7.1.3.

Aerosols or aerosol dispensers. Non-refillable receptacles meeting the requirements of 6;3.2.7, made of metal, glass or plastic and containing a gas, compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state.

Animal material. Animal carcasses, animal body parts, or animal foodstuffs.

Appropriate national authority. Any authority designated, or otherwise recognized, by a State to perform specific functions related to provisions contained in these Instructions.

Approval. An authorization issued by the appropriate national authority for:

a) transport of those entries listed in Table 3-1 as forbidden on passenger and/or cargo aircraft to which Special Provision A1, A2 or A109 has been assigned in column 7; or

b) other purposes as specified in these Instructions.

Note.— Unless otherwise indicated, approval is only required from the State of Origin.

Insert the following definition (Approval) (moved from current 2;7.2):

Approval: For the transport of Class 7 material:

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

Unilateral approval. The approval of a design which is required to be given by the competent authority of the country of origin of the design only.

End of inserted text.

. . .

Competent authority. Any ~~national~~ body or authority designated or otherwise recognized as such for any purpose in connection with these Instructions.

Note. — This applies to radioactive material only.

Compliance assurance. A systematic programme of measures applied by an appropriate authority which is aimed at ensuring that the provisions of these Instructions are met in practice.

Composite packagings. Packagings consisting of an outer packaging and an inner receptacle so constructed that the inner receptacle and the outer packaging form an integral packaging. Once assembled, it remains thereafter an integrated single unit; it is filled, stored, transported and emptied as such.

Note.— Composite packagings for the purpose of these Instructions are regarded as single packagings.

Insert the following two definitions (confinement and containment systems) (moved from current 2;7.2):

Confinement system. For the transport of Class 7 material, ~~T~~the assembly of fissile material and packaging components specified by the designer and agreed to by the competent authority as intended to preserve criticality safety.

Containment system. For the transport of Class 7 material, ~~T~~the assembly of components of the packaging specified by the designer as intended to retain the radioactive material during transport.

End of inserted text.

. . .

Critical temperature. The temperature above which the substance cannot exist in the liquid state.

Insert the following definition (Criticality safety index) (moved from current 2;7.2):

Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material. For the transport of Class 7 material, ~~A~~a number which is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material.

End of inserted text.

. . .

Dangerous goods security. Measures or precautions to be taken by operators**,** shippers and others involved in the transport of dangerous goods aboard aircraft to minimize theft or misuse of dangerous goods that may endanger persons or property.

Insert the following definion (Design) (moved from current 2;7.2):

Design. For the transport of Class 7 material, ~~T~~the description of special form radioactive material, low dispersible radioactive material, package or packaging which enables such items to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.

End of inserted text.

. . .

Exception. A provision in these Instructions which excludes a specific item of dangerous goods from the requirements normally applicable to that item.

Insert the following definion (Exclusive use) (moved from current 2;7.2):

Exclusive use. For the transport of Class 7 material, ~~T~~the sole use, by a single ~~consignor~~ shipper, of an aircraft or of a large freight container, in respect of which all initial, intermediate and final loading and unloading is carried out in accordance with the directions of the ~~consignor~~ shipper or consignee.

End of inserted text.

. . .

Freight container. See unit load device.

Note.— For the definition of freight container for radioactive material, see 2;~~7.2~~7.1.3.

. . .

Maximum net mass. The maximum net mass of contents in a single packaging or maximum combined mass of inner packagings and the contents thereof expressed in kilograms.

Insert the following definition (Maximum normal operating pressure) (moved from current 2;7.2):

Maximum normal operating pressure. For the transport of Class 7 material, ~~T~~the maximum pressure above atmospheric pressure at mean sea level that would develop in the containment system in a period of one year under the conditions of temperature and solar radiation corresponding to environmental conditions in the absence of venting, external cooling by an ancillary system, or operational controls during transport.

End of inserted text.

. . .

Package. The complete product of the packing operation, consisting of the packaging and its contents prepared for transport.

~~*Note. — For radioactive material, see 2;7.2.*~~

Packaging. One or more ~~R~~receptacles and any other components or materials necessary for the receptacles to perform ~~its~~ their containment and other safety functions.

Note.— For radioactive material, see 2;~~7.2~~7.1.3.

. . .

Quality assurance. A systematic programme of controls and inspections applied by any organization or body which is aimed at providing adequate confidence that the standard of safety prescribed by these Instructions is achieved in practice.

Insert the following two definitions (radiation level and radioactive contents) (moved from current 2;7.2):

Radiation level. For the transport of Class 7 material, ~~T~~the corresponding dose rate expressed in millisieverts per hour.

Radioactive contents. For the transport of Class 7 material, ~~T~~the radioactive material together with any contaminated or activated solids, liquids, and gases within the packaging.

End of inserted text.

. . .

Recycled plastic material. Material recovered from used industrial packagings that has been cleaned and prepared for processing into new packagings. The specific properties of the recycled material used for production of new packagings must be assured and documented regularly as part of a quality assurance programme recognized by the appropriate national authority. The quality assurance programme must include a record of proper pre-sorting and verification that each batch of recycled plastic material has the proper melt flow rate, density, and tensile yield strength, consistent with that of the design type manufactured from such recycled material. This necessarily includes knowledge about the packaging material from which the recycled plastic has been derived, as well as awareness of the prior contents of those packagings if those prior contents might reduce the capability of new packagings produced using that material. In addition, the packaging manufacturer's quality assurance programme must include performance of the mechanical design type test in Part 6, Chapter 4 on packagings manufactured from each batch of recycled plastic material. In this

testing, stacking performance may be verified by appropriate dynamic compression testing rather than static load testing.

Note.— ISO 16103:2005 "Packaging — Transport packages for dangerous goods — Recycled plastics material", provides additional guidance on procedures to be followed in approving the use of recycled plastics material.

. . .

Test pressure. The required pressure applied during a pressure test for qualification or re-qualification.

Insert the following definition (Transport index assigned to a package, overpack or freight container) (moved from current 2;7.2):

Transport index (TI) assigned to a package, overpack or freight container. For the transport of Class 7 material, ~~A~~a number which is used to provide control over radiation exposure.

End of inserted text.

UNECE. The United Nations Economic Commission for Europe (UNECE, Palais des Nations, 8-14 avenue de la Paix, CH-1211Geneva 10, Switzerland)

Unit load device. Any type of freight container, aircraft container, aircraft pallet with a net or aircraft pallet with a net over an igloo.

Note 1.— An overpack is not included in this definition.

Note 2.— A freight container for radioactive material is not included in this definition (see 2;~~7.2~~7.1.3).

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Chapter 4

TRAINING

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4.2 TRAINING CURRICULA

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4.2.3 Recurrent training must take place within 24 months of previous training to ensure knowledge is current. However, if recurrent training is completed within the final 3 months of validity of previous training, the period of validity extends from the date on which the recurrent training was completed until 24 months from the expiry date of that previous training.

. . .

4.2.5 A record of training must be maintained which must include:

a) the individual's name;

b) the most recent training completion date;

c) a description, copy or reference to training materials used to meet the training requirements;

d) the name and address of the organization providing the training; and

e) evidence which shows that a test has been completed satisfactorily.

The records of training must be retained for a minimum period of thirty-six months from the most recent training completion date and must be made available upon request to the appropriate national authority.

4.2.6 The subject matter relating to dangerous goods transport with which various categories of personnel should be familiar is indicated in Table 1-4.

4.2.7 Staff of operators not carrying dangerous goods as cargo must be trained commensurate with their responsibilities. The subject matter to which their various categories of staff should be familiar with is indicated in Table 1-5.

Table 1-4. Content of training courses for operators carrying dangerous goods as cargo

Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum	*Shippers and packers*		*Freight forwarders*			*Operators and ground handling agents*						Security ~~screeners~~ staff
	1	2	3	4	5	6	7	8	9	10	11	12
General philosophy	x	x	x	x	x	x	x	x	x	x	x	x
Limitations	x		x	x	x	x	x	x	x	x	x	x
General requirements for shippers	x		x			x						
Classification	x	x	x			x						x
List of dangerous goods	x	x	x			x				x		
Packing requirements	x	x	x			x						
Labelling and marking	x	x	x	x	x	x	x	x	x	x	x	x
Dangerous goods transport document and other relevant documentation	x		x	x		x	x					
Acceptance procedures						x						
Recognition of undeclared dangerous goods	x	x	x	x	x	x	x	x	x	x	x	x
Storage and loading procedures					x	x		x		x		
Pilots' notification						x		x		x		
Provisions for passengers and crew	x	x	x	x	x	x	x	x	x	x	x	x
Emergency procedures	x	x	x	x	x	x	x	x	x	x	x	x

KEY

. . .

8 — Operator's and ground handling agent's staff ~~responsible for~~ involved in the handling, storage and loading of cargo, mail or stores and baggage

. . .

12 — Security staff who ~~deal~~ are involved with the screening of passengers and their baggage and cargo, mail ~~or~~ and stores, e.g. security screeners, their supervisors and staff involved in implementing security procedures

Table 1-5 Content of training courses for operators not carrying dangerous goods as cargo

Contents	7	8	9	10	11
General Philosophy	X	X	X	X	X
Limitations	X	X	X	X	X
Labelling and marking	X	X	X	X	X
Dangerous goods transport document and other relevant documentation	X				
Recognition of undeclared dangerous goods	X	X	X	X	X
Provisions for passengers and crew	X	X	X	X	X
Emergency procedures	X	X	X	X	X

Key

7 — Operator's and ground handling agent's staff accepting cargo, mail or stores (other than dangerous goods)
8 — Operator's and ground handling agent's staff involved in the handling, storage and loading of cargo, mail or stores (other than dangerous goods) and baggage
9 — Passenger handling staff
10 — Flight crewmembers and load planners
11 — Crew members (other than flight crew members)

Note 1. — Depending on the responsibilities of the person, the aspects of training to be covered may vary from those shown in the tables. For example, in respect of classification, staff involved in implementing security procedures (e.g. screeners and their supervisors) need only be trained in the general properties of dangerous goods.

Note 2. — The categories of personnel identified in Table 1-4 and 1-5 are not all encompassing. Personnel employed by or interacting with the aviation industry in areas such as passenger and cargo reservation centres, and engineering and maintenance, except when acting in a capacity identified in Table 1-4 or 1-5, should be provided with dangerous goods training in accordance with 4.2.

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Chapter 5

DANGEROUS GOODS SECURITY

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Table 1-~~5~~6. Indicative list of high consequence dangerous goods

Class 1 Division 1.1 explosives
Class 1 Division 1.2 explosives
Class 1 Division 1.3 compatibility group C explosives
Class 1 Division 1.4 UN Nos. 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456 and 0500
Class 1 Division 1.5 explosives
Division 2.3 toxic gases (excluding aerosols)
Class 3 desensitized explosives
Division 4.1 desensitized explosives

Division 6.1 substances of Packing Group 1; except when transported under the excepted quantity provisions in 2.4

Division 6.2 infectious substances of Category A (UN Nos. 2814 and 2900)

Class 7 radioactive materials in quantities greater than 3000 A_1 (special form) or 3000 A_2, as applicable in Type B and Type C packages.

Insert new Chapter 6

Editorial Note.— This new chapter consolidates material concerning Class 7 from Part 1, Chapter 3 and Part 2, Chapter 7 of the 2007-2008 Edition of the TIs.

Chapter 6

GENERAL PROVISIONS CONCERNING CLASS 7

Parts of this Chapter are affected by State Variations …

~~**1.4 TRANSPORT OF RADIOACTIVE MATERIAL**~~

~~**1.4.1**~~6.1 ~~**General**~~Scope and application

~~1.4.1.1~~6.1.1 These Instructions establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment that are associated with the transport of radioactive material. These Instructions are based on the IAEA *Regulations for the Safe Transport of Radioactive Material* ~~(ST-1)~~, (2005 Edition), Safety Standards Series No. TS-R-1, IAEA, Vienna (~~1996~~2005). Explanatory material on the 1996 edition of TS-R-1 can be found in *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* ~~(1996 Edition)~~, Safety Standard Series No. TS-G-1.1 (ST-2), IAEA, Vienna (2002).

~~1.4~~.6.1.2 The objective of these Instructions is to protect persons, property and the environment from the effects of radiation during the transport of radioactive material. This protection is achieved by requiring:

a) containment of the radioactive contents;

b) control of external radiation levels;

c) prevention of criticality; and

d) prevention of damage caused by heat.

These requirements are satisfied firstly by applying a graded approach to the limits of the contents for packages and aircraft and to the performance standards, which are applied to package designs depending upon the hazard of the radioactive contents. Secondly, they are satisfied by imposing requirements on the design and operation of packages and on the maintenance of the packagings, including consideration of the nature of the radioactive contents. Finally, they are satisfied by requiring administrative controls including, where appropriate, approval by competent authorities.

~~1.4~~.6.1.3 These Instructions apply to the transport of radioactive material by air, including transport that is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with and

involved in the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of the radioactive material and packages. A graded approach is applied to the performance standards in these Instructions that is characterized by three general severity levels:

a) routine conditions of transport (incident free);

b) normal conditions of transport (minor mishaps); and

c) accident conditions of transport.

Editorial Note.— The following is moved from Part 2, Chapter 7.

~~7.1.2~~6.1.4 The~~se following radioactive materials are not included in Class 7 for the purposes of these~~ Instructions do not apply to:

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

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

c) natural material and ores containing naturally occurring radionuclides which are either in their natural state or have only been processed for purposes other than for extraction of the radionuclides, and are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in ~~7.7.2.1 b)~~2;7.2.2.1 b) or calculated in accordance with ~~7.7.2.2~~2;7.2.2.2 to ~~7.7.2.6~~7.2.2.6;

d) non-radioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the limit specified in the definition of contamination in ~~7.2~~2;7.1.

6.1.5 *Specific provisions for the transport of excepted packages*

~~7.9.1~~6.1.5.1 Excepted packages which ~~may~~ contain radioactive material in limited quantities, instruments, manufactured articles and empty packages as specified in 2;7.2.4.1.2 ~~7.7.1.2 and empty packagings as specified in 7.9.6 may be transported under the following conditions~~ may be subject only to the following provisions of Parts 5 to 7:

a) the applicable ~~requirements~~ provisions specified in ~~2; Introductory Chapter, 4.2, 2;7.9.2, and, as applicable, 2;7.9.3 to 2;7.9.6, 4;9.1.2, 5;2.4.2, 5;2.4.5 a) and e); 5;3.2.11 e), 5;4.4, 7;3.2.2 and 7;4.4~~ 5;2.4.10, 5;1.6.3, 5;1.7, 5;2.4.1, 5;2.2.2, 5.2.1.5.1 to 5.2.1.5.3, 5;3.2.11 b), 5;3.4, 5;4.1.4.1 a) and 7;3.2.2;

b) the requirements for excepted packages specified in 6;7.3; and

c) if the excepted package contains fissile material, one of the fissile exceptions provided by ~~6;7.10.2~~2;7.2.3.5 must apply and the requirement of 6;7.6.2 must be met~~; and~~.

~~d) the requirements in 1;2.3, if transported by post.~~

6.1.5.2 Excepted packages must be subject to the relevant provisions of all other parts of these Instructions.

Editorial Note.— The following is moved from Part 1, Chapter 1.

~~1.4.2~~6.2 Radiation protection programme

~~1.4.2.1~~6.2.1 The transport of radioactive material must be subject to a radiation protection programme, which must consist of systematic arrangements aimed at providing adequate consideration of radiation protection measures.

~~1.4.2.3~~6.2.2 ~~Doses to persons must be below the relevant dose limits.~~ Protection and safety must be optimized in order that the magnitude of individual doses, the number of persons exposed, and the likelihood of incurring exposure must be kept as low as reasonably achievable, economic and social factors being taken into account, and doses to persons must be below the relevant dose limits~~, with the restriction that the doses to individuals be subject to dose constraints~~. A structured and systematic approach must be adopted and must include consideration of the interfaces between transport and other activities.

~~1.4.2.2~~6.2.3 The nature and extent of the measures to be employed in the programme must be related to the magnitude and likelihood of radiation exposure. The programme must incorporate the requirements in 1.~~4.2.3~~6.2.2, 1.6.2.4 to 1.~~4.2.5~~6.2.7~~, 7;2.9.1.1; 7;2.9.1.2 and applicable emergency response procedures~~. Programme documents must be available, on request, for inspection by the relevant competent authority.

~~1.4.2.5~~6.2.4 For occupational exposure arising from transport activities, where it is assessed that the effective dose:

a) is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring must be conducted; and

b) is likely to exceed 6 mSv in a year, individual monitoring must be conducted.

When individual monitoring or workplace monitoring is conducted, appropriate records must be kept.

Note.— For occupational exposure arising from transport activities, where it is assessed that the effective dose is most unlikely to exceed 1 mSv in a year, no special work patterns, detailed monitoring, dose assessment programmes or individual record-keeping need be required.

6.2.5 In the event of accidents or incidents during the transport of radioactive material, emergency provisions, as established by relevant national and/or international organizations, must be observed to protect persons, property and the environment. Appropriate guidelines for such provisions are contained in "Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material", Safety Standard Series No. TS-G-1.2 (ST-3), IAEA, Vienna (2002).

6.2.6 Emergency procedures must take into account the formation of other dangerous substances that may result from the reaction between the contents of a consignment and the environment in the event of an accident.

~~1.4.2.4~~6.2.7 Workers must receive appropriate training concerning the radiation ~~protection~~hazards involved ~~including~~ and the precautions to be observed in order to ensure restriction of their ~~occupational~~ exposure and ~~the exposure~~ that of other persons who might be affected by their actions.

~~1.4.3~~6.3 Quality assurance

Quality assurance programmes based on international, national or other standards acceptable to the competent authority must be established and implemented for the design, manufacture, testing, documentation, use, maintenance and inspection of all special form radioactive material, low dispersible radioactive material and packages, and for transport and in-transit storage operations to ensure compliance with the relevant provisions of these Instructions. Certification that the design specification has been fully implemented must be available to the competent authority. The manufacturer, ~~consignor~~ shipper or user must be prepared to provide facilities for competent authority inspection during manufacture and use and to demonstrate to any cognizant competent authority that:

a) the manufacturing methods and materials used are in accordance with the approved design specifications; and

b) all packagings are periodically inspected and, as necessary, repaired and maintained in good condition so that they continue to comply with all relevant requirements and specifications, even after repeated use.

Where competent authority approval is required, such approval must take into account and be contingent upon the adequacy of the quality assurance programme.

~~1.4.4~~6.4 Special arrangement

~~1.4.4.1~~6.4.1 Special arrangement means those provisions, approved by the competent authority, under which consignments ~~of radioactive material that~~ which do not satisfy all the ~~applicable~~ requirements of these Instructions applicable to radioactive material may be transported.

~~1.4.4.2~~6.4.2 Consignments for which conformity with any provision applicable to Class 7 is impracticable must not be transported except under special arrangement. Provided the competent authority is satisfied that conformity with the Class 7 provisions of these Instructions is impracticable and that the requisite standards of safety established by these Instructions have been demonstrated through alternative means, the competent authority may approve special arrangement transport operations for a single consignment or a planned series of multiple consignments. The overall level of safety in transport

must be at least equivalent to that which would be provided if all the applicable requirements had been met. For international consignments of this type, multilateral approval must be required.

6.5 Radioactive material possessing other dangerous properties

6.5.1 In addition to the radioactive and fissile properties, any subsidiary risk of the contents of a package, such as explosiveness, flammability, pyrophoricity, chemical toxicity and corrosiveness, must also be taken into account in the documentation, packing, labelling, marking, placarding, stowage, segregation and transport, in order to be in compliance with all relevant provisions for dangerous goods of these Instructions.

~~1.4.5~~6.6 Non-compliance

In the event of a non-compliance with any limit in these Instructions applicable to radiation level or contamination:

a) the shipper must be informed of the non-compliance by the operator if the non-compliance is identified during transport; or

b) the shipper and the operator must be informed of the non-compliance by the consignee if the non-compliance is identified at receipt;

c) the operator, shipper or consignee, as appropriate, must:

   i) take immediate steps to mitigate the consequences of the non-compliance;

   ii) investigate the non-compliance and its causes, circumstances and consequences;

   iii) take appropriate action to remedy the causes and circumstances that led to the non-compliance and to prevent a recurrence of similar circumstances that led to the non-compliance; and

   iv) communicate to the relevant competent authority(ies) the causes of the non-compliance and corrective or preventative actions taken or to be taken; and

d) the communication of the non-compliance to the shipper and relevant competent authority(ies), respectively, must be made as soon as practicable and it must be immediate whenever an emergency exposure situation has developed or is developing.

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Part 2

CLASSIFICATION OF DANGEROUS GOODS

Chapter 2

CLASS 2 — GASES

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2.1 DEFINITIONS AND GENERAL PROVISIONS

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2.1.3 This class comprises compressed gases; liquefied gases; dissolved gases; refrigerated liquefied gases; mixtures of one or more gases with one or more vapours of substances of other classes; articles charged with a gas; and aerosols. (For aerosols, see 1;3.1).

Note 1.— Carbonated beverages and inflated balls used for sports are not subject to these Instructions.

Note 2.—"Cryogenic liquid" means the same as "refrigerated liquefied gas".

2.2 DIVISIONS

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

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

a) Division 2.1 — Flammable gases.

. . .

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

Gases which:

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

ii) are oxidizing — gases which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. The oxidizing ability must be determined by tests or by calculation in accordance with methods adopted by ISO (see ISO 10156:1996 and ISO 10156-2:2005); or

. . .

2.2.2 Gases of Division 2.2~~, other than refrigerated liquefied gases,~~ are not subject to these Instructions if they are transported at a pressure less than ~~280~~ 200 kPa at 20°C and are not liquefied or refrigerated liquefied gases.

. . .

2.4 MIXTURES OF GASES

For the classification of gas mixtures into one of the three divisions (including vapours of substance from other classes), the following principles must be used:

. . .

d) Oxidizing ability is determined either by tests or by calculation methods adopted by the International Standards Organization (see ISO 10156:1996 and ISO 10156-2:2005).

. . .

Chapter 3

CLASS 3 — FLAMMABLE LIQUIDS

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3.1 DEFINITION AND GENERAL PROVISIONS

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

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

b) their fire point according to ISO 2592:~~1973~~2000 is greater than 100°C; or

Chapter 4

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

. . .

4.2.4 Division 4.1 — Solid desensitized explosives

4.2.4.1 *Definition*

Solid desensitized explosives are explosive substances which are wetted with water or alcohols or are diluted with other substances to form a homogeneous solid mixture to suppress their explosive properties. Entries in the Dangerous Goods List for solid desensitized explosives are UN 1310, 1320, 1321, 1322, 1336, 1337, 1344, 1347, 1348, 1349, 1354, 1355, 1356, 1357, 1517, 1571, 2555, 2556, 2557, 2852, 2907, 3317, 3319, 3344, 3364, 3365, 3366, 3367, 3368, 3369, 3370, 3376, ~~and~~ UN 3380 and UN 3474.

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Chapter 5

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

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Table 2-7. List of currently assigned organic peroxides in packages

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

Organic peroxide	Concentration (per cent)	Diluent type A (per cent)	Diluent type B (per cent) (Note 1)	Inert solid (per cent)	Water (per cent)	Control tempera-ture (°C)	Emergency tempera-ture (°C)	UN generic entry	Notes
. . .									
tert-Amyl peroxyneodecanoate	≤47	≥53				0	+10	3119	
. . .									
tert-Butyl peroxy-3,5,5- trimethylhexanoate	≤42			≥58				3106	
. . .									
Cumyl peroxyneodecanoate	≤87	≥13				–10	0	3115	
. . .									

Editorial Note.— The hyphen before “butane” is deleted:

2,2-Di-(tert-amylperoxy)-butane	≤57	≥43						3105	
1,1-Di-(tert-butylperoxy)cyclohexane	≤72		≥28					3103	30)
. . .									
1,1-Di-(tert-butylperoxy)cyclohexane + tert-butyl peroxy-2-ethylhexanoate	≤43+≤16	≥41						3105	
. . .									
1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	≤90		≥10					3103	30)
. . .									
Dicumyl peroxide	>52-100			~~≤57~~				3110	12
. . .									
Di-2,4-dichlorobenzoyl peroxide	≤52 as a paste					+20	+25	3118	
. . .									
Di-(2-ethylhexyl)peroxydicarbonate	≤62 as a stable dispersion in water					–15	–5	~~3117~~3119	
~~Di-(2-ethylhexyl)peroxydicarbonate~~	~~≤52 as a stable dispersion in water~~					~~–15~~	~~–5~~	~~3119~~	
. . .									

Organic peroxide	Concentration (per cent)	Diluent type A (per cent)	Diluent type B (per cent) (Note 1)	Inert solid (per cent)	Water (per cent)	Control tempera-ture (°C)	Emergency tempera-ture (°C)	UN generic entry	Notes
3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate	≤77	≥23				–5	+5	3115	
3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate	≤52 as a stable dispersion in water					–5	+5	3119	
3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate	≤52	≥48				–5	+5	3117	
. . .									
Methyl isopropyl ketone peroxide(s)	see remark 31)	≥70						3109	31
. . .									
3,3,5,7,7-pentamethyl-1,2,4-trioxepane	≤100							3107	
. . .									

Notes:

. . .

30) Diluent type B with boiling point > 130°C.
31) Active oxygen ≤ 6.7 per cent.

Chapter 6

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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6.3.2 Classification of infectious substances

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6.3.2.3 *Exceptions*

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6.3.2.3.6 Patient specimens for which there is minimal likelihood that pathogens are present are not subject to these Instructions if the specimen is transported in a packaging which will prevent any leakage and which is marked with the words “Exempt human specimen” or “Exempt animal specimen”, as appropriate. The packaging must meet the following conditions:

. . .

c) When multiple fragile primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated to prevent contact between them.

Note.— In determining whether a patient specimen has a minimum likelihood that pathogens are present, an element of professional judgement is required to determine if a substance is exempt under this paragraph. That judgement should be based on the known medical history, symptoms and individual circumstances of the source, human or animal, and endemic local conditions. Examples of specimens which may be transported under this paragraph include blood or urine tests to monitor cholesterol levels, blood glucose levels, hormone levels, or prostate specific antibodies (PSA); tests required to monitor organ function such as heart, liver or kidney function for humans or animals with non-infectious diseases, or therapeutic drug monitoring; tests conducted for insurance or employment purposes and are intended to determine the presence of drugs or alcohol; pregnancy tests; biopsies to detect cancer; and antibody detection in humans or animals in the absence of any concern for infection (e.g. evaluation of vaccine induced immunity, diagnosis of autoimmune disease, etc.).

. . .

6.3.5 Medical or clinical wastes

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

6.3.5.2 Medical or clinical wastes that are reasonably believed to have a low probability of containing infectious substances must be assigned to UN 3291. For the assignment, international, regional or national waste catalogues may be taken into account.

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

. . .

6.3.6.3 Animal ~~carcasses~~ material affected by pathogens of Category A or which would be assigned to Category A in cultures only, must be assigned to UN 2814 or UN 2900 as appropriate. ~~Other animal carcasses affected by pathogens included in Category B must be transported in accordance with provisions determined by the competent authority.~~

. . .

Chapter 7

CLASS 7 — RADIOACTIVE MATERIAL

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

Note.— For Class 7, the type of packaging may have a decisive effect on classification.

7.1 DEFINITION~~S OF CLASS 7~~

7.1.1 *Radioactive material*, ~~means a~~Any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in ~~7.7.2.1~~ 7.2.2.1 to ~~7.7.2.6~~ 7.2.2.6.

Editorial Note.— The following contamination definitions are moved from current paragraph 7.2:

7.1.2 *Contamination*

Contamination. The presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm^2 for all other alpha emitters.

Non-fixed contamination. Contamination that can be removed from a surface during routine conditions of transport.

Fixed contamination. Contamination other than non-fixed contamination.

Editorial Note.— The following paragraphs are moved to new Chapter 1;6:

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

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

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

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

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

~~7.2~~7.1.3 Definitions of specific terms

A_1 and *A_2:*

A_1. The activity value of special form radioactive material, which is listed in Table 2-~~13~~12 or derived in ~~2;7.7.2~~7.2.2.2 and is used to determine the activity limits for the requirements of these Instructions.

A_2. The activity value of radioactive material, other than special form radioactive material, which is listed in Table 2-~~13~~12 or derived in 2;~~7.7.2~~7.2.2.2 and is used to determine the activity limits for the requirements of these Instructions.

Editorial Note.— Definitions for approval, confinement system and containment system below are moved to 1;3.1:

~~*Approval:*~~

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

~~*Unilateral approval.* The approval of a design which is required to be given by the competent authority of the country of origin of the design only.~~

~~*Confinement system*. The assembly of fissile material and packaging components specified by the designer and agreed to by the competent authority as intended to preserve criticality safety.~~

~~*Containment system*. The assembly of components of the packaging specified by the designer as intended to retain the radioactive material during transport.~~

Editorial Note.— The following Contamination definitions are moved to 7.1.3:

~~*Contamination:*~~

~~*Contamination*. The presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm^2 for all other alpha emitters.~~

~~*Non-fixed contamination*. Contamination that can be removed from a surface during routine conditions of transport.~~

~~*Fixed contamination*. Contamination other than non-fixed contamination.~~

Editorial Note.— The following 3 definitions are moved to 1;3.1:

~~*Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material.* A number which is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material.~~

~~*Design*. The description of special form radioactive material, low dispersible radioactive material, package or packaging which enables such items to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.~~

~~*Exclusive use*. The sole use, by a single consignor, of an aircraft or of a large freight container, in respect of which all initial, intermediate and final loading and unloading is carried out in accordance with the directions of the consignor or consignee.~~

Fissile material. Uranium-233, uranium-235, plutonium-239, plutonium-241, or any combination of these radionuclides. Excepted from this definition are:

a) natural uranium or depleted uranium which is unirradiated; and

b) natural uranium or depleted uranium which has been irradiated in thermal reactors only.

Freight container in the case of radioactive material transport. An article of transport equipment designed to facilitate the transport of packaged goods by one or more modes of transport without intermediate reloading, which is of a permanent enclosed character, rigid and strong enough for repeated use, and must be fitted with devices facilitating its handling, particularly in transfer between aircraft and from one mode of transport to another. A small freight container is that which has either an overall outer dimension less than 1.5 m, or an internal volume of not more than 3 m^3. Any other freight container is considered to be a large freight container. For the transport of Class 7 material, a freight container may be used as a packaging.

Low dispersible radioactive material. A solid radioactive material or a solid radioactive material in a sealed capsule, that has limited dispersibility and is not in powder form.

Editorial Note.— The definition below is from current paragraph 7.3.1:

Low specific activity (LSA) material. ~~See 7.3.~~ Radioactive material which by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply. External shielding materials surrounding the LSA material must not be considered in determining the estimated average specific activity.

Low toxicity alpha emitters. Natural uranium; depleted uranium; natural thorium; uranium-235 or uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical and chemical concentrates; or alpha emitters with a half-life of less than 10 days.

Editorial Note.— The following definition is moved to 1;3.1:

~~*Maximum normal operating pressure*. The maximum pressure above atmospheric pressure at mean sea level that would develop in the containment system in a period of one year under the conditions of temperature and solar radiation corresponding to environmental conditions in the absence of venting, external cooling by an ancillary system, or operational controls during transport.~~

Editorial Note.— The following definition is moved to 4;9.1.1:

~~*Package in the case of radioactive material*. The packaging with its radioactive contents as presented for transport. The types of packages covered by these Instructions, which are subject to the activity limits and material restrictions of 7.7 and meet the corresponding requirements, are:~~

~~a) Excepted package;~~

~~b) Industrial package Type 1 (Type IP-1 package);~~

~~c) Industrial package Type 2 (Type IP-2 package);~~

~~d) Industrial package Type 3 (Type IP-3 package);~~

~~e) Type A package;~~

~~f) Type B(U) package;~~

~~g) Type B(M) package;~~

~~h) Type C package.~~

~~Packages containing fissile material or uranium hexafluoride are subject to additional requirements.~~

~~*Note. — For packages for other dangerous goods, see the definitions under 1;3.1.1.*~~

Packaging in the case of radioactive material. The assembly of components necessary to enclose the radioactive contents completely. It may, in particular, consist of one or more receptacles, absorbent materials, spacing structures, radiation shielding and service equipment for filling, emptying, venting and pressure relief; devices for cooling, absorbing mechanical shocks, handling and tie-down, thermal insulation; and service devices integral to the package. The packaging may be a box, drum or similar receptacle, or may also be a freight container.

Note.— For packagings for other dangerous goods, see definitions under 1;3.1.1.

Editorial Note.— The following definition is moved to 1;3.1 (radiation level and radioactive contents):

~~*Radiation level.* The corresponding dose rate expressed in millisieverts per hour.~~

~~*Radioactive contents.* The radioactive material together with any contaminated or activated solids, liquids, and gases within the packaging.~~

Editorial Note.— The following definition is moved from current 7.4:

Special form radioactive material. ~~See 7.4.1.~~Either:

a) an indispersible solid radioactive material; or

b) a sealed capsule containing radioactive material.

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

Editorial Note.— The following definition is from current 7.5:

Surface contaminated object (SCO). ~~See 7.5.~~A solid object which is not itself radioactive but which has radioactive material distributed on its surfaces.

Transport index (TI) assigned to a package, overpack or freight container, or to unpackaged LSA-I or SCO-I. A number which is used to provide control over radiation exposure.

Unirradiated thorium. Thorium containing not more than 10^{-7} g of uranium-233 per gram of thorium-232.

Unirradiated uranium. Uranium containing not more than 2×10^{3} Bq of plutonium per gram of uranium-235, not more than 9×10^{6} Bq of fission products per gram of uranium-235 and not more than 5×10^{-3} g of uranium-236 per gram of uranium-235.

Uranium — natural, depleted, enriched:

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

Depleted uranium. Uranium containing a lesser mass percentage of uranium-235 than in natural uranium.

Enriched uranium. Uranium containing a greater mass percentage of uranium-235 than 0.72 per cent. In all cases, a very small mass percentage of uranium-234 is present.

7.2 CLASSIFICATION

7.2.1 General provisions

7.2.1.1 Radioactive material must be assigned to one of the UN numbers specified in Table 2-11 depending on the activity level of the radionuclides contained in a package, the fissile or non-fissile properties of these radionuclides, the type of package to be presented for transport and the nature or form of the contents of the package, or special arrangements governing the transport operation, in accordance with the provisions laid down in 7.2.2 to 7.2.5.

Table 2-11. Assignment of UN numbers

UN Number	*Name*
Excepted packages (1;6.1.5)	
UN 2908	**Radioactive material, excepted package — empty packaging**
UN 2909	**Radioactive material, excepted package — articles manufactured from natural uranium** or **depleted uranium** or **natural thorium**
UN 2910	**Radioactive material, excepted package — limited quantity of material**
UN 2911	**Radioactive material, excepted package — instruments** or **articles**
Low specific activity radioactive material (7.2.3.1)	
UN 2912	**Radioactive material, low specific activity (LSA-I)**, non-fissile or fissile excepted
UN 3321	**Radioactive material, low specific activity (LSA-II)**, non-fissile or fissile excepted
UN 3322	**Radioactive material, low specific activity (LSA-III)**, non-fissile or fissile excepted
UN 3324	**Radioactive material, low specific activity (LSA-II) fissile**
UN 3325	**Radioactive material, low specific activity (LSA-III) fissile**
Surface contaminated objects (7.2.3.2)	
UN 2913	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II)**, non-fissile or fissile excepted
UN 3326	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II), fissile**
Type A packages (7.2.4.4)	
UN 2915	**Radioactive material, Type A package**, non-special form, non-fissile or fissile excepted
UN 3327	**Radioactive material, Type A package, fissile**, non-special form
UN 3332	**Radioactive material, Type A package, special form**, non-fissile or fissile excepted
UN 3333	**Radioactive material, Type A package, special form, fissile**
Type B(U) package (7.2.4.6)	
UN 2916	**Radioactive material, Type B(U) package**, non-fissile or fissile excepted
UN 3328	**Radioactive material, Type B(U) package, fissile**

UN Number	*Name*
Type B(M) package (7.2.4.6)	
UN 2917	**Radioactive material, Type B(M) package**, non-fissile or fissile excepted
UN 3329	**Radioactive material, Type B(M) package, fissile**
Type C package (7.2.4.6)	
UN 3323	**Radioactive material, Type C package**, non-fissile or fissile excepted
UN 3330	**Radioactive material, Type C package, fissile**
Special arrangement (7.2.5)	
UN 2919	**Radioactive material, transported under special arrangement**, non-fissile or fissile excepted
UN 3331	**Radioactive material, transported under special arrangement, fissile**
Uranium hexafluoride (7.2.4.5)	
UN 2977	**Radioactive material, uranium hexafluoride, fissile**
UN 2978	**Radioactive material, uranium hexafluoride**, non-fissile or fissile excepted

Editorial Note.— Paragraph 7.3 below is moved to 7.2.3 (paragraph 7.3.1 is moved to 7.1.3):

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

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

~~7.3.2 LSA material must be in one of three groups:~~

~~a) LSA-I~~

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

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

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

~~iv) other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the values for activity concentration specified in 7.7.2.1 to 7.7.2.6, excluding fissile material in quantities not excepted under 6;7.10.2.~~

~~b) LSA-II~~

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

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

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

i) the radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.);

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

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

7.3.3 LSA-III material must be a solid of such a nature that if the entire contents of a package were subjected to the test specified in 7.3.4, the activity in the water would not exceed 0.1 A_2.

7.3.4 LSA-III material must be tested as follows:

A solid material sample representing the entire contents of the package must be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test must be sufficient to ensure that at the end of the 7-day test period, the free volume of the unabsorbed and unreacted water remaining must be at least 10 per cent of the volume of the solid test sample itself. The water must have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20°C. The total activity of the free volume of water must be measured following the 7-day immersion of the test sample.

7.3.5 Demonstration of compliance with the performance standards in 7.3.4 must be in accordance with 6;7.11.1 and 6;7.11.2.

Editorial Note.— Paragraph 7.4 below is moved to 7.2.3.3 (paragraph 7.4.1 is moved to 7.1.3):

7.4 REQUIREMENTS FOR SPECIAL FORM RADIOACTIVE MATERIAL

7.4.1 *Special form radioactive material* means either:

a) an indispersible solid radioactive material; or

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

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

7.4.2 Special form radioactive material must be of such a nature or must be so designed that if it is subjected to the tests specified in 7.4.4 to 7.4.8, it must meet the following requirements:

a) it would not break or shatter under the impact, percussion and bending tests specified in 7.4.5 a), b), c) or 7.4.6 a), as applicable;

b) it would not melt or disperse in the applicable heat test specified in 7.4.5 d) or 7.4.6 b), as applicable; and

c) the activity in the water from the leaching tests specified in 7.4.7 and 7.4.8 would not exceed 2 kBq; or alternatively for sealed sources, the leakage rate for the volumetric leakage assessment test specified in ISO 9978:1992 "Radiation Protection — Sealed Radioactive Sources — Leakage Test Methods", would not exceed the applicable acceptance threshold acceptable to the competent authority.

7.4.3 Demonstration of compliance with the performance standards in 7.4.2 must be in accordance with 6;7.11.1 and 6;7.11.2.

7.4.4 Specimens that comprise or simulate special form radioactive material must be subjected to the impact test, the percussion test, the bending test, and the heat test specified in 7.4.5 or alternative tests as authorized in 7.4.6. A different specimen may be used for each of the tests. Following each test, a leaching assessment or volumetric leakage test must be performed on the specimen by a method no less sensitive than the methods given in 7.4.7 for indispersible solid material or 7.4.8 for encapsulated material.

7.4.5 The relevant test methods are:

a) Impact test: The specimen must drop onto the target from a height of 9 m. The target must be as defined in 6;7.13;

b) Percussion test: The specimen must be placed on a sheet of lead which is supported by a smooth, solid surface and struck by the flat face of a mild steel bar so as to cause an impact equivalent to that resulting from a free drop of 1.4 kg through 1 m. The lower part of the bar must be 25 mm in diameter with the edges rounded off to a radius of 3.0 ± 0.3 mm. The lead, of hardness number 3.5 to 4.5 on the Vickers scale and not more than 25 mm thick, must cover an area greater than that covered by the specimen. A fresh surface of lead must be used for each impact. The bar must strike the specimen so as to cause maximum damage.

c) Bending test: The test must apply only to long, slender sources with both a minimum length of 10 cm and a length to minimum width ratio of not less than 10. The specimen must be rigidly clamped in a horizontal position so that one-half of its length protrudes from the face of the clamp. The orientation of the specimen must be such that the specimen will suffer maximum damage when its free end is struck by the flat face of a steel bar. The bar must strike the specimen so as to cause an impact equivalent to that resulting from a free vertical drop of 1.4 kg through 1 m. The lower part of the bar must be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm.

d) Heat test: The specimen must be heated in air to a temperature of 800°C and held at that temperature for a period of 10 minutes and must then be allowed to cool.

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

a) the tests prescribed in 7.4.5 a) and b) provided the mass of the special form radioactive material is:
i) less than 200 g and the specimens are alternatively subjected to the Class 4 impact test prescribed in ISO 2919:1990 "Radiation protection — Sealed radioactive sources — General requirements and classification"; or

ii) less than 500 g and the specimens are alternatively subjected to the Class 5 impact test prescribed in ISO 2919:1990: "Sealed radioactive sources — classification; and

b) the test prescribed in 7.4.5 d) provided the specimens are alternatively subjected to the Class 6 temperature test specified in ISO 2919:1990 "Radiation protection — Sealed radioactive sources — General requirements and classification".

7.4.7 For specimens which comprise or simulate indispersible solid material, a leaching assessment must be performed as follows:

a) The specimen must be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test must be sufficient to ensure that at the end of the 7 day test period, the free volume of the unabsorbed and unreacted water remaining must be at least 10 per cent of the volume of the solid test sample itself. The water must have an initial pH of 6–8 and a maximum conductivity of 1 mS/m at 20°C;

b) The water with the specimen must then be heated to a temperature of (50 ± 5)°C and maintained at this temperature for 4 hours;

c) The activity of the water must then be determined;

d) The specimen must then be kept for at least 7 days in still air at not less than 30°C and relative humidity not less than 90 per cent;

e) The specimen must then be immersed in water of the same specification as in a) above and the water with the specimen heated to (50 ± 5)°C and maintained at this temperature for 4 hours;

f) The activity of the water must then be determined.

7.4.8 For specimens which comprise or simulate radioactive material enclosed in a sealed capsule, either a leaching assessment or a volumetric leakage assessment must be performed as follows:

a) The leaching assessment must consist of the following steps:

i) the specimen must be immersed in water at ambient temperature. The water must have an initial pH of 6-8 with a maximum conductivity of 1 mS/m at 20°C;

ii) the water and specimen must be heated to a temperature of (50 ± 5)°C and maintained at this temperature for 4 hours;

iii) the activity of the water must then be determined;

iv) the specimen must then be kept for at least 7 days in still air at not less than 30°C and relative humidity of not less than 90 per cent;

v) the process in i), ii) and iii) must be repeated;

b) The alternative volumetric leakage assessment must comprise any of the tests prescribed in ISO 9978:1992 "Radiation protection — Sealed radioactive sources — Leakage test methods", which are acceptable to the competent authority.

Editorial Note.— Paragraph 7.5 below is moved to 7.2.3.2 (definition moved to 7.1.3):

7.5 SURFACE CONTAMINATED OBJECT (SCO), DETERMINATION OF GROUPS

Surface contaminated object (SCO) means a solid object which is not itself radioactive but which has radioactive material distributed on its surfaces. SCO is classified in one of two groups:

a) SCO-I: A solid object on which:

i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 0.4 Bq/cm^2 for all other alpha emitters; and

ii) the fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm^2 for all other alpha emitters; and

iii) the non fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm^2 for all other alpha emitters;

b) SCO-II: A solid object on which either the fixed or non-fixed contamination on the surface exceeds the applicable limits specified for SCO-I in a) above and on which:

i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 400 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 40 Bq/cm^2 for all other alpha emitters; and

ii) the fixed contamination on the accessible surface, averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm^2 for all other alpha emitters; and

iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm^2 for all other alpha emitters.

Editorial Note.— Paragraph 7.6 below is moved to 5;1.2.4:

7.6 DETERMINATION OF TRANSPORT INDEX AND CRITICALITY SAFETY INDEX (CSI)

7.6.1 Determination of transport index

7.6.1.1 The transport index (TI) for a package, overpack or freight container, must be the number derived in accordance with the following procedure:

a) Determine the maximum radiation level in units of millisieverts per hour (mSv/h) at a distance of 1 m from the external surfaces of the package, overpack, or freight container. The value determined must be multiplied by 100 and the resulting number is the transport index. For uranium and thorium ores and their concentrates, the maximum radiation level at any point 1 m from the external surface of the load may be taken as:

~~0.4 mSv/h for ores and physical concentrates of uranium and thorium;~~

~~0.3 mSv/h for chemical concentrates of thorium;~~

~~0.02 mSv/h for chemical concentrates of uranium, other than uranium hexafluoride;~~

~~b) For freight containers, the value determined in step a) above must be multiplied by the appropriate factor from Table 2-11;~~

~~c) The value obtained in steps a) and b) above must be rounded up to the first decimal place (e.g. 1.13 becomes 1.2), except that a value of 0.05 or less may be considered as zero.~~

~~7.6.1.2 The transport index for each overpack or freight container must be determined as either the sum of the transport indices of all the packages contained, or by direct measurement of radiation level, except in the case of non-rigid overpacks for which the transport index must be determined only as the sum of the transport indices of all the packages.~~

~~7.6.2 Determination of criticality safety index (CSI)~~

~~7.6.2.1 The criticality safety index (CSI) for packages containing fissile material must be obtained by dividing the number 50 by the smaller of the two values of N derived in 6;7.10.11 and 6;7.10.12 (i.e. CSI = 50/N). The value of the criticality safety index may be zero, provided that an unlimited number of packages is subcritical (i.e. N is effectively equal to infinity in both cases).~~

~~Table 2-11. Multiplication factors for freight containers~~

~~*Size of load**~~	~~*Multiplication factor*~~
~~size of load ≤ 1 m^2~~ ~~1 m^2 < size of load ≤ 5 m^2~~ ~~5 m^2 < size of load ≤ 20 m^2~~ ~~20 m^2 < size of load~~	~~1~~ ~~2~~ ~~3~~ ~~10~~
~~* Largest cross-sectional area of the load being measured.~~	

~~7.6.2.2 The criticality safety index for each overpack or freight container must be determined as the sum of the CSIs of all the packages contained. The same procedure must be followed for determining the total sum of CSIs in a consignment or aboard an aircraft.~~

Editorial Note.— Paragraph 7.7.1 below is moved to 7.2.4:

~~7.7 ACTIVITY LIMITS AND MATERIAL RESTRICTIONS~~

~~7.7.1 Contents limits for packages~~

~~7.7.1.1 *General*~~

~~The quantity of radioactive material in a package must not exceed the relevant limits for the package type as specified below.~~

7.7.1.2 *Excepted packages*

7.7.1.2.1 For radioactive material other than articles manufactured from natural uranium, depleted uranium or natural thorium, an excepted package must not contain activities greater than the following:

a) Where the radioactive material is enclosed in or is included as a component part of an instrument or other manufactured article, such as a clock or electronic apparatus, the limits specified in columns 2 and 3 of Table 2-12 for each individual item and each package, respectively; and

b) Where the radioactive material is not so enclosed in or is not included as a component of an instrument or other manufactured article, the package limits specified in column 4 of Table 2-12.

7.7.1.2.2 For articles manufactured of natural uranium, depleted uranium or natural thorium, an excepted package may contain any quantity of such material provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

7.7.1.3 *Industrial packages*

The radioactive contents in a single package of LSA material or in a single package of SCO must be so restricted that the radiation level specified in 4;9.2.1 must not be exceeded, and the activity in a single package must also be so restricted that the activity limits for an aircraft specified in 7;2.9.2 must not be exceeded. A single package of non-combustible solid LSA-II or LSA-III material must not contain an activity greater than 3000 A_2.

Editorial Note.— Current Table 2-12 below is renumbered as Table 2-15 and moved following paragraph 7.2.4.1.6:

Table 2-12. Activity limits for excepted packages

Physical state of contents	*Instruments or article*		*Materials*
	*Item limits**	*Package limits**	*Package limits**
Solids			
Special form	$10^{-2}A_1$	A_1	$10^{-3}A_1$
Other form	$10^{-2}A_2$	A_2	$10^{-3}A_2$
Liquids	$10^{-3}A_2$	$10^{-1}A_2$	$10^{-4}A_2$
Gases			
Tritium	$2 \times 10^{-2}A_2$	$2 \times 10^{-1}A_2$	$2 \times 10^{-2}A_2$
Special form	$10^{-3}A_1$	$10^{-2}A_1$	$10^{-3}A_1$
Other forms	$10^{-3}A_2$	$10^{-2}A_2$	$10^{-3}A_2$

* For mixtures of radionuclides, see 7.7.2.4 to 7.7.2.6.

7.7.1.4 *Type A packages*

7.7.1.4.1 Type A packages must not contain activities greater than the following:

a) for special form radioactive material — A_1; or

b) for all other radioactive material — A_2.

7.7.1.4.2 For mixtures of radionuclides whose identities and respective activities are known, the following condition must apply to the radioactive contents of a Type A package:

$$\sum_i \frac{B(i)}{A_1(i)} + \sum_j \frac{C(j)}{A_2(j)} \leq 1$$

where

B(i) is the activity of radionuclide i as special form radioactive material and $A_1(i)$ is the A_1 value for radionuclide i; and

C(j) is the activity of radionuclide j as other than special form radioactive material and $A_2(j)$ is the A_2 value for radionuclide j.

7.7.1.5 *Type B(U) and Type B(M) packages*

7.7.1.5.1 Type B(U) and Type B(M) packages must not contain:

a) activities greater than those authorized for the package design;

b) radionuclides different from those authorized for the package design; or

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

as specified in their certificates of approval.

7.7.1.5.2 Type B(U) and Type B(M) packages must, in addition, not contain activities greater than the following:

a) for low dispersible radioactive material — as authorized for the package design as specified in the certificate of approval;

b) for special form radioactive material — 3000 A_1 or 100 000 A_2, whichever is the lower; or

c) for all other radioactive material — 3000 A_2.

7.7.1.6 *Type C packages*

Type C packages must not contain:

a) activities greater than those authorized for the package design;

b) radionuclides different from those authorized for the package design; or

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

as specified in their certificates of approval.

7.7.1.7 *Packages containing fissile material*

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

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

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

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

as specified in their certificates of approval, where appropriate.

7.7.1.8 *Packages containing uranium hexafluoride*

Packages containing uranium hexafluoride must not contain:

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

b) a mass of uranium hexafluoride greater than a value that would lead to an ullage smaller than 5 per cent at the maximum temperature of the package as specified for the plant systems where the package will be used; or

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

~~7.7.2~~7.2.2 Determination of ~~A~~activity levels~~s~~

~~7.7.2.1~~7.2.2.1 The following basic values for individual radionuclides are given in Table 2-~~13~~12:

a) A_1 and A_2 in TBq;

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

c) activity limits for exempt consignments in Bq.

~~7.7.2.2~~7.2.2.2 For individual radionuclides which are not listed in Table 2-~~13~~12, determination of the basic radionuclide values referred to in ~~7.7.2.1~~7.2.2.1 requires multilateral approval. It is permissible to use the A_2 value calculated using a dose coefficient for the appropriate lung absorption type as recommended by the International Commission on Radiological Protection, if the chemical forms of each radionuclide under both normal and accident conditions of transport are taken into consideration. Alternatively, the radionuclide values in Table 2-~~14~~13 may be used without obtaining competent authority approval.

~~7.7.2.3~~7.2.2.3 In the calculations of A_1 and A_2 for a radionuclide not in Table 2-~~13~~12, a single radioactive decay chain in which the radionuclides are present in their naturally occurring proportions, and in which no daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide, must be considered as a single radionuclide; and the activity to be taken into account and the A_1 or A_2 value to be applied must be that corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and such daughter nuclides must be considered as mixtures of different nuclides.

~~7.7.2.4~~7.2.2.4 For mixtures of radionuclides, the determination of the basic radionuclide values referred to in ~~7.7.2.1~~7.2.2.1 may be determined as follows:

$$X_m = \frac{1}{\sum_i \frac{f(i)}{X(i)}}$$

where,

f(i) is the fraction of activity or activity concentration of radionuclide i in the mixture;

X(i) is the appropriate value of A_1 or A_2 or the activity concentration for exempt material or the activity limit for an exempt consignment as appropriate for the radionuclide i; and

X_m is the derived value of A_1 or A_2 or the activity concentration for exempt material or the activity limit for an exempt consignment in the case of a mixture.

~~7.7.2.5~~7.2.2.5 When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest radionuclide value, as appropriate, for the radionuclides in each group may be used in applying the formulas in ~~7.7.1.4.2~~ 7.2.2.4 and ~~7.7.2.4~~7.2.4.4. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest radionuclide values for the alpha emitters or beta/gamma emitters, respectively.

~~7.7.2.6~~7.2.2.6 For individual radionuclides or for mixtures of radionuclides for which relevant data are not available, the values shown in Table 2-~~14~~13 must be used.

Table 2-~~13~~12. Basic radionuclides values for individual radionuclides

Radionuclide (atomic number)	*A_1 (TBq)*	*A_2 (TBq)*	*Activity concentration for exempt material (Bq/g)*	*Activity limit for an exempt consignment (Bq)*
Actinium (89)				
. . .				

Editorial Note.— There are no changes to Table 2-13 (now Table 2-12).

Table ~~2-14~~2-13. Basic radionuclide values for unknown radionuclides or mixtures

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

Editorial Note.— Paragraph 7.2.3 below is moved from 7.3 (paragraph 7.3.1 is moved to 7.1.3):

7.2.3 Determination of other material characteristics

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

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

7.2.3.1 *Low specific activity (LSA) material*

7.2.3.1.1 (Reserved)

~~7.3.2~~7.2.3.1.2 LSA material must be in one of three groups:

a) LSA-I

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

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

iii) radioactive material for which the A_2 value is unlimited, excluding material classified as fissile ~~material in quantities not excepted under~~ according to ~~6;7.10.2~~ 7.2.3.5; or

iv) other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the values for activity concentration specified in ~~7.7.2.1~~ 7.2.2.1 to ~~7.7.2.6~~ 7.2.2.6, excluding material classified as fissile ~~material in quantities not excepted under~~ according to ~~6;7.10.2~~ 7.2.3.5.

b) LSA-II

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

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

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

i) the radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.);

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

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

~~7.3.3~~7.2.3.1.3 LSA-III material must be a solid of such a nature that if the entire contents of a package were subjected to the test specified in ~~7.3.4~~ 7.2.3.1.4, the activity in the water would not exceed 0.1 A_2.

~~7.3.4~~7.2.3.1.4 LSA-III material must be tested as follows:

A solid material sample representing the entire contents of the package must be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test must be sufficient to ensure that at the end of the 7-day test period, the free volume of the unabsorbed and unreacted water remaining must be at least 10 per cent of the volume of the solid test sample itself. The water must have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20°C. The total activity of the free volume of water must be measured following the 7-day immersion of the test sample.

~~7.3.5~~7.2.3.1.5 Demonstration of compliance with the performance standards in ~~7.3.4~~ 7.2.3.1.4 must be in accordance with 6;7.11.1 and 6;7.11.2.

Editorial Note.— Paragraph 7.2.3.2 below is moved from 7.5:

7.2.3.2 ~~**7.5**~~ *Surface contaminated object (SCO)~~, determination of groups~~*

Editorial Note.— Text in 7.2.3.2.1 below moved to 2;7.1.3, definition for Surface contaminated object:

7.2.3.2.1 ~~*Surface contaminated object (SCO)* means a solid object which is not itself radioactive but which has radioactive material distributed on its surfaces.~~ SCO is classified in one of two groups:

a) SCO-I: A solid object on which:

i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 0.4 Bq/cm^2 for all other alpha emitters; and

ii) the fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm^2 for all other alpha emitters; and

iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm^2 for all other alpha emitters;

b) SCO-II: A solid object on which either the fixed or non-fixed contamination on the surface exceeds the applicable limits specified for SCO-I in a) above and on which:

i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 400 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 40 Bq/cm^2 for all other alpha emitters; and

ii) the fixed contamination on the accessible surface, averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm^2 for all other alpha emitters; and

iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm^2 for all other alpha emitters.

Editorial Note.— Paragraph 7.2.3.3 is below moved from 7.4 and paragraph 7.4.1 is moved to 7.1.3:

7.2.3.3 ~~**7.4 REQUIREMENTS FOR** *Special form radioactive material*~~

~~7.4.1 *Special form radioactive material* means either:~~

~~a) an indispersible solid radioactive material; or~~

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

7.2.3.3.1 Special form radioactive material must have at least one dimension not less than 5 mm. When a sealed capsule constitutes part of the special form radioactive material, the capsule must be so manufactured that it can be opened only by destroying it. The design for special form radioactive material requires unilateral approval.

~~7.4.2~~7.2.3.3.2 Special form radioactive material must be of such a nature or must be so designed that if it is subjected to the tests specified in ~~7.4.4~~ 7.2.3.3.4 to ~~7.4.8~~ 7.2.3.3.8, it must meet the following requirements:

a) it would not break or shatter under the impact, percussion and bending tests specified in ~~7.4.5~~ 7.2.3.3.5 a), b), c) or ~~7.4.6~~ 7.2.3.3.6 a), as applicable;

b) it would not melt or disperse in the applicable heat test specified in ~~7.4.5~~7.2.3.3.5 d) or ~~7.4.6~~7.2.3.3.6 b), as applicable; and

c) the activity in the water from the leaching tests specified in ~~7.4.7~~ 7.2.3.3.7 and ~~7.4.8~~ 7.2.3.3.8 would not exceed 2 kBq; or alternatively for sealed sources, the leakage rate for the volumetric leakage assessment test specified in ISO 9978:1992 “Radiation Protection — Sealed Radioactive Sources — Leakage Test Methods”, would not exceed the applicable acceptance threshold acceptable to the competent authority.

~~7.4.3~~7.2.3.3.3 Demonstration of compliance with the performance standards in ~~7.4.2~~ 7.2.3.3.2 must be in accordance with 6;7.11.1 and 6;7.11.2.

~~7.4.4~~7.2.3.3.4 Specimens that comprise or simulate special form radioactive material must be subjected to the impact test, the percussion test, the bending test, and the heat test specified in ~~7.4.5~~ 7.2.3.3.5 or alternative tests as authorized in ~~7.4.6~~ 7.2.3.3.6. A different specimen may be used for each of the tests. Following each test, a leaching assessment or volumetric leakage test must be performed on the specimen by a method no less sensitive than the methods given in ~~7.4.7~~ 7.2.3.3.7 for indispersible solid material or ~~7.4.8~~ 7.2.3.3.8 for encapsulated material.

~~7.4.5~~7.2.3.3.5 The relevant test methods are:

a) Impact test: The specimen must drop onto the target from a height of 9 m. The target must be as defined in 6;7.13;

b) Percussion test: The specimen must be placed on a sheet of lead which is supported by a smooth, solid surface and struck by the flat face of a mild steel bar so as to cause an impact equivalent to that resulting from a free drop of 1.4 kg through 1 m. The lower part of the bar must be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3)~~,~~ mm. The lead, of hardness number 3.5 to 4.5 on the Vickers scale and not more than 25 mm thick, must cover an area greater than that covered by the specimen. A fresh surface of lead must be used for each impact. The bar must strike the specimen so as to cause maximum damage.

c) Bending test: The test must apply only to long, slender sources with both a minimum length of 10 cm and a length to minimum width ratio of not less than 10. The specimen must be rigidly clamped in a horizontal position so that one-half of its length protrudes from the face of the clamp. The orientation of the specimen must be such that the specimen will suffer maximum damage when its free end is struck by the flat face of a steel bar. The bar must strike the specimen so as to cause an impact equivalent to that resulting from a free vertical drop of 1.4 kg through 1 m. The lower part of the bar must be 25 mm in diameter with the edges rounded off to a radius of (3.0 ± 0.3) mm.

d) Heat test: The specimen must be heated in air to a temperature of 800°C and held at that temperature for a period of 10 minutes and must then be allowed to cool.

~~7.4.6~~7.2.3.3.6 Specimens that comprise or simulate radioactive material enclosed in a sealed capsule may be excepted from:

a) the tests prescribed in ~~7.4.5~~ 7.2.3.3.5 a) and b) provided the mass of the special form radioactive material is:

i) less than 200 g and the specimens are alternatively subjected to the Class 4 impact test prescribed in ISO 2919:1999 "Radiation protection — Sealed radioactive sources — General requirements and classification"; or

ii) less than 500 g and the specimens are alternatively subjected to the Class 5 impact test prescribed in ISO 2919:1999~~:~~ "Radiation protection — Sealed radioactive sources — General requirements and classification; and

b) the test prescribed in ~~7.4.5~~ 7.2.3.3.5 d) provided the specimens are alternatively subjected to the Class 6 temperature test specified in ISO 2919:1999 "Radiation protection — Sealed radioactive sources — General requirements and classification".

~~7.4.7~~7.2.3.3.7 For specimens which comprise or simulate indispersible solid material, a leaching assessment must be performed as follows:

a) The specimen must be immersed for 7 days in water at ambient temperature. The volume of water to be used in the test must be sufficient to ensure that at the end of the 7-day test period, the free volume of the unabsorbed and unreacted water remaining must be at least 10 per cent of the volume of the solid test sample itself. The water must have an initial pH of 6-8 and a maximum conductivity of 1 mS/m at 20°C;

b) The water with the specimen must then be heated to a temperature of (50 ± 5)°C and maintained at this temperature for 4 hours;

c) The activity of the water must then be determined;

d) The specimen must then be kept for at least 7 days in still air at not less than 30°C and relative humidity not less than 90 per cent;

e) The specimen must then be immersed in water of the same specification as in a) above and the water with the specimen heated to (50 ± 5)°C and maintained at this temperature for 4 hours;

f) The activity of the water must then be determined.

~~7.4.8~~7.2.3.3.8 For specimens which comprise or simulate radioactive material enclosed in a sealed capsule, either a leaching assessment or a volumetric leakage assessment must be performed as follows:

a) The leaching assessment must consist of the following steps:

i) the specimen must be immersed in water at ambient temperature. The water must have an initial pH of 6-8 with a maximum conductivity of 1 mS/m at 20°C;

ii) the water and specimen must be heated to a temperature of (50 ± 5)°C and maintained at this temperature for 4 hours;

iii) the activity of the water must then be determined;

iv) the specimen must then be kept for at least 7 days in still air at not less than 30°C and relative humidity of not less than 90 per cent;

v) the process in i), ii) and iii) must be repeated;

b) The alternative volumetric leakage assessment must comprise any of the tests prescribed in ISO 9978:1992 "Radiation protection — Sealed radioactive sources — Leakage test methods", which are acceptable to the competent authority.

Editorial Note.— Paragraph 7.2.3.4 below is moved from 7.10:

~~**7.10**~~ 7.2.3.4 ~~*Requirements for l*~~*Low dispersible radioactive material*

Editorial Note.— New text below is moved from 6;7.21.5:

~~7.10.1~~7.2.3.4.1 The design for low dispersible radioactive material requires multilateral approval. Low dispersible radioactive material must be such that the total amount of this radioactive material in a package must meet the following requirements:

a) The radiation level at 3 m from the unshielded radioactive material does not exceed 10 mSv/h;

b) If subjected to the tests specified in 6;7.19.3 and 6;7.19.4, the airborne release in gaseous and particulate forms of up to 100 µm aerodynamic equivalent diameter would not exceed 100 A_2. A separate specimen may be used for each test; and

c) If subjected to the test specified in ~~7.3.4~~ 7.2.3.1.4, the activity in the water would not exceed 100 A_2. In the application of this test, the damaging effects of the tests specified in b) above must be taken into account.

~~7.10.2~~7.2.3.4.2 Low dispersible material must be tested as follows:

A specimen that comprises or simulates low dispersible radioactive material must be subjected to the enhanced thermal test specified in 6;7.19.3 and the impact test specified in 6;7.19.4. A different specimen may be used for each of the tests. Following each test, the specimen must be subjected to the leach test specified in ~~7.3.4~~ 7.2.3.1.4. After each test, it must be determined if the applicable requirements of ~~7.10.1~~ 7.2.3.4.1 have been met.

~~7.10.3~~7.2.3.4.3 Demonstration of compliance with the performance standards in ~~7.10.1~~ 7.2.3.4.1 and ~~7.10.2~~ 7.2.3.4.2 must be in accordance with 6;7.11.1 and 6;7.11.2.

7.2.3.5 *Fissile material*

7.2.3.5.1 Packages containing fissile radionuclides must be classified under the relevant entry of Table 2-11 for fissile material unless one of the conditions a) to d) of this paragraph is met. Only one type of exception is allowed per consignment.

Editorial Note.— Remaining paragraph 7.2.3.5 is moved from 6;7.10.2 and Table 2-14 moved from current Table 6-5.

a) A mass limit per consignment such that:

$$\frac{\text{mass of uranium - 235(g)}}{X} + \frac{\text{mass of other fissile material (g)}}{Y} < 1$$

where X and Y are the mass limits defined in Table ~~6-5~~ 2-14, provided that the smallest external dimension of each package is not less than 10 cm and that either:

i) each individual package contains not more than 15 g of fissile material; for unpackaged material, this quantity limitation must apply to the consignment being carried in or on the conveyance;

ii) the fissile material is a homogeneous hydrogenous solution or mixture where the ratio of fissile nuclides to hydrogen is less than 5 per cent by mass; or

iii) there are not more than 5 g of fissile material in any 10 L volume of material.

Neither beryllium nor deuterium ~~in hydrogeneous material enriched in deuterium~~ must be present in quantities exceeding 1 per cent of the applicable consignment mass limits provided in Table ~~6-5~~ 2-14, except for deuterium in natural concentration in hydrogen.

b) Uranium enriched in uranium-235 to a maximum of 1 per cent by mass, and with a total plutonium and uranium-233 content not exceeding 1 per cent of the mass of uranium-235, provided that the fissile material is distributed essentially homogeneously throughout the material. In addition, if uranium-235 is present in metallic, oxide or carbide forms, it must not form a lattice arrangement;

c) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 per cent by mass, with a total plutonium and uranium-233 content not exceeding 0.002 per cent of the mass of uranium, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2;

d) Packages containing, individually, a total plutonium mass not more than 1 kg, of which not more than 20 per cent by mass may consist of plutonium-239, plutonium-241 or any combination of those radionuclides.

Table ~~6-5~~2-14. Consignment mass limits for exceptions from the requirements for packages containing fissile material

Fissile material	*Fissile material mass (g) mixed with substances having an average hydrogen density less than or equal to water*	*Fissile material mass (g) mixed with substances having an average hydrogen density greater than water*
Uranium 235 (X) Other fissile material (Y)	400 250	290 180

Editorial Note.— New paragraph 7.2.4 below is comprised of current 7.7.1 and 7.9.2 to 7.9.6:

7.2.4 Classification of packages

~~7.7.1.1 *General*~~

7.2.4.1 The quantity of radioactive material in a package must not exceed the relevant limits for the package type as specified below.

~~7.7.1.2~~7.2.4.1.2 *Classification as ~~E~~excepted packages*

~~7.7.1.2.1 For radioactive material other than articles manufactured from natural uranium, depleted uranium or natural thorium, an excepted package must not contain activities greater than the following:~~

~~a) Where the radioactive material is enclosed in or is included as a component part of an instrument or other manufactured article, such as a clock or electronic apparatus, the limits specified in columns 2 and 3 of Table 2-12 for each individual item and each package, respectively; and~~

~~b) Where the radioactive material is not so enclosed in or is not included as a component of an instrument or other manufactured article, the package limits specified in column 4 of Table 2-12.~~

Editorial Note.— Paragraph 7.2.4.1.2.1 below is modified from 7.9.1:

7.2.4.1.2.1 Packages may be classified as excepted packages if:

a) they are empty packagings having contained radioactive material;

b) they contain instruments or articles in limited quantities;

c) they contain articles manufactured of natural uranium, depleted uranium or natural thorium; or

d) they contain radioactive material in limited quantities.

Editorial Note.— Paragraph 7.2.4.1.2.2 and 7.2.4.1.2.3 are moved from 7.9.2 to 7.9.6:

~~7.9.2~~7.2.4.1.2.2 A package containing radioactive material may be classified as an excepted package provided that t~~T~~he radiation level at any point on ~~the~~ its external surface ~~of an excepted package must~~ does not exceed 5 μSv/h.

~~7.9.3~~7.2.4.1.2.3 Radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article~~, with activity not exceeding the item and package limits specified in columns 2 and 3 respectively of Table 2-12, may be transported in an excepted package provided~~ may be classified under UN 2911, **Radioactive material, excepted package — instruments** or **articles** provided that:

a) the radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1 mSv/h; and

b) each instrument or article bears the marking “RADIOACTIVE” except:

i) radioluminescent time-pieces or devices;

ii) consumer products that either have received regulatory approval ~~following their sale to the end user~~ according to 1;6.1.4 d) or do not individually exceed the activity limit for an exempt consignment in Table 2-~~13~~12 (column 5), provided such products are transported in a package that bears the marking “RADIOACTIVE” on an internal surface in such a manner that warning of the presence of radioactive material is visible on opening the package; ~~and~~

c) the active material is completely enclosed by non-active components (a device performing the sole function of containing radioactive material must not be considered to be an instrument or manufactured article)~~.~~; and

Editorial Note.— Paragraph d) below is modified from current 7.7.1.2.1.

d) The limits specified in columns 2 and 3 of Table 2-15 are met for each individual item and each package, respectively.

~~7.9.4~~7.2.4.1.2.4 Radioactive material ~~in forms other than as specified in 7.9.3,~~ with an activity not exceeding the limit specified in column 4 of Table 2-~~12~~15, may be ~~transported in an excepted package~~ classified under UN 2910 — **Radioactive material, excepted package — limited quantity of material** provided that:

a) the package retains its radioactive contents under routine conditions of transport; and

b) the package bears the marking “RADIOACTIVE” on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package.

~~7.9.5 A manufactured article in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be transported as an excepted package, provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.~~

~~7.9.6~~7.2.4.1.2.5 An empty packaging which had previously contained radioactive material ~~may be transported as an excepted package~~ with an activity not exceeding the limit specified in column 4 of Table 2-15 may be classified under UN 2908 — **Radioactive material, excepted package — empty packaging**, provided that:

a) it is in a well-maintained condition and securely closed;

b) the outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material;

c) the level of internal non-fixed contamination ~~does not exceed one hundred times the levels specified in 4;9.1.2; and~~, when averaged over any 300 cm^2, does not exceed:

(i) 400 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters; and

(ii) 40 Bq/cm^2 for all other alpha emitters; and

d) any labels which may have been displayed on it in conformity with 5;3.2.6 are no longer visible.

~~7.7.1.2.2~~7.2.4.1.6 ~~For a~~Articles manufactured of natural uranium, depleted uranium or natural thorium and articles in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be classified under UN 2909, **Radioactive material, excepted package — articles manufactured from**

natural uranium or **depleted uranium** or **natural thorium**, ~~an excepted package may contain any quantity of such material~~ provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

~~7.7.1.3 *Industrial packages*~~

~~The radioactive contents in a single package of LSA material or in a single package of SCO must be so restricted that the radiation level specified in 4;9.2.1 must not be exceeded, and the activity in a single package must also be so restricted that the activity limits for an aircraft specified in 7;2.9.2 must not be exceeded. A single package of non-combustible solid LSA-II or LSA-III material must not contain an activity greater than 3000 A_2.~~

Table ~~2-12~~ 2-15. Activity limits for excepted packages

Physical state of contents	*Instruments or article*		*Materials*
	*Item limits**	*Package limits**	*Package limits**
Solids			
Special form	10^{-2} A_1	A_1	10^{-3} A_1
Other form	10^{-2} A_2	A_2	10^{-3} A_2
Liquids	10^{-3} A_2	10^{-1} A_2	10^{-4} A_2
Gases			
Tritium	2×10^{-2} A_2	2×10^{-1} A_2	2×10^{-2} A_2
Special form	10^{-3} A_1	10^{-2} A_1	10^{-3} A_1
Other forms	10^{-3} A_2	10^{-2} A_2	10^{-3} A_2

* For mixtures of radionuclides, see ~~7.7.2.4~~ 7.2.2.4 to ~~7.7.2.6~~ 7.2.2.6.

7.2.4.2 *Classification as low specific activity (LSA) material*

7.2.4.2.1 Radioactive material may only be classified as LSA material if the conditions of 7.2.3.1 and 4;9.2.1 are met.

7.2.4.3 *Classification as surface contaminated object (SCO)*

7.2.4.3.1 Radioactive material may be classified as SCO if the conditions of 7.2.3.2.1 and 4;9.2.1 are met.

~~7.7.1.4~~7.2.4.4 *Classification of Type A packages*

~~7.7.1.4.1~~7.2.4.4.1 Packages containing radioactive material may be classified as Type A packages provided that the following conditions are met:

7.2.4.4.1.1 Type A packages must not contain activities greater than the following:

a) for special form radioactive material — A_1; or

b) for all other radioactive material — A_2.

~~7.7.1.4.2~~7.2.4.4.1.2 For mixtures of radionuclides whose identities and respective activities are known, the following condition must apply to the radioactive contents of a Type A package:

$$\sum_i \frac{B(i)}{A_1(i)} + \sum_j \frac{C(j)}{A_2(j)} \leq 1$$

where

B(i) is the activity of radionuclide i as special form radioactive material; ~~and~~

$A_1(i)$ is the A_1 value for radionuclide i; ~~and~~

C(j) is the activity of radionuclide j as other than special form radioactive material; ~~and~~

A_2(j) is the A_2 value for radio-nuclide j.

Editorial Note.— Current paragraph 7.7.1.5 below is moved to 7.2.4.6:

~~7.7.1.5 *Type B(U) and Type B(M) packages*~~

~~7.7.1.5.1 Type B(U) and Type B(M) packages must not contain:~~

~~a) activities greater than those authorized for the package design;~~

~~b) radionuclides different from those authorized for the package design; or~~

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

~~as specified in their certificates of approval.~~

~~7.7.1.5.2 Type B(U) and Type B(M) packages must, in addition, not contain activities greater than the following:~~

~~a) for low dispersible radioactive material — as authorized for the package design as specified in the certificate of approval;~~

~~b) for special form radioactive material — 3000 A_1 or 100 000 A_2, whichever is the lower; or~~

~~c) for all other radioactive material — 3000 A_2.~~

Editorial Note.— Current paragraph 7.7.1.6 below is moved to 7.2.4.6.4:

~~7.7.1.6 *Type C packages*~~

~~Type C packages must not contain:~~

~~a) activities greater than those authorized for the package design;~~

~~b) radionuclides different from those authorized for the package design; or~~

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

~~as specified in their certificates of approval.~~

~~7.7.1.7 *Packages containing fissile material*~~

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

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

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

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

~~as specified in their certificates of approval, where appropriate.~~

~~7.7.1.8~~7.2.4.5 ~~*Packages containing*~~*Classification of uranium hexafluoride*

7.2.4.5.1 Uranium hexafluoride must only be assigned to UN Nos. 2977 — **Radioactive material, uranium hexafluoride, fissile** or 2978 — **Radioactive material, uranium hexafluoride**, non-fissile or fissile excepted.

7.2.4.5.2 Packages containing uranium hexafluoride must not contain:

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

b) a mass of uranium hexafluoride greater than a value that would lead to an ullage smaller than 5 per cent at the maximum temperature of the package as specified for the plant systems where the package will be used; or

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

Editorial Note.— Current paragraph 7.2.4.6 below is moved from current 7.7.1.5:

~~7.7.1.5~~7.2.4.6 *Classification as Type B(U), ~~and~~ Type B(M) or Type C packages*

7.2.4.6.1 Packages not otherwise classified in 7.2.4 (7.2.4.1.2 to 7.2.4.5) must be classified in accordance with the competent authority approval certificate for the package issued by the country of origin of design.

~~7.7.1.5.1~~7.2.4.6.2 A package may only be classified as a Type B(U) ~~and Type B(M)~~ package~~s~~ if it ~~must~~ does not contain:

a) activities greater than those authorized for the package design;

b) radionuclides different from those authorized for the package design; or

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

as specified in their certificates of approval.

Editorial Note.— Paragraph 7.2.4.6.3 below is the same text as for B(U) above:

7.2.4.6.3 A package may only be classified as a Type B(M) package if it does not contain:

a) activities greater than those authorized for the package design;

b) radionuclides different from those authorized for the package design; or

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

as specified in their certificates of approval.

~~7.7.1.5.2 Type B(U) and Type B(M) packages must, in addition, not contain activities greater than the following:~~

~~a) for low dispersible radioactive material — as authorized for the package design as specified in the certificate of approval;~~

~~b) for special form radioactive material — 3000 A_1 or 100 000 A_2, whichever is the lower; or~~

~~c) for all other radioactive material — 3000 A_2.~~

Editorial Note.— Paragraph 7.2.4.6.4 below is moved from current 7.7.1.6:

~~7.7.1.6 *Type C packages*~~

7.2.4.6.4 A package may only be classified as a Type C ~~packages must~~ if it does not contain:

a) activities greater than those authorized for the package design;

b) radionuclides different from those authorized for the package design; or

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

as specified in their certificates of approval.

7.2.5 Special arrangements

Radioactive material must be classified as transported under special arrangement when it is intended to be transported in accordance with 1;6.4.

~~7.8 LIMITS ON TRANSPORT INDEX, CRITICALITY SAFETY INDEX,~~

~~RADIATION LEVELS FOR PACKAGES AND OVERPACKS~~

Editorial Note.— Paragraphs 7.8.1 to 7.8.3 below are moved to 4;9.1.10 to 4;91.1.12*:*

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

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

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

Editorial Note.— Paragraphs 7.8.4, 7.8.5 and Table 2-15 below are moved to 5;1.2.4.4:

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

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

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

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

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

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

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

~~7.9 REQUIREMENTS AND CONTROLS FOR TRANSPORT OF EXCEPTED PACKAGES~~

Editorial Note.— The following is moved to 1;6.1.4:

~~7.9.1 Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles as specified in 7.7.1.2 and empty packagings as specified in 7.9.6 may be transported under the following conditions:~~

~~a) the applicable requirements specified in 2; Introductory Chapter, 4.2, 2;7.9.2, and, as applicable, 2;7.9.3 to 2;7.9.6, 4;9.1.2, 5;2.4.2, 5;2.4.5 a) and e); 5;3.2.11 e), 5;4.4, 7;3.2.2 and 7;4.4;~~

Editorial Note.— Table 2-15 moved to 5;1.2.4

Table 2-15. Categories of packages and overpacks

Conditions		
Transport index	*Maximum radiation level at any point on external surface*	*Category*
0*	Not more than 0.005 mSv/h	I-WHITE
More than 0 but not more than 1*	More than 0.005 mSv/h but not more than 0.5 mSv/h	II-YELLOW
More than 1 but not more than 10	More than 0.5 mSv/h but not more than 2 mSv/h	III-YELLOW
More than 10	More than 2 mSv/h but not more than 10 mSv/h	III-YELLOW**
* If the measured transport index is not greater than 0.05, the value quoted may be zero in accordance with 7.6.1.1 c). ** Must be transported under exclusive use and special arrangement.		

b) the requirements for excepted packages specified in 6;7.3;

c) if the excepted package contains fissile material, one of the fissile exceptions provided by 6;7.10.2 must apply and the requirement of 6;7.6.2 must be met; and

d) the requirements in 1;2.3, if transported by post.

Editorial Note.— Paragraphs 7.9.2 to 7.9.6 below are moved to 7.2.4.1.2:

7.9.2 The radiation level at any point on the external surface of an excepted package must not exceed 5 μSv/h.

7.9.3 Radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article, with activity not exceeding the item and package limits specified in columns 2 and 3 respectively of Table 2-12, may be transported in an excepted package provided that:

a) the radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0.1 mSv/h; and

b) each instrument or article bears the marking "RADIOACTIVE" except:

i) radioluminescent time-pieces or devices;

ii) consumer products that either have received regulatory approval following their sale to the end user or do not individually exceed the activity limit for an exempt consignment in Table 2-13 (column 5), provided such products are transported in a package that bears the marking "RADIOACTIVE" on an internal surface in such a manner that warning of the presence of radioactive material is visible on opening the package; and

c) the active material is completely enclosed by non active components (a device performing the sole function of containing radioactive material must not be considered to be an instrument or manufactured article).

7.9.4 Radioactive material in forms other than as specified in 7.9.3, with an activity not exceeding the limit specified in column 4 of Table 2-12, may be transported in an excepted package provided that:

a) the package retains its radioactive contents under routine conditions of transport; and

b) the package bears the marking "RADIOACTIVE" on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package.

~~7.9.5 A manufactured article in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be transported as an excepted package, provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.~~

~~7.9.6 An empty packaging which had previously contained radioactive material may be transported as an excepted package provided that:~~

~~a) it is in a well-maintained condition and securely closed;~~

~~b) the outer surface of any uranium or thorium in its structure is covered with an inactive sheath made of metal or some other substantial material;~~

~~c) the level of internal non-fixed contamination does not exceed one hundred times the levels specified in 4;9.1.2; and~~

~~d) any labels which may have been displayed on it in conformity with 5;3.2.6 are no longer visible.~~

Editorial Note.— Paragraph 7.10 below is moved to 7.2.3.4:

~~7.10 REQUIREMENTS FOR LOW DISPERSIBLE RADIOACTIVE MATERIAL~~

~~7.10.1 Low dispersible radioactive material must be such that the total amount of this radioactive material in a package must meet the following requirements:~~

~~a) The radiation level at 3 m from the unshielded radioactive material does not exceed 10 mSv/h;~~

~~b) If subjected to the tests specified in 6;7.19.3 and 6;7.19.4, the airborne release in gaseous and particulate forms of up to 100 μm aerodynamic equivalent diameter would not exceed 100 A_2. A separate specimen may be used for each test; and~~

~~c) If subjected to the test specified in 7.3.4, the activity in the water would not exceed 100 A_2. In the application of this test, the damaging effects of the tests specified in b) above must be taken into account.~~

~~7.10.2 Low dispersible material must be tested as follows:~~

~~A specimen that comprises or simulates low dispersible radioactive material must be subjected to the enhanced thermal test specified in 6;7.19.3 and the impact test specified in 6;7.19.4. A different specimen may be used for each of the tests. Following each test, the specimen must be subjected to the leach test specified in 7.3.4. After each test, it must be determined if the applicable requirements of 7.10.1 have been met.~~

~~7.10.3 Demonstration of compliance with the performance standards in 7.10.1 and 7.10.2 must be in accordance with 6;7.11.1 and 6;7.11.2.~~

Chapter 8

CLASS 8 — CORROSIVES SUBSTANCES

. . .

8.2 ASSIGNMENT OF PACKING GROUPS

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

a) *Packing Group I* is assigned to substances that cause full thickness destruction of intact skin tissue within an observation period of up to 60 minutes starting aft0er an exposure time of 3 minutes or less.

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

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

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

ii) are judged not to cause full thickness destruction of intact skin tissue but which exhibit a corrosion rate either on steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55°C when tested on both materials. For the purposes of testing steel, type S235JR+CR (1.0037 resp. St 37-2), S275J2G3+CR (1.0144 resp. St 44-3), ISO 3574, Unified Numbering System (UNS) G10200 or SAE 1020, and for testing aluminium, non-clad types 7075-T6 or AZ5GU-T6, must be used. An acceptable test is prescribed in the UN *Manual of Tests and Criteria*, Part III, Section 37.

Note.— Where an initial test on either steel or aluminium indicates the substance being tested is corrosive the follow up test on the other metal is not required.

Chapter 9

CLASS 9 — MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

. . .

9.2 ASSIGNMENT TO CLASS 9

9.2.1 Class 9 includes, inter alia:

a) Environmentally hazardous substances (aquatic environment), liquid or solid substances pollutant to the aquatic environment and solutions and mixtures of such substances (including preparations and wastes). See Part 3, Chapter 3, special provision A97. are those that meet the criteria in 2.9.3 of the UN Model Regulations or that meet criteria in international regulations or national regulations established by the national authority in a country of origin, transit or destination.

Substances or mixtures dangerous to the aquatic environment not otherwise classified under these Instructions must be assigned to packing group III and designated:

UN 3077 Environmentally hazardous substance, solid, n.o.s. or
UN 3082 Environmentally hazardous substance, liquid, n.o.s

. . .

Some examples of substances in Class 9 are:

— Blue, brown or white asbestos;

— Carbon dioxide, solid (dry ice);

~~Environmentally hazardous substance, liquid/solid, n.o.s.;~~

— Zinc dithionite.

. . .

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED ~~QUANTITIES~~ AND ~~EXCEPTIONS~~EXCEPTED QUANTITIES

. . .

Chapter 2

ARRANGEMENT OF THE DANGEROUS GOODS LIST (TABLE 3-1)

Parts of this Chapter are affected by State Variations AU 1, AU 2, AU 3, BE 3, CA 7, CA 8, CA 10, CA 11, CA 13, FR 1, GB 3, IR 3, NL 1, US 3, US 6, US 15, ZA 1; see Table A-1

2.1 ARRANGEMENT OF THE DANGEROUS GOODS LIST (TABLE 3-1)

2.1.1 The Dangerous Goods List (Table 3-1) is divided into ~~12~~ 13 columns as follows:

Column 1 "Name" — this column contains the alphabetically arranged list of dangerous goods, identified by their proper shipping names in boldface characters (see 1.2). Also included, in lightface type, are:

a) other names by which certain articles and substances may be known; in such cases a cross reference to the proper shipping name is given~~.~~;

b) names of articles and substances which are forbidden for carriage by air under any circumstances; and

c) names of articles and substances which are subject to additional considerations under special provisions.

An explanation of some of the terms used appears in Attachment 2.

. . .

Column 9 "Excepted Quantities" — this provides an alpha numeric code described in sub-section 5.1.2 which indicates the maximum quantity per inner and outer packaging for transporting dangerous goods as excepted quantities in accordance with Chapter 5.

. . .

Proposed amendments to Table 3-1 are presented in Attachments A, B and C to the report on this agenda item. Attachment A contains the amendments in UN No. order, Attachment B contains the same proposed amendments in alphabetical order and Attachment C contains the excepted quantity codes for new column 9.

Chapter 3

SPECIAL PROVISIONS

Table 3-2 lists the special provisions referred to in column 7 of Table 3-1 and the information contained in them is additional to that shown for the relevant entry. Where the wording of the special provision is equivalent to that in the UN Model Regulations the UN special provision number is shown in parentheses.

Table 3-2. Special provisions

TIs	*UN*	
A1		This commodity may be transported on passenger aircraft, only with the prior approval of the appropriate authority of the State of Origin under the written conditions established by that authority. The conditions must include the quantity limitations and packing requirements and these must comply with S-3;1.2.2 of the Supplement. A copy of the document of approval, showing the quantity limitations and packing requirements, must accompany the consignment. The commodity may be carried on cargo aircraft in accordance with columns 11 and 12 of Table 3-1. When States, other than the State of Origin, have notified ICAO that they require prior approval of shipments made under this special provision, approval must also be obtained from these States, as appropriate. This commodity may be transported on passenger aircraft and on cargo aircraft, only with the prior approval of the appropriate authority of the State of Origin under the written conditions established by the authority. Where States, other than the State of Origin, have notified ICAO that they require prior approval of shipments made under this special provision, approval must also be obtained from the States of transit, overflight and destination and of the State of the Operator, as appropriate. In each case the conditions must include the quantity limitations and packing requirements and these must comply with S-3;1.2.3 of the Supplement. A copy of the document(s) of approval, showing the quantity limitations and the packing and labelling requirements, must accompany the consignment.
A3	(223)	If the chemical or physical properties of a substance covered by this description are such that, when tested, it does not meet the established defining criteria for the class or division listed in column 3, or any other class or division, it is not subject to these Instructions.
A4		Liquids having a vapour inhalation toxicity of Packing Group I are forbidden on both passenger and cargo aircraft. Liquids having a mist inhalation toxicity of Packing Group I are forbidden on a passenger aircraft. They may be carried on cargo aircraft providing they are packed in accordance with the packing instructions for the Packing Group I substance and the maximum net quantity per package does not exceed 5 L.
A5		Solids having an inhalation toxicity of Packing Group I are forbidden on passenger aircraft. They may be carried on cargo aircraft providing they are packed in accordance with the packing instructions for the Packing Group I substance and the maximum net quantity per package does not exceed 15 kg.
A6	(43)	When offered for carriage as pesticides, these substances must be carried under the relevant pesticide entry and in accordance with the relevant pesticide provisions (see 2;6.2.3 and 2;6.2.4).
A7		Not used.
A8	(322)	When transported in non-friable tablet form, these goods are assigned to Packing Group III.
A9		Alcoholic beverages containing not more than 70 per cent alcohol by volume, when packed in receptacles of 5 litres or less, are not subject to these Instructions when carried as cargo.
A10	(39)	This substance is not subject to these Instructions when it contains less than 30 per cent or not less than 90 per cent silicon.
A11	(305)	These substances are not subject to these Instructions when in concentrations of not more than 50 mg/kg.
A12	(45)	Antimony sulphides and oxides which contain not more than 0.5 per cent of arsenic calculated on the total ~~weight~~ mass are not subject to these Instructions.

TIs	*UN*	
A13	(47)	Ferricyanides and ferrocyanides are not subject to these Instructions.
A14		The label conforming to Figure 5-13 may be used until 31 December 2010.
A15	(59)	These substances are not subject to these Instructions when they contain not more than 50 per cent magnesium.
A16	(62)	This substance is not subject to these Instructions when it does not contain more than 4 per cent sodium hydroxide.
A17		These substances must not be classified and transported unless authorized by the appropriate authority of the State of Origin on the basis of results from Series 2 tests and a Series 6(c) test on packages as prepared for transport.
A18	(66)	Mercurous chloride and cinnabar are not subject to these Instructions.
A19	(225)	Fire extinguishers under this entry may include installed actuating cartridges (cartridges, power device of Division 1.4C or 1.4S), without changing the classification of Division 2.2 provided the total quantity of deflagrating (propellant) explosives does not exceed 3.2 grams per extinguishing unit.
A20		During the course of transport this substance must be protected from direct sunlight and all sources of heat and be placed in an adequately ventilated area. A statement to this effect must be included in the Dangerous Goods Transport Document.
A21		This entry only applies to vehicles and equipment which are powered by wet batteries, sodium batteries or lithium batteries and which are transported with these batteries installed. Examples of such vehicles and equipment are electrically-powered cars, lawn mowers, wheelchairs and other mobility aids. Vehicles that also contain an internal combustion engine must be consigned under the entry Vehicle (flammable gas powered) or Vehicle (flammable liquid powered), as appropriate. Hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries or lithium batteries, transported with the battery(ies) installed, must be consigned under the entries UN 3166 **Vehicle, flammable gas powered** or UN 3166 **Vehicle, flammable liquid powered**, as appropriate.
A22		The classification of this substance will vary with particle size and packaging, but borderlines have not been experimentally determined. The appropriate classification must be made using the procedure for the classification of explosives.
A23	(325)	In the case of non-fissile or fissile excepted uranium hexafluoride, the material must be classified under UN 2978.
A24		The total quantity of explosive substance contained in the shaped charges and the detonating cord must not exceed 10 kg per assembled perforating gun.
A25	(205)	This entry must not be used for Pentachlorophenol (UN 3155).
A26		Refrigerating machines include air conditioning units and machines or other appliances which have been designed for the specific purpose of keeping food or other items at low temperature in an internal compartment. Refrigerating machines and refrigerating machine components are considered not subject to these Instructions if containing less than 12 kg of a gas in Division 2.2 or if containing less than 12 L ammonia solution (UN 2672).
A27	(276)	This includes any substance which is not covered by any of the other classes but which has narcotic, noxious or other properties such that, in the event of spillage or leakage on an aircraft, extreme annoyance or discomfort could be caused to crew members so as to prevent the correct performance of assigned duties.
A28	(135)	The dihydrated sodium salt of dichloroisocyanuric acid is not subject to these Instructions.
A29	(138)	p-Bromobenzyl cyanide is not subject to these Instructions.
A30	(273)	Maneb and maneb preparations stabilized against self-heating need not be classified in Division 4.2 when it can be demonstrated by testing that a cubic metre of the substance does not self-ignite and that the temperature at the centre of the sample does not exceed 200EC, when the sample is maintained at a temperature of not less than 75EC ± 2EC for a period of 24 hours.

TIs	*UN*	
A31	(141)	Products which have undergone sufficient heat treatment so they present no hazard during transport are not subject to these Instructions.
A32		Air bag~~s~~ inflators, air bag modules or seat-belt~~s~~ pretensioners installed in conveyances or in completed conveyance components such as steering columns, door panels, seats, etc., which are not capable of inadvertent activation are not subject to these Instructions. The words “not restricted” and the special provision number A32 must be provided on the air waybill when an air waybill is issued.
A33	(103)	Ammonium nitrites and mixtures of an inorganic nitrite with an ammonium salt are prohibited.
A34	(113)	The transport of chemically unstable mixtures is prohibited.
A35		This substance is not subject to these Instructions when: — mechanically produced, particle size more than 53 microns; or — chemically produced, particle size more than 840 microns.
A36		The provisions of Special Provision A2 apply to this entry for Packing Group I only and the provisions of Special Provision A1 apply to this entry for Packing Group II only, as applicable.
A37		This entry is not intended to include Ammonium permanganate, the transport of which is prohibited under any circumstances.
A38	(207)	Polymeric beads and moulding compounds may be made from polystyrene, poly(methyl methacrylate) or other polymeric material.
A39		This substance possesses some dangerous explosive properties when transported in large volumes.
A40	(28)	This substance may be transported under provisions of Division 4.1 only if it is so packed that the percentage of diluent will not fall below that stated at any time during transport.

TIs	*UN*	
A41		Permeation devices that contain dangerous goods and that are used for calibrating air quality monitoring devices are not subject to these Instructions provided the following requirements are met: a) Each device must be constructed of a material compatible with the dangerous goods it contains; b) The total contents of dangerous goods in each device is limited to 2 millilitres and the device must not be liquid full at 55EC; c) Each permeation device must be placed in a sealed, high impact-resistant, tubular inner packaging of plastic or equivalent material. Sufficient absorbent material must be contained in the inner packaging to completely absorb the contents of the device. The closure of the inner packaging must be securely held in place with wire, tape or other positive means; d) Each inner packaging must be contained in a secondary packaging constructed of metal, or plastic having a minimum thickness of 1.5 mm. The secondary packaging must be hermetically sealed; e) The secondary packaging must be securely packed in strong outer packaging. The completed package must be capable of withstanding, without breakage or leakage of any inner packaging and without significant reduction in effectiveness: i) the following free drops onto a rigid, non-resilient, flat and horizontal surface from a height of 1.8 m: — one drop flat on the bottom; — one drop flat on the top; — one drop flat on the long side; — one drop flat on the short side; — one drop on a corner at the junction of three intersecting edges; and ii) a force applied to the top surface for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3 m (including the test sample). *Note.— Each of the above tests may be performed on different but identical packages.* f) The gross mass of the completed package must not exceed 30 kg.
A42	(249)	Ferrocerium (lighter flints), stabilized against corrosion, with a minimum iron content of 10 per cent are not subject to these Instructions.
A43	(210)	Toxins from plant, animal or bacterial sources which contain infectious substances, or toxins that are contained in infectious substances, must be classified as Division 6.2.
A44		The entry ~~C~~chemical kit~~s~~ or first aid kit~~s include~~ is intended to apply to boxes, cases, etc., containing small ~~amounts~~ quantities of one or more compatible items of dangerous goods which are used, for example, for medical, analytical or testing or repair purposes. The only dangerous goods which are permitted in the kits are substances which may be transported as: a) excepted quantities as specified in column 9 of Table 3-1, ~~under 1;2.4.2.2~~ provided the inner packagings and quantities are as prescribed in ~~1;2.4.3 a) and 1;2.4.4 a)~~ 5.1.2 and 5.2.1 a); or b) limited quantities under 3;4.1.2.

Editorial Note.— For proposed amendment to A45, see the report on Agenda Item 5.4.

TIs	*UN*	
A46		Mixtures of solids which are not subject to these Instructions and flammable liquids may be transported under this entry without first applying the classification criteria of Division 4.1, providing there is no free liquid visible at the time the substance is packaged and the packaging must pass a leakproofness test at the Packing Group II level. Small inner packagings consisting of sealed packets or articles containing less than 10 mL of a Packing Group II or III flammable liquid absorbed into a solid material are not subject to these Instructions provided there is no free liquid in the packet or articles.
A47	(219)	Genetically modified micro-organisms and genetically modified organisms, which meet the definition of an infectious substance and the criteria for inclusion in Division 6.2 in accordance with 2;6, must be transported as UN 2814, UN 2900 or UN 3373, as appropriate.
A48		Packaging tests are not considered necessary.
A49		Other inert material or inert material mixture may be used at the discretion of the appropriate authority of the State of Origin, provided this inert material has identical phlegmatizing properties.
A50		Mixtures of solids which are not subject to these Instructions and toxic liquids may be transported under this entry without first applying the classification criteria of Division 6.1, providing there is no free liquid visible at the time the substance is packaged and the packaging must pass a leakproofness test at the Packing Group II level. This entry must not be used for solids containing a Packing Group I liquid.
A51		Irrespective of the limit specified in column 10 of Table 3-1, aircraft batteries up to a limit of 100 kg gross mass per package may be transported. Transport in accordance with this special provision must be noted on the dangerous goods transport document.
A52	(228)	Mixtures not meeting the criteria for flammable gases (Division 2.1) must be transported under UN 3163.
A53	(37)	This substance is not subject to these Instructions when coated.
A54	(32)	This substance is not subject to these Instructions when in any other form.
A55	(142)	Solvent extracted soya bean meal containing not more than 1.5 per cent oil and not more than 11 per cent moisture, which is substantially free of flammable solvent, is not subject to these Instructions.
A56		This entry applies to articles which contain Class 1 explosive substances and which may also contain dangerous goods of other classes. These articles are used as lifesaving vehicle air bag inflators or air bag modules or seat belt pretensioners. The quantities given in columns 10 and 12 of Table 3-1 refer to the net mass of the finished article. *Note.— For the carriage of a vehicle, see Packing Instruction 900.*
A57		Packagings must be so constructed that explosion is not possible by reason of increased internal pressure.
A58	(144)	An aqueous solution containing not more than 24 per cent alcohol by volume is not subject to these Instructions.
A59		A tire assembly unserviceable or damaged is not subject to these Instructions if the tire is completely deflated. A tire assembly with a serviceable tire is not subject to these Instructions provided the tire is not inflated to a gauge pressure exceeding the maximum rated pressure for that tire. However, such tires (including valve assemblies) must be protected from damage during transport, which may require the use of a protective cover.
A60	(215)	This entry only applies to the technically pure substance or to formulations derived from it having an SADT higher than 75EC and therefore does not apply to formulations which are self-reactive substances. (For self-reactive substances, see 2;4.2.3. Table 2-6). Homogeneous mixtures containing not more than 35 per cent by mass of azocarbonamide and at least 65 per cent of inert substance are not subject to these Instructions unless criteria of other classes or divisions are met.
A61	(168)	Asbestos which is immersed or fixed in a natural or artificial binder (such as cement, plastics, asphalt, resins or mineral ore) in such a way that no escape of hazardous quantities of respirable asbestos fibres can occur during transport is not subject to these Instructions. Manufactured articles, containing asbestos and not meeting this requirement, are nevertheless not subject to these Instructions, when packed so that no escape of hazardous quantities of respirable asbestos fibres can occur during transport.

TIs	*UN*	
A62	(178)	This designation must be used only when no other appropriate designation exists in the list and then only with the approval of the appropriate authority of the State of Origin.
A63		Not used.
A64	(306)	This entry may only be used for substances that do not exhibit explosive properties of Class 1 when tested in accordance with test series 1 and 2 of Class 1 (see UN *Manual of Tests and Criteria*, Part I).
A65	(270)	Aqueous solutions of Division 5.1 inorganic solid nitrate substances are considered as not meeting the criteria of Division 5.1 if the concentration of the substances in solution at the minimum temperature encountered in transport is not greater than 80 per cent of the saturation limit.
A66		Polyester resin kits consist of two components: a base material (Class 3, Packing Group II or III) and an activator (Division 5.2). The organic peroxide must be type D, E or F, not requiring temperature control. ~~Only organic peroxides that are authorized for transport on passenger aircraft are permitted in the kits. Those requiring temperature control are forbidden.~~ Packing Group II or III is assigned according to the criteria for Class 3, ~~applied~~ applies to the base material. The quantity limit shown for a limited quantity packing instruction in column 10 of Table 3-1 applies to the base material.
A67		Non-spillable batteries meeting the requirements of Packing Instruction 806 are not subject to these Instructions if, at a temperature of 55°C, the electrolyte will not flow from a ruptured or cracked case. The battery must not contain any free or unabsorbed liquid. ~~When packaged for transport, the terminals must be protected from short circuit such as by the use of non-conductive caps that entirely cover the terminals.~~ Any electrical battery or battery powered device, equipment or vehicle having the potential of dangerous evolution of heat must be prepared for transport so as to prevent: a) a short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or in the case of equipment, by disconnection of the battery and protection of exposed terminals); and b) unintentional activation. The words "not restricted" and the special provision number A67 must be provided on the air waybill when an air waybill is issued.
A68	(272)	This substance must not be transported under the provisions of Division 4.1 unless specifically authorized by the appropriate national authority. (See UN 0143.)
A69		Articles, each containing not more than 100 mg of mercury, gallium or inert gas and packaged so that the quantity of mercury, gallium or inert gas per package does not exceed 1 g, are not subject to these Instructions when carried as cargo. The words "not restricted" and the special provision number A69 must be provided on the air waybill when an air waybill is issued.
A70		Internal combustion engines being shipped either separately or incorporated into a machine or other apparatus, the fuel tank of which has never contained any fuel~~,~~ and the fuel system of which is completely empty of fuel, or that are powered by a fuel that does not meet the classification criteria for any class or division, and without batteries or other dangerous goods, are not subject to these Instructions. The words "not restricted" and the special provision number A70 must be provided on the air waybill when an air waybill is issued.
A71	(38)	This substance is not subject to these Instructions when it contains not more than 0.1 per cent calcium carbide.
A72	(163)	A substance specifically listed by name in Table 3-1 must not be transported under this entry. Materials transported under this entry may contain 20 per cent or less nitrocellulose provided the nitrocellulose contains not more than 12.6 per cent nitrogen.
A73	(237)	The membrane filters, including paper separators, coating, or backing materials, etc., that are present in transport, must not be liable to propagate a detonation as tested by one of the tests described in the UN *Manual of Tests and Criteria*, Part I, Test Series 1(a). In addition, the appropriate authority may determine, on the basis of the results of suitable burning rate tests taking account of the standard tests in the UN *Manual of Tests and Criteria,* Part III, subsection 33.2.1, that nitrocellulose membrane filters in the form in which they are to be transported are not subject to the provisions of these Instructions applicable to flammable solids in Division 4.1.

TIs	UN	
A74	(169)	Phthalic anhydride in the solid state and tetrahydrophthalic anhydrides, with not more than 0.05 per cent maleic anhydride, are not subject to these Instructions. Phthalic anhydride molten at a temperature above its flash point, with not more than 0.05 per cent maleic anhydride, must be classified under UN 3256.
A75		Articles such as sterilization devices, when containing less than 30 mL per inner packaging with not more than 150 mL per outer packaging, may be transported on passenger and cargo aircraft in accordance with the provisions in 1;2.4, irrespective of 1;2.4.2.2 and the indication of "forbidden" in columns 9 to 12 of the Dangerous Goods List (Table 3-1), provided such packagings were first subjected to comparative fire testing. Comparative fire testing must show no difference in burning rate between a package as prepared for transport (including the substance to be transported) and an identical package filled with water.
A76	(326)	In the case of fissile uranium hexafluoride, the material must be classified under UN 2977.
A77		Mixtures of solids which are not subject to these Instructions and corrosive liquids may be transported under this entry without first applying the classification criteria of Class 8, providing there is no free liquid visible at the time the substance is packaged and the packaging must pass a leakproofness test at the packing group II level.
A78		Radioactive material with a subsidiary risk must: a) be labelled with subsidiary risk labels corresponding to each subsidiary risk exhibited by the material in accordance with the relevant provisions of 5;3.2; corresponding placards must be affixed to transport units in accordance with the relevant provisions of 5;3.6; b) be allocated to Packing Groups I, II or III, as and if appropriate, by application of the grouping criteria provided in Part 2 corresponding to the nature of the predominant subsidiary risk. The description required in 5;4.1.5.7.1 b) must include a description of these subsidiary risks (e.g. "Subsidiary risk: 3,6.1"), the name of the constituents which most predominantly contribute to this (these) subsidiary risk(s) and, where applicable, the packing group. Radioactive material with a subsidiary risk of Division 4.2 (Packing Group I) must be transported in Type B packages. Radioactive material with a subsidiary risk of Division 2.1 is forbidden from transport on passenger aircraft, and radioactive material with a subsidiary risk of Division 2.3 is forbidden from transport on passenger or cargo aircraft except with the prior approval of the appropriate authority of the State of Origin under the conditions established by that authority. A copy of the document of approval, showing the quantity limitations and the packaging requirements, must accompany the consignment.
A79	(307)	This entry may only be used for uniform mixtures containing ammonium nitrate as the main ingredient within the following composition limits: a) not less than 90 per cent ammonium nitrate with not more than 0.2 per cent total combustible/organic material calculated as carbon and with added matter, if any, which is inorganic and inert towards ammonium nitrate; or b) less than 90 per cent but more than 70 per cent ammonium nitrate with other inorganic materials or more than 80 per cent but less than 90 per cent ammonium nitrate mixed with calcium carbonate and/or dolomite and/or mineral calcium sulphate and not more than 0.4 per cent total combustible/organic material calculated as carbon; or c) nitrogen type ammonium nitrate based fertilizers containing mixtures of ammonium nitrate and ammonium sulphate with more than 45 per cent but less than 70 per cent ammonium nitrate and not more than 0.4 per cent total combustible/organic material calculated as carbon such that the sum of the percentage composition of ammonium nitrate and ammonium sulphate exceeds 70 per cent.
A80	(220)	The technical name of the flammable liquid component only of this solution or mixture must be shown in parenthesis immediately following the proper shipping name.
A81		The quantity limit shown in column 10 does not apply to body fluids known to contain or suspected of containing infectious substances provided they are not in risk group 4, when in primary receptacles not exceeding 1000 mL, and in outer packagings not exceeding 4 L. The quantity limits shown in columns 10 and 12 do not apply to body parts, organs or whole bodies known to contain or suspected of containing infectious substances.
A82	(177)	Barium sulphate is not subject to these Instructions.

TIs	*UN*	
A83	(208)	The commercial grade of calcium nitrate fertilizer, when consisting mainly of a double salt (calcium nitrate and ammonium nitrate) containing not more than 10 per cent ammonium nitrate and at least 12 per cent water of crystallization, is not subject to these Instructions.
A84	(182)	The group of alkali metals includes lithium, sodium, potassium, rubidium and caesium.
A85	(183)	The group of alkaline earth metals includes magnesium, calcium, strontium and barium.
A86	(241)	The formulation must be prepared so that it remains homogeneous and does not separate during transport. Formulations with low nitrocellulose contents are not subject to these Instructions provided that 1) they do not exhibit dangerous properties when tested for their liability to detonate, deflagrate or explode when heated under defined confinement by tests of test series 1(a), 2(b) and 2(c) respectively in the UN *Manual of Tests and Criteria* and 2) they are not flammable solids when tested in accordance with test N1 in the UN *Manual of Tests and Criteria*, Part III, subsection 3.3.2.1.4 (chips, if necessary, crushed and sieved to a particle size of less than 1.25 mm).
A87		Articles which are not fully enclosed by packaging, crates or other means that prevent ready identification are not subject to the marking requirements of 5;2 or the labelling requirements of 5;3.
A88		Prototype lithium batteries and cells to be tested that are packed with not more than 24 cells or 12 batteries per packaging that have not been tested to the requirements in subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the following requirements are met: a) the cells and batteries must be transported in an outer packaging that is a metal, plastic or plywood drum or a metal, plastic or wooden box and that meets the criteria for Packing Group I packagings; and b) each cell and battery must be individually packed in an inner packaging inside an outer packaging and surrounded by cushioning material that is non-combustible, and non-conductive. Cells and batteries must be protected against short circuiting.
A89	(186)	In determining the ammonium nitrate content, all nitrate ions for which a molecular equivalent of ammonium ions is present in the mixture shall be calculated as ammonium nitrate.
A90	(193)	This entry may only be used for uniform ammonium nitrate based fertilizer mixtures of the nitrogen, phosphate or potash type, containing not more than 70 per cent ammonium nitrate and not more than 0.4 per cent total combustible/organic material calculated as carbon or with not more than 45 per cent ammonium nitrate and unrestricted combustible material. Fertilizers within these composition limits are not subject to these Instructions if shown by a Trough Test (see UN *Manual of Tests and Criteria*, Part III, subsection 38.2) not to be liable to self-sustaining decomposition.
A91	(198)	A nitrocellulose solution containing not more than 20 per cent nitrocellulose may be transported under the requirements for “Paint” or “Printing ink” as applicable; see UN 1210, 1263~~ and~~, 3066, 3469 and 3470.
A92	(199)	Lead compounds which, when mixed in a ratio of 1:1000 with 0.07 M hydrochloric acid and stirred for 1 hour at a temperature of 23°C ±2°C, exhibit a solubility of 5 per cent or less ~~are considered insoluble~~ (see ISO 3711:1990 *“Lead chromate pigments and lead chromate-molybdate pigments — Specifications and methods of test”*) are considered insoluble and are not subject to these Instructions unless they meet the criteria for inclusion in another hazard class or division.
A93		A heat-producing article is not subject to these Instructions when the heat-producing component or the energy source is removed to prevent unintentional functioning during transport. The words “not restricted” and the special provision number A93 must be provided on the air waybill when an air waybill is issued.
A94		Batteries or cells containing sodium must not contain dangerous goods other than sodium, sulphur and/or polysulphides. Batteries or cells must not be offered for transport at a temperature such that liquid elemental sodium is present in the battery or cell unless approved and under the conditions established by the appropriate national authority. Cells must consist of hermetically sealed metal casings which fully enclose the dangerous goods and which are so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport. Batteries must consist of cells secured within and fully enclosed by a metal casing so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport.

TIs	*UN*	
A95	(203)	This entry is not to be used for Polychlorinated biphenyls (UN 2315).
A96	(196)	Only formulations which in laboratory testing neither detonate in the cavitated state nor deflagrate, which show no effect when heated under confinement and which exhibit no explosive power may be transported under this entry. The formulation must also be thermally stable (i.e. the SADT is 60EC or higher for a 50 kg package). Formulations not meeting these criteria must be transported under the appropriate provisions of Division 5.2.
A97		These entries may be used for substances which are hazardous to the environment but do not meet the classification criteria of any other class or other substance within Class 9. This must be based on the criteria as indicated in 2;9.2.1 a)~~in the Regulations of other modes of transport or criteria recognized by the appropriate authority of the State of origin, transit or destination~~. This designation may also be used for wastes not otherwise subject to these Instructions but which are covered under the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*. ~~*Note. — If any document has been issued in relation to such designation, it is not required to accompany a consignment.*~~
A98		Aerosols, gas cartridges and receptacles, small, containing gas with a capacity not exceeding 50 ml, containing no constituents subject to these Instructions other than a Division 2.2 gas, are not subject to these Instructions unless their release could cause extreme annoyance or discomfort to crew members so as to prevent the correct performance of assigned duties. The words "not restricted" and the special provision number A98 must be provided on the air waybill when an air waybill is issued.
A99		Irrespective of the limit specified in column 12 of Table 3-1, a lithium battery or battery assembly that has successfully passed the tests specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, and that meets the requirements of Packing Instruction 903 as prepared for transport may have a mass exceeding 35 kg G, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
A100	(243)	Gasoline, motor spirit and petrol for use in spark-ignition engines (e.g. in automobiles, stationary engines and other engines) must be assigned to this entry regardless of variations in volatility.
A101	(227)	When phlegmatized with water and inorganic inert material, the content of urea nitrate may not exceed 75 per cent by mass and the mixture must not be capable of being detonated by the series 1 type (a) test in the UN *Manual of Tests and Criteria*, Part I.
A102	(244)	This listing includes aluminium dross, aluminium skimmings, spent cathodes, spent potliner and aluminium salt slags.
A103		Flammable liquefied gases must be contained within refrigerating machine components. These components must be designed and tested to at least three times the working pressure of the machinery. The refrigerating machines must be designed and constructed to contain the liquefied gas and preclude the risk of bursting or cracking of the pressure-retaining components during normal conditions of transport. Refrigerating machines and refrigerating machine components are considered not subject to these Instructions if containing less than 100 g flammable, non-toxic, liquefied gas.
A104		A toxic subsidiary risk label, although not required by these Instructions, may be applied.
A105	(242)	Sulphur is not subject to these Instructions when it has been formed to a specific shape (e.g. prills, granules, pellets, pastilles or flakes).

TIs	UN	
A106		This entry may only be used for samples of chemicals taken for analysis in connection with the implementation of the Chemical Weapons Convention. They may be transported on a passenger or cargo aircraft providing prior approval has been granted by the appropriate authority of the State of Origin or the Director General of the Organization for the Prohibition of Chemical Weapons and providing the samples comply with the requirements shown against the entry for chemical samples in Table S-3-1 of the Supplement. The substance is assumed to meet the criteria of Packing Group I for Division 6.1. Subsidiary risk labelling is not required. A copy of the document of approval showing the quantity limitations and the packing requirements must accompany the consignment. *Note.— The transport of substances under this description must be in accordance with chain of custody and security procedures specified by the Organization for the Prohibition of Chemical Weapons.*
A107		This entry only applies to machinery or apparatus containing dangerous goods as a residue or as an integral element of the machinery or apparatus. It must not be used for machinery or apparatus for which a proper shipping name already exists in Table 3-1.
A108		The provisions of Special Provision A1 apply to this entry for Packing Group I only.
A109		This commodity may be transported on cargo aircraft, only with the prior approval of the appropriate authority of the State of Origin under the written conditions established by that authority. The conditions must include the quantity limitations and packing requirements and these must comply with S-3;1.2.4 of the Supplement. A copy of the document of approval, showing the quantity limitations and packing requirements, must accompany the consignment. Where States, other than the State of Origin, have notified ICAO that they require prior approval of shipments made under this special provision, approval must also be obtained from these States, as appropriate.
A110	(226)	Formulations of these substances containing not less than 30 per cent non-volatile, non-flammable phlegmatizer are not subject to these Instructions.
A111		Oxygen generators, chemical, that have passed their expiration date, are unserviceable or that have been used are forbidden for transport.
A112		Consumer commodities may only include substances of Class 2 (non-toxic aerosols only), Class 3, Packing Group II or III, Division 6.1 (Packing Group III only), UN 3077, UN 3082 and UN 3175, provided such substances do not have a subsidiary risk. Dangerous goods that are forbidden for transport aboard passenger aircraft must not be transported as consumer commodities.
A113	(279)	The substance is assigned to this classification or Packing Group based on human experience rather than the strict application of classification criteria set out in the Instructions.

TIs	*UN*	
A114	(283)	Articles, containing gas, intended to function as shock absorbers, including impact energy absorbing devices, or pneumatic springs are not subject to these Instructions provided: a) each article has a gas space capacity not exceeding 1.6 litres and a charge pressure not exceeding 280 bar where the product of the capacity (litres) and charge pressure (bars) does not exceed 80 (i.e. 0.5 litre gas space and 160 bar change pressure, 1 litre gas space and 80 bar charge pressure, 1.6 litre gas space and 50 bar charge pressure, 0.28 litre gas space and 280 bar charge pressure); b) each article has a minimum burst pressure of 4 times the charge pressure at 20°C for products not exceeding 0.5 litre gas space capacity and 5 times charge pressure for products greater than 0.5 litre gas space capacity; c) each article is manufactured from material which will not fragment upon rupture; d) each article is manufactured in accordance with a quality assurance standard acceptable to the appropriate national authority; and e) the design type has been subjected to a fire test demonstrating that pressure in the article is relieved by means of a fire-degradable seal or other pressure-relief device such that the article will not fragment and the article does not rocket.
A115	(280)	This entry applies to articles which are used as lifesaving vehicle air bag inflators, or air bag modules or seat belt pretensioners, and which contain dangerous goods of Class 1 or dangerous goods of other classes and when transported as component parts and when these articles as presented for transport have been tested in accordance with test series 6 (c) of Part I of the UN *Manual of Tests and Criteria*, with no explosion of the device, no fragmentation of the device casing or pressure vessel, no projection hazard and no thermal effect which would significantly hinder firefighting or other emergency response efforts in the immediate vicinity.
A121		Not used.
A122	(286)	Nitrocellulose membrane filters covered by this entry, each with a mass not exceeding 0.5 g, are not subject to these Instructions when contained individually in an article or a sealed packet.
A123		This entry applies to Batteries, electric storage, not otherwise listed in Table 3-1. Examples of such batteries are: alkali-manganese, zinc-carbon, nickel-metal hydride and nickel-cadmium batteries. Any electrical battery or battery-powered device, equipment or vehicle having the potential of a dangerous evolution of heat ~~that is not prepared~~ must be prepared for transport so as to prevent: a) ~~-~~a short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or, in the case of equipment, by disconnection of the battery and protection of exposed terminals); and b) unintentional activation~~is forbidden from transport~~. The words “not restricted” and the special provision number A123 must be provided on the air waybill when an air waybill is issued.
A124	(292)	Mixtures containing not more than 23.5 per cent oxygen by volume may be transported under this entry when no other oxidizing gases are present. A Division 5.1 subsidiary risk label is not required for any concentrations within this limit.
A125	(293)	The following definitions apply to matches: a) Fusee matches are matches the heads of which are prepared with a friction-sensitive igniter composition and a pyrotechnic composition which burns with little or no flame, but with intense heat; b) Safety matches are combined with or attached to the box, book or card that can be ignited by friction only on a prepared surface; c) Strike anywhere matches are matches that can be ignited by friction on a solid surface; d) Wax Vesta matches are matches that can be ignited by friction either on a prepared surface or on a solid surface.
A126		Not used.

TIs	*UN*	
A127		Not used.
A128	(153)	This entry only applies if it is demonstrated, on the basis of tests, that the substances, when in contact with water are not combustible nor show a tendency to auto-ignition and that the mixture of gases evolved is not flammable.
A129	(252)	Provided the ammonium nitrate remains in solution under all conditions of transport, aqueous solutions of ammonium nitrate, with not more than 0.2 per cent combustible material, in a concentration not exceeding 80 per cent are not subject to these Instructions.
A130		When this material meets the definitions and criteria of other classes or divisions as defined in Part 2, it must be classified in accordance with the predominant subsidiary risk. Such material must be declared under the proper shipping name and UN number appropriate for the material in that predominant Class or division, with the addition of the name applicable to this radioactive material according to column 1 of the Dangerous Goods List, and must be transported in accordance with the provisions applicable to that UN number. In addition, all other requirements specified in ~~2;7.9.1~~ 1;6.1.5 must apply.
A131		Sterilization devices, when containing less than 30 mL per inner packaging with not more than 300 mL per outer packaging, may be transported on passenger and cargo aircraft in accordance with the provisions in 1;2.4, irrespective of 1;2.4.2.2 and the indication of "Forbidden" in columns 9 to 12 of the Dangerous Goods List (Table 3-1). In addition, after filling, each inner packaging must be determined to be leak-tight by placing the inner packaging in a hot water bath at a temperature, and for a period of time, sufficient to ensure that an internal pressure equal to the vapour pressure of ethylene oxide at 55°C is achieved. Any inner packaging showing evidence of leakage, distortion or other defect under this test may not be transported under the terms of this special provision. In addition to the packaging required by 1;2.4, inner packagings must be placed in a sealed plastics bag compatible with ethylene oxide and capable of containing the contents in the event of breakage or leakage of the inner packaging. Glass inner packagings must be placed within a protective shield capable of preventing the glass from puncturing the plastics bag in the event of damage to the packaging (e.g. crushing).
A132	(204)	Articles containing smoke-producing substance(s) corrosive according to the criteria for Class 8 must be labelled with a "Corrosive" subsidiary risk label.
A133		Substances must not be transported under this entry unless approved by the appropriate national authority on the basis of the results of appropriate tests according to Part I of the UN *Manual of Tests and Criteria*. Packaging must ensure that the percentage of diluent does not fall below that stated in the appropriate authority approval at any time during transport.
A134	(312)	Vehicles which contain an internal combustion engine must be consigned under the entries UN 3166 **Vehicle, flammable gas powered** or UN 3166 **Vehicle, flammable liquid powered**, as appropriate. These entries include hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries or lithium batteries, transported with the battery(ies) installed.
A135	(313)	Substances and mixtures meeting the criteria for Class 8 must be labelled with a "Corrosive" subsidiary risk label.
A136	(314)	a) These substances are liable to exothermic decomposition at elevated temperatures. Decomposition can be initiated by heat or by impurities (e.g. powdered metals (iron, manganese, cobalt, magnesium) and their compounds). b) During the course of transport, these substances must be shaded from direct sunlight and all sources of heat and be placed in adequately ventilated areas.
A137	(315)	This entry must not be used for Division 6.1 substances that meet the inhalation toxicity criteria for Packing Group I described in 2;6.2.2.4.3.
A138	(316)	This entry applies only to calcium hypochlorite, dry, when transported in non-friable tablet form.
A139	(317)	"Fissile-excepted" applies only to those packages complying with 6;7.10.2.
A140	(318)	For the purposes of documentation, the proper shipping name must be supplemented with the technical name (see 1.2.7). Technical names need not be shown on the package. When the infectious substances to be transported are unknown, but suspected of meeting the criteria for inclusion in category A and assignment to UN 2814 or UN 2900, the words "suspected category A infectious substance" must be shown, in parentheses, following the proper shipping name on the transport document, but not on the outer packagings.
A141		Not used.

TIs	*UN*	
A142		Not used.
A143	(321)	These storage systems must always be considered as containing hydrogen.
A144		Protective breathing equipment (PBE) containing a small chemical oxygen generator for use by aircrew members may be transported on passenger aircraft in accordance with Packing Instruction 523 subject to the following conditions: a) the PBE must be serviceable and contained in the manufacturer's original unopened inner packaging (i.e. vacuum sealed bag and protective container); b) the PBE may only be consigned by, or on behalf of, an operator in the event that a PBE(s) has been rendered unserviceable or has been used and there is a need to replace such items so as to restore the number of PBEs on an aircraft to that required by pertinent airworthiness requirements and operating regulations; c) a maximum of two PBE may be contained in a package; d) the statement "Aircrew protective breathing equipment (smoke hood) in accordance with Special Provision A144" must be: (i) included on the dangerous goods transport document; (ii) marked adjacent to the proper shipping name on the package. All other requirements applicable to chemical oxygen generators must apply except that the "cargo aircraft only" handling label must not be displayed.
A145		This entry applies to fuel cell cartridges containing flammable liquids, including methanol or methanol/water solutions. Fuel cell cartridge means a container that stores fuel for discharge into fuel cell powered equipment through a valve(s) that controls the discharge of fuel into such equipment and is free of electric charge generating components. The cartridge must be designed and constructed to prevent the fuel from leaking during normal conditions of transport. This entry applies to fuel cell cartridge design types shown without their packaging to pass an internal pressure test at a pressure of 100 kPa (gauge).
A146	(328)	This entry applies to fuel cell cartridges ~~containing flammable liquids, including methanol or methanol/water solutions.~~ including when contained in equipment or packed with equipment. Fuel cell cartridges installed in or integral to a fuel cell system are regarded as contained in equipment. Fuel cell cartridge means an ~~container~~ article that stores fuel for discharge into the fuel cell ~~powered equipment~~ through a valve(s) that controls the discharge of fuel into ~~such equipment and is free of electric charge generating components~~ the fuel cell. ~~The cartridge~~ Fuel cell cartridges, including when contained in equipment, must be designed and constructed to prevent ~~the~~ fuel ~~from~~ leak~~ing~~age ~~during~~ under normal conditions of transport. ~~This entry applies to f~~Fuel cell cartridge design types ~~shown without their packaging to~~ using liquids as fuels must pass an internal pressure test at a pressure of 100 kPa (gauge) without leakage.. Except for fuel cell cartridges containing hydrogen in metal hydride which must be in compliance with A162, each fuel cell cartridge design type, including fuel cell cartridges installed in or integral to a fuel cell system, must be shown to pass a 1.2 meter drop test onto an unyielding surface in the orientation most likely to result in failure of the containment system with no loss of contents.
A147	(329)	Where substances have a flash point of 60°C or less, the package(s) must bear a "FLAMMABLE LIQUID" subsidiary risk label in addition to the hazard label(s) required by these Instructions.
A148	(330)	~~Alcohols containing petroleum products (e.g. gasoline) up to 5 per cent must be transported under the entry UN 1987 **Alcohols, n.o.s.**~~Not used.
A149		Not used.
A150		An additional subsidiary risk hazard label may be required by a Note found adjacent to the technical name entry in Table 2-7.

TIs	*UN*	
A151		When dry ice is used as a refrigerant for other than dangerous goods loaded in a unit load device or other type of pallet, the quantity limits per package shown in columns 10 and 12 of Table 3-1 for dry ice do not apply. In such case, the unit load device or other type of pallet must be identified to the operator and must allow the venting of the carbon dioxide gas to prevent a dangerous build-up of pressure.
A152		Insulated packagings containing refrigerated liquid nitrogen fully absorbed in a porous material and intended for transport, at low temperature, of non-dangerous products are not subject to these Instructions provided the design of the insulated packaging would not allow the build-up of pressure within the container and would not permit the release of any refrigerated liquid nitrogen irrespective of the orientation of the insulated packaging. The words "not restricted" and the special provision number A152 must be provided on the air waybill when an air waybill is issued.
A153		Not used. ~~Plastic aerosols of a capacity greater than 120 mL (IP.7C) are permitted only when the propellant is non-flammable and non-toxic and the contents are not dangerous goods in accordance with the provisions of the Technical Instructions.~~
A154		Lithium batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).
A155	(332)	Magnesium nitrate hexahydrate is not subject to these Instructions.
A156	(333)	Ethanol and gasoline, motor spirit or petrol mixtures for use in spark-ignition engines (e.g. in automobiles, stationary engines and other engines) must be assigned to this entry regardless of variations in volatility.
A157	(334)	A fuel cell cartridge may contain an activator provided it is fitted with two independent means of preventing unintended mixing with the fuel during transport.
A158	(335)	Mixtures of solids which are not subject to these Instructions and environmentally hazardous liquids or solids must be classified as UN 3077 and may be transported under this entry, provided there is no free liquid visible at the time the substance is loaded or at the time the packaging is closed. Sealed packets and articles containing less than 10 mL of an environmentally hazardous liquid, absorbed into a solid material but with no free liquid in the packet or article, or containing less than 10 g of an environmentally hazardous solid, are not subject to these Instructions.
A159	(336)	A single package of non-combustible solid LSA-II or LSA-III material must not contain an activity greater than 3000 A_2.
A160	(337)	Type B(U) and Type B(M) packages, must not contain activities greater than the following: a) For low dispersible radioactive material: as authorized for the package design as specified in the certificate of approval; b) For special form radioactive material: 3000 A_1 or 100 000 A_2, whichever is the lower; or c) For all other radioactive material: 3000 A_2.`
A161	(338)	Each fuel cell cartridge transported under this entry and designed to contain a liquefied flammable gas must: a) be capable of withstanding, without leakage or bursting, a pressure of at least two times the equilibrium pressure of the contents at 55°C; b) not contain more than 200 mL of liquefied flammable gas with a vapour pressure not exceeding 1 000 kPa at 55°C; and c) pass the hot water bath test prescribed in 6;5.4.1.
A162	(339)	Fuel cell cartridges containing hydrogen in a metal hydride transported under this entry must have a water capacity less than or equal to 120 mL. The pressure in the fuel cell cartridge must not exceed 5 MPa at 55°C. The design type must withstand, without leaking or bursting, a pressure of two (2) times the design pressure of the cartridge at 55°C or 200 kPa more than the design pressure of the cartridge at 55°C, whichever is greater. The pressure at which this test is conducted is referred to in the drop test and the hydrogen cycling test as the "minimum shell burst pressure".

TIs *UN*

Fuel cell cartridges must be filled in accordance with procedures provided by the manufacturer. The manufacturer must provide the following information with each fuel cell cartridge:

a) inspection procedures to be carried out before initial filling and before refilling of the fuel cell cartridge;

b) safety precautions and potential hazards to be aware of;

c) method for determining when the rated capacity has been achieved;

d) minimum and maximum pressure range;

e) minimum and maximum temperature range; and

f) any other requirements to be met for initial filling and refilling including the type of equipment to be used for initial filling and refilling.

The fuel cell cartridges must be designed and constructed to prevent fuel leakage under normal conditions of transport. Each cartridge design type, including cartridges integral to a fuel cell, must be subjected to and must pass the following tests:

Drop test

A 1.8 metre drop test onto an unyielding surface in four different orientations:

a) vertically, on the end containing the shut-off valve assembly;

b) vertically, on the end opposite to the shut-off valve assembly;

c) horizontally, onto a steel apex onto a steel apex with a diameter of 38 mm, with the steel apex in the upward position; and

d) at a 45° angle on the end containing the shut-off valve assembly.

There must be no leakage, determined by using a soap bubble solution or other equivalent means on all possible leak locations, when the cartridge is charged to its rated charging pressure. The fuel cell cartridge must then be hydrostatically pressurized to destruction. The recorded burst pressure must exceed 85 per cent of the minimum shell burst pressure.

Fire test

A fuel cell cartridge filled to rated capacity with hydrogen must be subjected to a fire engulfment test. The cartridge design, which may include a vent feature integral to it, is deemed to have passed the fire test if:

a) the internal pressure vents to zero gauge pressure without rupture of the cartridge; or

b) the cartridge withstands the fire for a minimum of 20 minutes without rupture.

Hydrogen cycling test

This test is intended to ensure that a fuel cell cartridge design stress limits are not exceeded during use.

The fuel cell cartridge must be cycled from not more than 5 per cent rated hydrogen capacity to not less than 95 per cent rated hydrogen capacity and back to not more than 5 per cent rated hydrogen capacity. The rated charging pressure must be used for charging and temperatures must be held within the operating temperature range. The cycling must be continued for at least 100 cycles.

Following the cycling test, the fuel cell cartridge must be charged and the water volume displaced by the cartridge must be measured. The cartridge design is deemed to have passed the hydrogen cycling test if the water volume displaced by the cycled cartridge does not exceed the water volume displaced by an uncycled cartridge charged to 95 per cent rated capacity and pressurized to 75 per cent of its minimum shell burst pressure.

Production leak test

Each fuel cell cartridge must be tested for leaks at 15°C ± 5°C, while pressurized to its rated charging pressure. There must be no leakage, determined by using a soap bubble solution or other equivalent means on all possible leak locations.

Each fuel cell cartridge must be permanently marked with the following information:

a) the rated charging pressure in megapascals (MPa);

b) the manufacturer's serial number of the fuel cell cartridges or unique identification number; and

TIs	*UN*	
		c) the date of expiry based on the maximum service life (year in four digits; month in two digits).
A163	(340)	Chemical kits, first aid kits and polyester resin kits containing dangerous goods in inner packagings which do not exceed the quantity limits for excepted quantities applicable to individual substances as specified in column 9 of Table 3-1 may be transported in accordance with 3;5. Division 5.2 substances, although not individually authorized as excepted quantities in Table 3-1, are authorized in such kits and are assigned Code E2 (see 5.1.2).
A164		Any electrical battery or battery powered device, equipment or vehicle having the potential of a dangerous evolution of heat must be prepared for transport so as to prevent: a) a short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or in the case of equipment, by disconnection of the battery and protection of exposed terminals); and b) unintentional activation.

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Chapter 4

DANGEROUS GOODS IN LIMITED QUANTITIES

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4.1 APPLICABILITY

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4.1.2 Only dangerous goods which are permitted on passenger aircraft and which meet the criteria of the following classes, divisions and packing groups (if appropriate) may be carried under these provisions for dangerous goods in limited quantities:

≠	~~Divisions 2.1 and 2.2~~	~~UN 1950 and UN 2037 without subsidiary risk~~
	Class 2	Only UN 1950 in Divisions 2.1 and 2.2, and UN 2037 in Divisions 2.1 and 2.2 without a subsidiary risk

. . .

Insert new chapter 5 as follows:

Chapter 5

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

5.1 Excepted quantities

5.1.1 Excepted quantities of dangerous goods of certain classes, other than articles, meeting the provisions of this chapter are not subject to any other provisions of these Instructions except for:

a) the training requirements in 1;4;

b) the classification procedures and packing group criteria in Part 2; and

c) the packaging requirements of 4;1.1.1, 4;1.1.3.1, 4;1.1.5, 4;1.1.6 and 4;1.1.7.

Note.— In the case of radioactive material, the requirements for radioactive material in excepted packages in 1;6.1.5 apply.

5.1.2 Dangerous goods which may be carried as excepted quantities in accordance with this chapter are shown in column 9 of the dangerous goods list by means of an alphanumeric code as follows:

Table 3-3. Excepted quantity codes for Table 3-1

Code	*Maximum quantity per inner packaging*	*Maximum quantity per outer packaging*
E0	Not permitted as Excepted Quantity	
E1	30g/30 mL	1kg/1 L
E2	30g/30 mL	500g/500 mL
E3	30g/30 mL	300g/300 mL
E4	1g/1 mL	500g/500 mL
E5	1g/1 mL	300g/300 mL

5.1.2.1 For gases, the volume indicated for inner packagings refers to the water capacity of the inner receptacle and the volume indicated for outer packagings refers to the combined water capacity of all inner packagings within a single outer package.

5.1.3 Where dangerous goods in excepted quantities for which different codes are assigned are packaged together the total quantity per outer packaging must be limited to that corresponding to the most restrictive Code.

5.2 Packagings

5.2.1 Packagings used for the transport of dangerous goods in excepted quantities must be in compliance with the following:

a) there must be an inner packaging and each inner packaging must be constructed of plastic (when used for liquid dangerous goods it must have a thickness of not less than 0.2 mm), or of glass, porcelain, stoneware, earthenware or metal (see also 4;1.1.3.1) and the closure of each inner packaging must be held securely in place with wire, tape or other positive means; any receptacle having a neck with moulded screw threads must have a leak proof threaded type cap. The closure must be resistant to the contents;

b) each inner packaging must be securely packed in an intermediate packaging with cushioning material in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents. The intermediate packaging must completely contain the contents in case of breakage or leakage, regardless of package orientation. For liquid dangerous goods, the intermediate packaging must contain sufficient absorbent material to absorb the entire contents of the inner packaging. In such cases, the absorbent material may be the cushioning material. Dangerous goods must not react dangerously with cushioning, absorbent material and packaging material or reduce the integrity or function of the materials;

c) the intermediate packaging must be securely packed in a strong, rigid outer packaging (wooden, fibreboard or other equally strong material);

d) each package type must be in compliance with the provisions in 5.3;

e) each package must be of such a size that there is adequate space to apply all necessary markings; and

f) overpacks may be used and may also contain packages of dangerous goods or goods not subject to these Instructions.

5.3 Tests for packages

5.3.1 The complete package as prepared for transport, with inner packagings filled to not less than 95 per cent of their capacity for solids or 98 per cent for liquids, must be capable of withstanding, as demonstrated by testing which is

appropriately documented, without breakage or leakage of any inner packaging and without significant reduction in effectiveness:

a) drops onto a rigid, non-resilient flat and horizontal surface from a height of 1.8 m:

1) where the sample is in the shape of a box, it must be dropped in each of the following orientations:

— flat on the base;
— flat on the top;
— flat on the longest side;
— flat on the shortest side;
— on a corner;

2) where the sample is in the shape of a drum, it must be dropped in each of the following orientations:

— diagonally on the top chime, with the centre of gravity directly above the point of impact;
— diagonally on the base chime;
— flat on the side.

Note.— Each of the above drops may be performed on different but identical packages.

b) a force applied to the top surface for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3 m (including the drop sample).

5.3.2 For the purposes of testing, the substances to be transported in the packaging may be replaced by other substances except where this would invalidate the results of the tests. For solids, when another substance is used, it must have the same physical characteristics (mass, grain size, etc.) as the substance to be carried. In the drop tests for liquids, when another substance is used, its relative density (specific gravity) and viscosity must be similar to those of the substance to be transported.

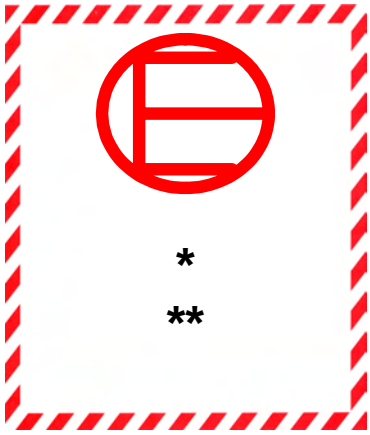
5.4 Marking of packages

5.4.1 Packages containing excepted quantities of dangerous goods prepared in accordance with this chapter must be durably and legibly marked with the mark shown in Figure 3-1. The primary hazard class or, when assigned, the division of each of the dangerous goods contained in the package must be shown in the mark. Where the name of the ~~consignor~~ shipper or consignee is not shown elsewhere on the package this information must be included within the mark.

5.4.2 The dimensions of the mark must be a minimum of 100 mm × 100 mm.

5.4.3 An overpack containing dangerous goods in excepted quantities must display the markings required by 5.4.1, unless such markings on packages within the overpack are clearly visible.

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Hatching and symbol of the same colour, black or red, on white or suitable contrasting background

* Place for class or, when assigned, the division number(s)

** Place for name of shipper or consignee, if not shown elsewhere on the package

Figure 3-1. Excepted quantities mark

5.5 Documentation

If a document such as an air waybill accompanies dangerous goods in excepted quantities, it must include the statement "Dangerous Goods in Excepted Quantities" and indicate the number of packages.

Part 4

PACKING INSTRUCTIONS

INTRODUCTORY NOTES

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Note 10.— Carriage of flames

With the approval of the appropriate authority of the State of Origin, or transit (where applicable), of Destination and of the Operator, lamps fuelled by UN 1223 — **Kerosene** or UN 3295 — **Hydrocarbons, liquid, n.o.s.**, carried by a passenger to transport a symbolic flame (e.g. Olympic flame, Peace flame) may be carried in accordance with the provisions of Special Provision 2XX (which appears in the Supplement).

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Chapter 1

GENERAL PACKING REQUIREMENTS

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1.1 GENERAL REQUIREMENTS APPLICABLE TO ALL CLASSES EXCEPT CLASS 7

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1.1.2 New, remanufactured, reused or reconditioned packagings which are listed in Tables 6-2 and 6-3, must meet the applicable requirements of Part 6 of these Instructions. Such packagings must be manufactured and tested under a quality assurance programme which satisfies the appropriate national authority, in order to ensure that such packagings meet those applicable requirements. Where packagings are required to be tested in accordance with 6;4, their subsequent use must be as specified in the applicable test report and conform in all respects with the design type which was tested, including the method of packing and size and type of any inner packagings, except as provided for in 1.1.9.1 and 6;4.1.7. Before being filled and handed over for transport, every packaging must be inspected to ensure that it is free from corrosion, contamination or other damage. Any packaging which shows signs of reduced strength as compared with the approved design type must no longer be used or must be so reconditioned that it is able to withstand the design type tests.

Note.— ISO 16106:2006 Packaging — Transport packages for dangerous goods — Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings — Guidelines for the application of ISO 9001 provides acceptable guidance on procedures which may be followed.

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1.1.8 Subject to 1.1.7 an outer packaging may contain more than one item of dangerous goods provided that:

. . .

e) the quantities of different dangerous goods contained in one outer packaging must be such that "Q" does not exceed the value of 1, where "Q" is calculated using the formula:

$$Q = \frac{n_1}{M_1} + \frac{n_2}{M_2} + \frac{n_3}{M_3} + \ldots$$

where n_1, n_2, etc. are the net quantities of the different dangerous goods and M_1, M_2, etc. are the maximum net quantities for these different dangerous goods according to Table 3-1 for passenger or cargo aircraft as applicable. However, the following dangerous goods do not need to be taken into account in the calculation of the "Q" value:

1) carbon dioxide, solid (dry ice), UN 1845;

2) those where columns 10 and 12 of Table 3-1 indicate "No limit";

3) those with the same UN number, packing group, and physical state (i.e. solid or liquid), providing they are the only dangerous goods in the package and the total net quantity does not exceed the maximum net quantity according to Table 3-1~~.~~;

4) those where columns 10 and 12 of Table 3-1 indicate a maximum gross mass per package.

f) For packages containing dangerous goods where the letter "G" follows the quantity shown in column 10 or 12 of Table 3-1, the gross mass of the completed package does not exceed the lowest applicable gross mass.

An outer packaging containing Division 6.2 (Infectious Substances) may contain material for refrigeration, or freezing or packaging material such as absorbent material.

Note.— For packages containing radioactive material, see 9.1.3.

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Chapter 2

GENERAL

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2.7.7 Prior to filling, the filler must perform an inspection of the cylinder and ensure that the cylinder is authorized for the substances to be transported and that the provisions of these Instructions have been met. Shut-off valves must be closed after filling and remain closed during transport. The ~~consignor~~ shipper must verify that the closures and equipment are not leaking.

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Chapter 4

CLASS 2 — GASES

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4.1 SPECIAL PACKING PROVISIONS FOR DANGEROUS GOODS OF CLASS 2

4.1.1 General requirements

4.1.1.1 This section provides general requirements applicable to the use of cylinders and closed cryogenic receptacles for the transport of Class 2 gases (e.g. UN 1072 **Oxygen, compressed**). Cylinders and closed cryogenic receptacles must be constructed and closed so as to prevent any loss of contents which might be caused under normal conditions of transport, including by vibration, or by changes in temperature, humidity or pressure (resulting from change in altitude, for example).

Editorial Note.— Text in 4.1.1.2 below is moved to 6;5.1.1.9:

4.1.1.2 Parts of cylinders and closed cryogenic receptacles that are in direct contact with dangerous goods must not be affected or weakened by those dangerous goods and must not cause a dangerous effect (e.g. catalysing a reaction or reacting with the dangerous goods). The provisions of ISO 11114-1:1997 and ISO 11114-2:2000 must be met as applicable. ~~Cylinders for UN 1001 **Acetylene, dissolved** and UN 3374 **Acetylene, solvent free** must be filled with a porous mass, uniformly distributed, of a type that conforms to the requirements and testing specified by the appropriate national authority and which:~~

~~a) is compatible with the cylinder and does not form harmful or dangerous compounds either with the acetylene or with the solvent in the case of UN 1001; and~~

~~b) is capable of preventing the spread of decomposition of the acetylene in the porous mass.~~

~~In the case of UN 1001, the solvent must be compatible with the cylinders.~~

4.1.1.3 Cylinders and closed cryogenic receptacles, including their closures, must be selected that are able to contain a gas or a mixture of gases according to the requirements of 6;5.1.2 and the requirements of the specific packing instructions of this Part.

4.1.1.4 Refillable cylinders must not be filled with a gas or gas mixture different from that previously contained unless the necessary operations for change of gas service have been performed. The change of service for compressed and liquefied gases must be in accordance with ISO 11621:1997, as applicable. In addition, a cylinder that previously contained a Class 8 corrosive substance or a substance of another class with a corrosive subsidiary risk must not be authorized for the transport of a Class 2 substance unless the necessary inspection and testing as specified in 6;~~5.1.5~~5.1.6 have been performed.

. . .

4.1.1.10 Refillable cylinders, other than closed cryogenic receptacles, must be periodically inspected according to the provisions of 6;~~5.1.5~~5.1.6 and Packing Instruction 200. Cylinders and closed cryogenic receptacles must not be filled after they become due for periodic inspection but may be transported after the expiry of the time limit.

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4.2 PACKING INSTRUCTIONS

200	PACKING INSTRUCTION 200	200

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

Cylinders, constructed as specified in 6;5 are authorized for the transport of a specific substance when specified in the following tables (Table 1 and Table 2). Cylinders other than UN marked and certified cylinders may be used if the design, construction, testing, approval and markings conform to the requirements of the appropriate national authority in which they are approved and filled. The substances contained must be permitted in cylinders and permitted for air transport according to these Instructions. Cylinders for which prescribed periodic tests have become due must not be charged and offered for transport until such retests have been successfully completed. Valves must be suitably protected or must be designed and constructed in such a manner that they are able to withstand damage without leakage as specified in Annex B of ISO 10297:1999. Cylinders with capacities of one litre or less must be packaged in outer packaging constructed of suitable material of adequate strength and design in relation to the packaging capacity and its intended use, and secured or cushioned so as to prevent significant movement within the outer packaging during normal conditions of transport. For some substances, the special packing provisions may prohibit a particular type of cylinder. The following requirements must be met:

. . .

4) Keys for the column “Special packing provisions”:

. . .

Gas specific provisions:

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Editorial Note.— Paragraph r) below is re-numbered w) and moved after v) below:

~~r) Ethyl chloride may be carried in securely sealed glass ampoules (IP.8) containing not more than 5 g of ethyl chloride and filled with a ullage of not less than 7.5 per cent at 21°C. Ampoules must be cushioned with efficient non-combustible material in partitioned cartons to the extent of not more than 12 ampoules per carton. The cartons must be tightly packed to prevent movement in wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or plastic boxes (4H1, 4H2) that meet the performance testing requirements of 6;4 at the Packing Group II performance level. Not more than 300 g of ethyl chloride is permitted per package.~~

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Periodic inspection:

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v) The interval between periodic inspections for steel cylinders may be extended to 15 years if approved by the appropriate national authority of the country of use.

Editorial Note.— Paragraph w) below is moved from r) above.

w) Ethyl chloride may be carried in securely sealed glass ampoules (IP.8) containing not more than 5 g of ethyl chloride with a ullage of not less than 7.5 per cent at 21°C. Ampoules must be cushioned with efficient non-combustible material in partitioned cartons with not more than 12 ampoules per carton. The cartons must be tightly packed to prevent movement in wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or plastic boxes (4H1, 4H2) that meet the performance testing requirements of 6;4 at the Packing Group II performance level. Not more than 300 g of ethyl chloride is permitted per package.

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Table 2. LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary risk	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
1001	**Acetylene, dissolved**	2.1			X	10	60 52		c, p
1009	**Bromotrifluoromethane (refrigerant gas R 13b1)**	2.2			X	10	42 120 250	1.13 1.44 1.60	
1010	**Butadienes, stabilized** (1,2-butadiene)	2.1			X	10	10	0.59	
1010	**Butadienes, stabilized** (1,3-butadiene)	2.1			X	10	10	0.55	z
1010	**Butadienes and hydrocarbon mixture, stabilized** containing more than 40% butadienes	2.1			X	10			v z
1011	**Butane**	2.1			X	10	10	~~0.51~~0.52	v

UN No.	Name and description	Class or Division	Subsidiary risk	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
1012	**Butylene** (butylenes mixture)	2.1			X	10	10	0.50	z
1012	**Butylene** (1-butylene)	2.1			X	10	10	0.53	
1012	**Butylene** (cis-2-butylene)	2.1			X	10	10	0.55	
1012	**Butylene** (trans-2 butylene)	2.1			X	10	10	0.54	
1013	**Carbon dioxide**	2.2			X	10	190 250	~~0.66~~0.68 ~~0.75~~0.76	
1018	**Chlorodifluoromethane (refrigerant gas R 22)**	2.2			X	10	~~29~~27	1.03	
1020	**Chloropentafluoroethane (refrigerant gas R 115)**	2.2			X	10	25	~~1.08~~1.05	
1021	**1-Chloro-1,2,2,2-tetrafluoroethane (refrigerant gas R 124)**	2.2			X	10	~~12~~11	1.20	
1022	**Chlorotrifluoromethane (refrigerant gas R 13)**	2.2			X	10	100 120 190 250	0.83 0.90 1.04 ~~1.10~~1.11	
1027	**Cyclopropane**	2.1			X	10	~~20~~18	~~0.53~~0.55	
1028	**Dichlorodifluoromethane (refrigerant gas R 12)**	2.2			X	10	~~18~~16	1.15	
1029	**Dichlorofluoromethane (refrigerant gas R 21)**	2.2			X	10	10	1.23	
1030	**1,1-Difluoroethane (Refrigerant gas R 152 a)**	2.1			X	10	~~18~~16	0.79	
1032	**Dimethylamine, anhydrous**	2.1			X	10	10	0.59	b
1033	**Dimethyl ether**	2.1			X	10	18	0.58	
1035	**Ethane**	2.1			X	10	95 120 300	0.25 ~~0.29~~0.30 ~~.39~~0.40	
1036	**Ethylamine**	2.1			X	10	10	0.61	b
1037	**Ethyl chloride**	2.1			X	10	10	0.80	a, ~~r~~w
1039	**Ethyl methyl ether**	2.1			X	10	10	0.64	
1041	**Ethylene oxide and carbon dioxide mixture** with more than 9% ethylene oxide but not more than 87%	2.1			X	10	190 250	0.66 .75	
1043	**Fertilizer ammoniating solution** with free ammonia	2.2			X	5			b, z
1055	**Isobutylene**	2.1			X	10	10	0.52	

UN No.	Name and description	Class or Division	Subsidiary risk	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
1058	**Liquefied gases,** non-flammable, charged with nitrogen, carbon dioxide or air	2.2			X	10	Test pressure = 1.5 × working pressure		
1060	**Methylacetylene and propadiene mixture, stabilized or**	2.1			X	10			c, z
1060	**Methylacetylene and propadiene mixture, stabilized** (propadiene with 1% to 4% methylacetylene)	2.1			X	10	22	0.52	c
1061	**Methylamine, anhydrous**	2.1			X	10	13	0.58	b
1063	**Methyl chloride (refrigerant gas R 40)**	2.1			X	10	17	0.81	a
1070	**Nitrous oxide**	2.2	5.1		X	10	180 225 250	0.68 0.74 0.75	
1075	**Petroleum gases, liquefied**	2.1			X	10			v, z
1077	**Propylene**	2.1			X	10	~~30~~27	0.43	
1078	**Refrigerant gas, n.o.s.**	2.2			X	10			z
1080	**Sulphur hexafluoride**	2.2			X	10	70 140 160	~~1.04~~1.06 ~~1.33~~1.34 ~~1.37~~1.38	
1081	**Tetrafluoroethylene, stabilized**	2.1			X	10	200		m, o
1083	**Trimethylamine, anhydrous**	2.1			X	10	10	0.56	b
1085	**Vinyl bromide, stabilized**	2.1			X	10	10	1.37	a
1086	**Vinyl chloride, stabilized**	2.1			X	10	12	0.81	a
1087	**Vinyl methyl ether, stabilized**	2.1			X	10	10	0.67	
1858	**Hexafluoropropylene (refrigerant gas R 1216)**	2.2			X	10	22	1.11	
1860	**Vinyl fluoride, stabilized**	2.1			X	10	250	0.64	a
1912	**Methyl chloride and methylene chloride mixture**	2.1			X	10	17	0.81	a
1952	**Ethylene oxide and carbon dioxide mixture** with not more than 9% ethylene oxide	2.2			X	10	190 250	0.66 0.75	
1958	**1,2-dichloro-1,1,2,2-tetrafluoroethane (refrigerant gas R 114)**	2.2			X	10	10	1.30	
1959	**1,1-difluoroethylene (refrigerant gas R 1132a)**	2.1			X	10	250	0.77	

UN No.	Name and description	Class or Division	Subsidiary risk	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
1962	**Ethylene**	2.1			X	10	225 300	0.34 ~~0.37~~0.38	
1965	**Hydrocarbon gas mixture, liquefied, n.o.s.**	2.1			X	10			v, z
1968	**Insecticide gas, n.o.s.**	2.2			X	10			z
1969	**Isobutane**	2.1			X	10	10	0.49	v
1973	**Chlorodifluoromethane and chloropentafluoroethane mixture** with fixed boiling point, with approximately 49% chlorodifluoromethane **(refrigerant gas R 502)**	2.2			X	10	31	~~1.05~~1.01	
1974	**Chlorodifluorobromo-methane (refrigerant gas R 12b1)**	2.2			X	10	10	1.61	
1976	**Octafluorocyclobutane (refrigerant gas R C318)**	2.2			X	10	11	~~1.34~~1.32	
1978	**Propane**	2.1			X	10	~~25~~23	~~0.42~~0.43	v
1982	**Tetrafluoromethane (refrigerant gas R 14)**	2.2			X	10	200 300	~~0.62~~0.71 ~~0.94~~0.90	
1983	**1-chloro-2,2,2-trifluoroethane (refrigerant gas R 133a)**	2.2			X	10	10	1.18	
1984	**Trifluoromethane (refrigerant gas R 23)**	2.2			X	10	190 250	~~0.87~~0.88 ~~0.95~~0.96	
2035	**1,1,1-trifluoroethane (refrigerant gas R 143a)**	2.1			X	10	35	~~0.75~~0.73	
2036	**Xenon**	2.2			X	10	130	~~1.24~~1.28	
2044	**2,2-dimethylpropane**	2.1			X	10	10	0.53	
2073	**Ammonia solution,** relative density less than 0.880 at 15°C in water, with more than 35% but not more than 40% ammonia with more than 40% but not more than 50% ammonia	2.2			X X	5 5	10 12	0.80 0.77	b b
2193	**Hexafluoroethane (refrigerant gas R 116)**	2.2			X	10	200	~~1.10~~1.13	
2200	**Propadiene, stabilized**	2.1			X	10	22	0.50	
2419	**Bromotrifluoroethylene**	2.1			X	10	10	1.19	
2422	**Octafluorobut-2-ene (refrigerant gas R 1318)**	2.2			X	10	12	1.34	
2424	**Octafluoropropane (refrigerant gas R 218)**	2.2			X	10	25	~~1.09~~1.04	
2451	**Nitrogen trifluoride**	2.2	5.1		X	10	200	0.50	

UN No.	Name and description	Class or Division	Subsidiary risk	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
2452	**Ethylacetylene, stabilized**	2.1			X	10	10	0.57	c
2453	**Ethyl fluoride (refrigerant gas R 161)**	2.1			X	10	30	0.57	
2454	**Methyl fluoride (refrigerant gas R 41)**	2.1			X	10	300	~~0.36~~0.63	
2517	**1-chloro-1,1-difluoroethane (refrigerant gas R 142b)**	2.1			X	10	10	0.99	
2599	**Chlorotrifluoromethane and trifluoromethane azeotropic mixture** with approximately 60% chlorotrifluoromethane (refrigerant gas R 503)	2.2			X	10	31 42 100	~~0.11~~0.12 ~~0.20~~0.17 ~~0.66~~0.64	
2601	**Cyclobutane**	2.1			X	10	10	0.63	
2602	**Dichlorodifluoro-methane and difluoroethane azeotropic mixture** with approximately 74% dichlorodifluoromethane (refrigerant gas R 500)	2.2			X	10	22	1.01	
3070	**Ethylene oxide and dichlorodifluoro-methane mixture** with not more than 12.5% ethylene oxide	2.2			X	10	18	1.09	
3153	**Perfluoro(methyl vinyl ether)**	2.1			X	10	20	0.75	
3154	**Perfluoro(ethyl vinyl ether)**	2.1			X	10	10	0.98	
3157	**Liquefied gas, oxidizing, n.o.s.**	2.2	5.1		X	10			z
3159	**1,1,1,2-tetrafluoroethane (refrigerant gas R 134a)**	2.2			X	10	~~22~~18	~~1.04~~1.05	
3161	**Liquefied gas, flammable, n.o.s.**	2.1			X	10			z
3163	**Liquefied gas, n.o.s.**	2.2			X	10			z
3220	**Pentafluoroethane (refrigerant gas R 125)**	2.2			X	10	49 ~~36~~35	0.95 ~~0.72~~0.87	
3252	**Difluoromethane (refrigerant gas R 32)**	2.1			X	10	48	0.78	
3296	**Heptafluoropropane (refrigerant gas R 227)**	2.2			X	10	~~15~~13	~~1.20~~1.21	
3297	**Ethylene oxide and chlorotetrafluoroethane mixture** with not more than 8.8% ethylene oxide	2.2			X	10	10	1.16	
3298	**Ethylene oxide and pentafluoroethane mixture** with not more than 7.9% ethylene oxide	2.2			X	10	26	1.02	

UN No.	Name and description	Class or Division	Subsidiary risk	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
3299	**Ethylene oxide and tetrafluoroethane mixture** with not more than 5.6% ethylene oxide	2.2			X	10	17	1.03	
3337	**Refrigerant gas R 404a**	2.2			X	10	36	0.82	
3338	**Refrigerant gas R 407a**	2.2			X	10	~~36~~32	0.94	
3339	**Refrigerant gas R 407b**	2.2			X	10	~~38~~33	0.93	
3340	**Refrigerant gas R 407c**	2.2			X	10	~~35~~30	0.95	
3354	**Insecticide gas, flammable, n.o.s.**	2.1			X	10			z
3374	**Acetylene, solvent free**	2.1			X	5	60 52		c, p

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202 PACKING INSTRUCTION 202 202

This instruction applies to Class 2 refrigerated liquefied gases in open and closed cryogenic receptacles.

1. Open cryogenic receptacles must be metal or glass vacuum insulated vessels or flasks vented to the atmosphere to prevent any increase in pressure within the package and must be designed and constructed to permit the release of the gas.

2. The use of safety relief valves, check valves, frangible discs or similar devices in the vent lines is not permitted.

3. Receptacles must be equipped with devices which prevent the release of liquid.

4. Fill and discharge openings must be protected against the entry of foreign materials which might increase the internal pressure.

5. The maximum water capacity for metal receptacles is 50 litres~~.~~ and for glass receptacles is 5 litres.

6. The open receptacle must have a secure base and must be designed so that it will remain stable and will not topple under normal conditions of transport.

7. The glass vessel or flask must be protected by shock absorbent material or structure and placed in a strong outer packaging that permits the release of the gas. The package must be designed so that the upright position of the glass vessel or flask is guaranteed under normal conditions of transport. Packagings must conform to the requirements of 6;3.1 and meet Packing Group II performance test requirements in accordance with 6;4 and be marked in compliance with 6;2.

8. Open cryogenic receptacles are permitted for nitrogen, argon, krypton and xenon refrigerated liquids.

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203	PACKING INSTRUCTION 203	203

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Plastic aerosols (IP.7C)

Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of the Technical Instructions, in which case the quantity must not exceed 500 mL.~~:~~

~~a) 500 mL capacity when containing non-flammable non-toxic gas and contents; or~~

~~b) 120 mL capacity when containing flammable and/or toxic gas and contents.~~

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Y203	PACKING INSTRUCTION Y203	Y203

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Plastic aerosols (IP.7C)

Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of the Technical Instructions, in which case the quantity must not exceed 500 mL.~~:~~

~~a) 500 mL capacity when containing non-flammable non-toxic gas and contents; or~~

~~b) 120 mL capacity when containing flammable and/or toxic gas and contents.~~

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Packing Instruction [215]		
Passenger and Cargo Aircraft for UN 3478 and 3479		
PACKAGING FOR FUEL CELL CARTRIDGES		
General Requirements Part 4;1.1.1, 4;1.1.2, 4;1.1.7: **Compatibility** • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	**Quantity CARGO**
UN3478 Fuel cell cartridges **UN3479 Fuel cell cartridges**	**1 kg of fuel cell cartridges**	**15 kg of fuel cell cartridges**
PACKAGINGS FOR FUEL CELL CARTRIDGES MUST MEET THE PGII PERFORMANCE REQUIREMENTS		
OUTER PACKAGINGS		
Boxes	**Drums**	**Jerricans**
Aluminium(4B)	Aluminium(1B2)	Steel (3A2)
Fibreboard (4G)	Fibreboard (1G)	Plastics(3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Aluminium (3B2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
• Fuel cell cartridges must be securely cushioned in the outer packagings.		

Packing Instruction [216]		
Passenger and Cargo Aircraft for UN3478 and 3479		
PACKAGING FOR FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT		
General Requirements Part 4;1.1.1, 4;1.1.7: **Compatibility** • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	**Quantity CARGO**
UN3478 Fuel cell cartridges contained in equipment **UN3479 Fuel cell cartridges contained in equipment**	**1 kg of fuel cell cartridges**	**15 kg of fuel cell cartridges**
PACKAGING FOR FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT		
Boxes	**Drums**	**Jerricans**
Strong outer packagings		
Additional Requirements for fuel cell cartridges contained in equipment		
• Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation • Equipment must be securely cushioned in the outer packagings • Fuel cell systems must not charge batteries during transport • On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC PAS 62282-6-1 Ed. 1 or a standard approved by the appropriate authority of the State of Origin		

Packing Instruction [217]		
Passenger and Cargo Aircraft for UN3478 and 3479		
PACKAGING FOR FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT		
General Requirements Part 4;1.1.1, 4;1.1.7: **Compatibility** • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	**Quantity CARGO**
UN3478 Fuel cell cartridges packed with equipment **UN3479 Fuel cell cartridges packed with equipment**	**1 kg of fuel cell cartridges**	**15 kg of fuel cell cartridges**
Boxes	**Drums**	**Jerricans**
Strong outer packagings		
Additional Requirements for fuel cell cartridges packed with equipment		
• When fuel cell cartridges are packed with equipment, they must be packed in intermediate packagings together with the equipment they are capable of powering. • The maximum number of fuel cell cartridges in the intermediate packaging must be the minimum number required to power the equipment, plus 2 spares. • The fuel cell cartridges and the equipment must be packed with cushioning material or divider(s) or inner packaging so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the equipment and the cartridges within the packaging.		

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Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

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Replace current Packing Instruction 313 with the following three packing instructions.

Packing Instruction [313]		
Passenger and Cargo Aircraft for UN3473		
PACKAGING FOR FUEL CELL CARTRIDGES		
General Requirements Part 4;1.1.1, 4;1.1.2, 4;1.1.7: **Compatibility** • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	**Quantity CARGO**
UN 3473 Fuel cell cartridges	**5 kg of fuel cell cartridges**	**50 kg of fuel cell cartridges**
PACKAGINGS FOR FUEL CELL CARTRIDGES MUST MEET THE PGII PERFORMANCE REQUIREMENTS		
OUTER PACKAGINGS		
Boxes	**Drums**	**Jerricans**
Aluminium(4B)	Aluminium(1B2)	Steel (3A2)
Fibreboard (4G)	Fibreboard (1G)	Plastics(3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Aluminium (3B2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
• Fuel cell cartridges must be securely cushioned in the outer packagings.		

Packing Instruction [314]		
Passenger and Cargo Aircraft for UN3473		
PACKAGING FOR FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT		
General Requirements Part 4;1.1.1, 4;1.1.7: Compatibility • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	Quantity CARGO
UN 3473 Fuel cell cartridges contained in equipment	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges
Boxes	Drums	Jerricans
Strong outer packagings		
Additional Requirements for fuel cell cartridges contained in equipment		
• Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation • Equipment must be securely cushioned in the outer packagings • Fuel cell systems must not charge batteries during transport • On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC PAS 62282-6-1 Ed. 1 or a standard approved by the appropriate authority of the State of Origin		

Packing Instruction [315]		
Passenger and Cargo Aircraft for UN3473		
PACKAGING FOR FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT		
General Requirements Part 4;1.1.1, 4;1.1.7: Compatibility • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	Quantity CARGO
UN 3473 Fuel cell cartridges packed with equipment	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges
Boxes	Drums	Jerricans
Strong outer packagings		
Additional Requirements for fuel cell cartridges packed with equipment		
• When fuel cell cartridges are packed with equipment, they must be packed in intermediate packagings together with the equipment they are capable of powering. • The maximum number of fuel cell cartridges in the intermediate packaging must be the minimum number required to power the equipment, plus 2 spares. • The fuel cell cartridges and the equipment must be packed with cushioning material or divider(s) or inner packaging so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the equipment and the cartridges within the packaging.		

Chapter 6

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

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416	PACKING INSTRUCTION 416	416

The general packing requirements of 4;1 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

INNER:

	UN No.	*Glass or earthenware IP.1 (kg)*	*Plastic IP.2 (kg)*	*Metal (not aluminium) IP.3 (kg)*	*Aluminium IP.3A (kg)*	*Plastic bag IP.5 (kg)*	*Glass ampoule IP.8 (kg)*	*Particular packing requirements*	
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[	3474	0.5	0.5	No	No	No	0.5	—	]
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435	PACKING INSTRUCTION 435	435

~~As specified by the appropriate national authority.~~ Only packagings which are approved by the appropriate national authority for these substances may be used (see 4;2.8). A copy of this approval must accompany each consignment or an annotation that it has been granted must be included with the transport document.

Packing Instruction [436]		
Passenger and Cargo Aircraft for UN 3476		
PACKAGING FOR FUEL CELL CARTRIDGES		
General Requirements Part 4;1.1.1, 4;1.1.2, 4;1.1.7: Compatibility • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	Quantity CARGO
UN3476 Fuel cell cartridges	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges
PACKAGINGS FOR FUEL CELL CARTRIDGES MUST MEET THE PGII PERFORMANCE REQUIREMENTS		
OUTER PACKAGINGS		
Boxes	Drums	Jerricans
Aluminium(4B)	Aluminium(1B2)	Steel (3A2)
Fibreboard (4G)	Fibreboard (1G)	Plastics(3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Aluminium (3B2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
• Fuel cell cartridges must be securely cushioned in the outer packagings. • The mass of each fuel cell cartridge must not exceed 1 kg.		

Packing Instruction [437]		
Passenger and Cargo Aircraft for UN 3476		
PACKAGING FOR FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT		
General Requirements Part 4;1.1.1, 4;1.1.7: Compatibility • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	Quantity CARGO
UN3476 Fuel cell cartridges contained in equipment	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges
Boxes	Drums	Jerricans
Strong outer packagings		
Additional Requirements for fuel cell cartridges contained in equipment		
• Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation • Equipment must be securely cushioned in the outer packagings. • The mass of each fuel cell cartridge must not exceed 1 kg. • Fuel cell systems must not charge batteries during transport • On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC PAS 62282-6-1 Ed. 1 or a standard approved by the appropriate authority of the State of Origin		

Packing Instruction [438]		
Passenger and Cargo Aircraft for UN 3476		
PACKAGING FOR FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT		
General Requirements Part 4;1.1.1, 4;1.1.7: **Compatibility** • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	**Quantity CARGO**
UN3476 Fuel cell cartridges packed with equipment	**5 kg of fuel cell cartridges**	**50 kg of fuel cell cartridges**
Boxes	**Drums**	**Jerricans**
Strong outer packagings		
Additional Requirements for fuel cell cartridges packed with equipment		
• When fuel cell cartridges are packed with equipment, they must be packed in intermediate packagings together with the equipment they are capable of powering. • The maximum number of fuel cell cartridges in the intermediate packaging must be the minimum number required to power the equipment, plus 2 spares. • The fuel cell cartridges and the equipment must be packed with cushioning material or divider(s) or inner packaging so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the equipment and the cartridges within the packaging. • The mass of each fuel cell cartridge must not exceed 1 kg.		

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Chapter 8

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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602 PACKING INSTRUCTION 602 602

This packing instruction applies to UN 2814 and UN 2900.

The following packagings are authorized provided the special packing provisions are met.

Packagings meeting the requirements of 6;6 and approved accordingly consisting of:

a) inner packagings comprising:

1) ~~watertight~~ leakproof primary receptacle(s);

2) a ~~watertight~~ leakproof secondary packaging;

3) other than for solid infectious substances, an absorbent material in sufficient quantity to absorb the entire contents placed between the primary receptacle(s) and the secondary packaging; if multiple fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them;

b) a rigid outer packaging ~~of adequate strength for its capacity, mass and intended use~~. The smallest external dimension must be not less than 100 mm.

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d) Other than for exceptional consignments, e.g. whole organs, which require special packaging, the following additional requirements must apply:

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2) Substances consigned refrigerated or frozen. Ice, dry ice or other refrigerant must be placed around the secondary packaging(s) or, alternatively, in an overpack with one or more complete packages marked in accordance with 6;~~2.2.2~~6.3. Interior supports must be provided to secure secondary packaging(s) or packages in position after the ice or dry ice has dissipated. If ice is used, the outer packaging or overpack must be leakproof. If dry ice is used, the outer packaging or overpack must permit the release of carbon dioxide gas. The primary receptacle and the secondary packaging must maintain their integrity at the temperature of the refrigerant used;

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f) Alternative packagings for the transport of animal material may be authorized by the competent authority in accordance with the provisions of 4;2.8.

g) A quantity of 30 ml or less of dangerous goods included in Class 3, 8 or 9 may be packed in each primary receptacle containing infectious substances provided these substances meet the requirements of 3;5.

Special packing provisions

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c) An itemized list of contents must be enclosed between the secondary packaging and the outer packaging. When the infectious substances to be transported are unknown, but suspected of meeting the criteria for inclusion in Category A ~~and assignment to UN 2814 or UN 2900~~, the words “suspected Category A infectious substance” must be shown in parentheses following the proper shipping name on the itemized list of contents inside the outer packaging.

d) Before an empty packaging is returned to the shipper, or sent elsewhere, it must be disinfected or sterilized to nullify any hazard and any label or marking indicating that it had contained an infectious substance must be removed or obliterated.

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650	PACKING INSTRUCTION 650	650

This packing instruction applies to UN 3373.

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6) The completed package must be capable of successfully passing the drop test in 6;~~6.2~~6.5.3 as specified in 6;~~6.1.5~~6.5.2 of the Instructions except that the height of the drop must not be less than 1.2 m. Following the appropriate drop sequence, there must be no leakage from the primary receptacle(s) which must remain protected by absorbent material, when required, in the secondary packaging.

. . .

11) Infectious substances assigned to UN 3373 which are packed and marked in accordance with this packing instruction are not subject to any other requirement in these Instructions except for the following:

a) the name and address of the shipper and of the consignee must be provided on each package;

b) ~~the proper shipping name, UN number and~~ the name and telephone number of a person responsible must be provided on a written document (such as an air waybill) or on the package;

. . .

12) Clear instructions on filling and closing such packages must be provided to the ~~consignor~~ shipper or to the person who prepares the package (e.g. patient) by packaging manufacturers and subsequent distributors to enable the package to be correctly prepared for transport.

13) Other dangerous goods must not be packed in the same packaging as Division 6.2 infectious substances unless they are necessary for maintaining the viability, stabilizing or preventing degradation or neutralizing the hazards of the infectious substances. A quantity of 30 ml or less of dangerous goods included in Class 3, 8 or 9 may be packed in each primary receptacle containing infectious substances provided these substances meet the requirements of ~~1;2.4.2 and 1;2.4.3~~ 3;5. When these small quantities of dangerous goods are packed with infectious substances in accordance with this packing instruction no other requirements in these Instructions need be met.

Additional requirements:

1) Alternative packagings for the transport of animal material may be authorized by the competent authority in accordance with the provisions of 4;2.8.

6XX	PACKING INSTRUCTION 6XX	6XX
Only packagings which are approved by the appropriate national authority for these substances may be used (see 4;2.8). A copy of this approval must accompany each consignment or an annotation that it has been granted must be included with the transport document.		

Chapter 9

CLASS 7 — RADIOACTIVE MATERIAL

Parts of this Chapter are affected by State Variations CA 1, CA 2, CA 4, JP 17; see Table A-1

9.1 GENERAL

Insert new text beginning after the first sentence of existing 9.1.1 (moved from the definition for package in the case of radioactive material in current 1;7.2) as follows:

9.1.1 Radioactive material, packagings and packages must meet the requirements of 6;7. The quantity of radioactive material in a package must not exceed the limits specified in 2;~~7.7.1~~7.2.4. ~~*Package in the case of radioactive material.* The packaging with its radioactive contents as presented for transport.~~ The types of packages for radioactive materials covered by these Instructions~~, which are subject to the activity limits and material restrictions of 7.7 and meet the corresponding requirements,~~ are:

a) Excepted package (see 1;6.1.5);

b) Industrial package Type 1 (Type IP-1 package);

c) Industrial package Type 2 (Type IP-2 package);

d) Industrial package Type 3 (Type IP-3 package);

e) Type A package;

f) Type B(U) package;

g) Type B(M) package;

h) Type C package.

Packages containing fissile material or uranium hexafluoride are subject to additional requirements.

~~*Note. — For packages for other dangerous goods, see the definitions under 1;3.1.1.*~~

End of inserted text

. . .

9.1.3 A package, other than an excepted package, must not contain any other items except such articles and documents as are necessary for the use of the radioactive material. This requirement must not preclude the transport of low specific activity material or surface contaminated objects with other items. The transport of such articles and documents in a package, or of low specific activity material or surface contaminated objects with other items may be permitted provided that

there is no interaction between them and the packaging or its radioactive contents that would reduce the safety of the package.

. . .

9.1.5 Radioactive material meeting the criteria of other Classes or Divisions as defined in Part 2 must be allocated to Packing Group I, II or III, as appropriate, by the application of the grouping criteria provided in Part 2 corresponding to the nature of the predominant subsidiary risk. It must also be capable of meeting the appropriate packaging performance criteria for the subsidiary risk.

~~9.1.6 Radioactive material packages must be marked to indicate that the shipper has determined that the package meets the applicable air transport requirements as specified in 5;2.4.12.~~

Editorial Note.— Paragraphs 9.1.7 and 9.1.8 below are moved from current 5;1.2.1:

~~**1.2.1 Requirements before shipments**~~

~~1.2.1.1 *First shipment of a package*~~

9.1.6 Before the first shipment of any package, the following requirements must be fulfilled:

a) If the design pressure of the containment system exceeds 35 kPa (gauge), it must be ensured that the containment system of each package conforms to the approved design requirements relating to the capability of that system to maintain its integrity under that pressure;

b) For each Type B(U), Type B(M) and Type C package and for each package containing fissile material, it must be ensured that the effectiveness of its shielding and containment and, where necessary, the heat transfer characteristics and the effectiveness of the confinement system, are within the limits applicable to or specified for the approved design;

c) For packages containing fissile material, where, in order to comply with the requirements of 6;7.10.1 neutron poisons are specifically included as components of the package, checks must be performed to confirm the presence and distribution of those neutron poisons.

~~1.2.1.2 *Each shipment*~~

9.1.7 Before each shipment of any package, the following requirements must be fulfilled:

a) For any package it must be ensured that all the requirements specified in the relevant provisions of these Instructions have been satisfied;

b) It must be ensured that lifting attachments which do not meet the requirements of 6;7.1.2 have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with 6;7.1.3;

≠ c) For each package requiring competent authority approval, it must be ensured that all the requirements specified in the approval certificates have been satisfied;

d) Each Type B(U), Type B(M) and Type C package must be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure unless an exemption from these requirements has received unilateral approval;

e) For each Type B(U), Type B(M) and Type C package, it must be ensured by inspection and/or appropriate tests that all closures, valves, and other openings of the containment system through which the radioactive contents might escape are properly closed and, where appropriate, sealed in the manner for which the demonstrations of compliance with the requirements of 6;7.7.7 and 6;7.9.3 were made;

f) For each special form radioactive material, it must be ensured that all the requirements specified in the approval certificate and the relevant provisions of these Instructions have been satisfied;

g) For packages containing fissile material, the measurement specified in 6;7.10.4 b) and the tests to demonstrate closure of each package as specified in 6;7.10.7 must be performed where applicable;

h) For each low dispersible radioactive material, it must be ensured that all the requirements specified in the approval certificate and the relevant provisions of these Instructions have been satisfied.

Editorial Note.— Paragraph 9.1.9 below is moved from 5;1.2.3.2:

~~1.2.3.2~~9.1.8 ~~The consignor must be in possession of a copy of each applicable certificate.~~The ~~consignor~~ shipper must also have a copy of any instructions with regard to the proper closing of the package and any preparation for shipment before making any shipment under the terms of the certificates.

Editorial Note.— Paragraph 9.1.10 below is moved from 2;7.8.1 to 2;7.8.3:

~~7.8.1~~9.1.9 Except for consignments under exclusive use, the transport index of any package or overpack must not exceed 10, nor must the criticality safety index of any package or overpack exceed 50.

~~7.8.2~~9.1.10 Except for packages or overpacks transported under exclusive use and special arrangement under the conditions specified in 7;2.9.5.3, the maximum radiation level at any point on any external surface of a package or overpack must not exceed 2 mSv/h.

~~7.8.3~~9.1.11 The maximum radiation level at any point on any external surface of a package or overpack under exclusive use must not exceed 10 mSv/h.

9.2 REQUIREMENTS AND CONTROLS FOR TRANSPORT OF LSA MATERIAL AND SCO

9.2.1 The quantity of LSA material or SCO in a single Industrial package Type 1 (Type IP-1), Industrial package Type 2 (Type IP-2), or Industrial package Type 3 (Type IP-3), must be so restricted that the external radiation level at 3 m from the unshielded material does not exceed 10 mSv/h.

9.2.2 LSA material and SCO which is or contains fissile material must meet the applicable requirements in 7;2.9.4.1, 7;2.9.4.2 and 6;7.10.1.

9.2.3 LSA material and SCO in groups LSA-I and SCO-I must not be transported unpackaged.

9.2.4 LSA material and SCO must be packaged in accordance with Table 4-2.

Editorial Note.— Paragraph 9.3 below is moved from 2;7.7.1.7:

~~7.7.1.7~~9.3 Packages containing fissile material

Unless ~~excepted by 6;7.10.2~~ not classified as fissile in accordance with 2;7.2.3.5, packages containing fissile material must not contain:

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

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

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

as specified in their certificates of approval, where appropriate.

. . .

Chapter 10

CLASS 8 — CORROSIVES SUBSTANCES

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Packing Instruction [827]		
Passenger and Cargo Aircraft for UN 3477		
PACKAGING FOR FUEL CELL CARTRIDGES		
General Requirements Part 4;1.1.1, 4;1.1.2, 4;1.1.7: Compatibility • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	Quantity CARGO
UN3477 Fuel cell cartridges	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges
PACKAGINGS FOR FUEL CELL CARTRIDGES MUST MEET THE PGII PERFORMANCE REQUIREMENTS		
OUTER PACKAGINGS		
Boxes	Drums	Jerricans
Aluminium(4B)	Aluminium(1B2)	Steel (3A2)
Fibreboard (4G)	Fibreboard (1G)	Plastics(3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Aluminium (3B2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
• Fuel cell cartridges must be securely cushioned in the outer packagings. • The mass of each fuel cell cartridge must not exceed 1 kg.		

Packing Instruction [828]		
Passenger and Cargo Aircraft for UN 3477		
PACKAGING FOR FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT		
General Requirements Part 4;1.1.1, 4;1.1.7: Compatibility • Substances must be compatible with their packagings as required by 4; 1.1.3		
	Quantity PASSENGER	Quantity CARGO
UN3477 Fuel cell cartridges contained in equipment	5 kg of fuel cell cartridges	50 kg of fuel cell cartridges
Boxes	Drums	Jerricans
Strong outer packagings		
Additional Requirements for fuel cell cartridges contained in equipment		
• Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation. • Equipment must be securely cushioned in the outer packagings. • The mass of each fuel cell cartridge must not exceed 1 kg. • Fuel cell systems must not charge batteries during transport • On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC PAS 62282-6-1 Ed. 1 or a standard approved by the appropriate authority of the State of Origin		

<table>
<tr><td colspan="4">Packing Instruction [829]</td></tr>
<tr><td colspan="4">Passenger and Cargo Aircraft for UN 3477</td></tr>
<tr><td colspan="4">PACKAGING FOR FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT</td></tr>
<tr><td colspan="4">General Requirements
Part 4;1.1.1, 4;1.1.7:
Compatibility
• Substances must be compatible with their packagings as required by 4; 1.1.3</td></tr>
<tr><td colspan="2"></td><td>Quantity PASSENGER</td><td>Quantity CARGO</td></tr>
<tr><td colspan="2">UN3477 Fuel cell cartridges packed with equipment</td><td>5 kg of fuel cell cartridges</td><td>50 kg of fuel cell cartridges</td></tr>
<tr><td>Boxes</td><td>Drums</td><td colspan="2">Jerricans</td></tr>
<tr><td colspan="4">Strong outer packagings</td></tr>
<tr><td colspan="4">Additional Requirements for fuel cell cartridges packed with equipment</td></tr>
<tr><td colspan="4">• When fuel cell cartridges are packed with equipment, they must be packed in intermediate packagings together with the equipment they are capable of powering.
• The maximum number of fuel cell cartridges in the intermediate packaging must be the minimum number required to power the equipment, plus 2 spares.
• The fuel cell cartridges and the equipment must be packed with cushioning material or divider(s) or inner packaging so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the equipment and the cartridges within the packaging.
• The mass of each fuel cell cartridge must not exceed 1 kg.</td></tr>
</table>

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

. . .

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.

Magnetized material may be shipped in a unit load device or other type of pallet prepared by a single shipper provided that the shipper has made prior arrangements with the operator. The shipper must provide the operator with written documentation stating the number of packages of magnetized material contained in each unit load device or other type of pallet.

The following note is moved from the end of the packing instruction:

Note.— For loading instructions, see 7;2.10

Determination of shielding requirements

. . .

~~*Note.— For loading restrictions, see 7;2.10.*~~

903	PACKING INSTRUCTION 903	903

The general packing requirements of 4;1 must be met.

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

~~Lithium c~~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 UN *Manual of Tests and Criteria*, Part III, subsection 38.3;

. . .

904	PACKING INSTRUCTION 904	904

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

Dry ice used as a refrigerant for other than dangerous goods may be shipped in a unit load device or other type of pallet prepared by a single shipper provided that the shipper has made prior arrangements with the operator. In such case, the unit load device, or other type of pallet must allow the venting of the carbon dioxide gas to prevent a dangerous build-up of pressure. The shipper must provide the operator with written documentation stating the total quantity of the dry ice contained in the unit load device or other type of pallet.

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

905	PACKING INSTRUCTION 905	905

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

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

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

. . .

. . .

910	PACKING INSTRUCTION 910	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 4;1 or Part 6 of these Instructions; they must, however, comply with all other applicable requirements.

. . .

e) Inner packagings must be tightly packed in strong outer packagings and must be so packed, secured or cushioned as to prevent any breakage, puncture or leakage of contents ~~or significant movement within~~ into 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) Inner packagings containing liquids, excluding flammable liquids in inner packagings of 120 mL or less, must be packed with their closures upward and the upright position of the package must be indicated by “Package orientation” labels (Figure 5-24). These labels, or pre-printed package orientation labels meeting the same specification as either Figure 5-24 or ISO Standard 780-1985, must be affixed to, or printed on, at least two opposite vertical sides of the package with the arrows pointing in the correct direction.

. . .

k) Consumer commodities shipped according to these provisions may be shipped in a unit load device or other type of pallet prepared by a single shipper provided they contain no other dangerous goods. The shipper must provide the operator with written documentation stating the number of packages of consumer commodities contained in each unit load device or other type of pallet.

. . .

. . .

915	PACKING INSTRUCTION 915	915

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

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 containing dangerous goods 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, with the exception of dry ice. If dry ice is used, the requirements in Packing Instruction 904 must be met.

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)

. . .

Y915	PACKING INSTRUCTION Y915	Y915

The requirements of 3;4 must be met except that 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 containing dangerous goods 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, with the exception of dry ice. If dry ice is used, the requirements in Packing Instruction 904 must be met..

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

916	PACKING INSTRUCTION 916	916

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

a) For other than fuel system components, machinery or apparatus may only contain:

1) dangerous goods permitted under 3;4.1.2; or

2) dangerous goods permitted under 3;4.1.2 and magnetized material meeting the requirements of Packing Instruction 902~~.~~; or

3) gases of Division 2.2 without subsidiary risk but excluding refrigerated liquefied gases.

. . .

"Package orientation" labels (Figure 5-24), or pre-printed orientation labels meeting the same specification as either Figure 5-24 or ISO Standard 780~~ 1985~~:1997 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. Irrespective of 5;3.2.10, machinery or apparatus containing magnetized material meeting the requirements of Packing Instruction 902 must also bear the "Magnetized material" label (Figure 5-22).

. . .

918	PACKING INSTRUCTION 918	918

This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries, when packed with equipment.

~~Lithium c~~Cells or batteries packed with equipment must meet the requirements of Packing Instruction 903 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. Each completed package containing lithium cells or batteries must be marked and labelled in accordance with the applicable requirements of Part 5, Chapters 1, 2 and 3.

The equipment and the packages of ~~lithium c~~Cells or batteries must be ~~overpacked~~ placed in an overpack. The overpack must bear applicable marks and labels as set out in Part 5;1 and 5;2.4.9.

For the purpose of this packing instruction, “equipment” means apparatus requiring the lithium batteries with which it is packed for its operation.

Part 5

SHIPPER'S RESPONSIBILITIES

Chapter 1

GENERAL

. . .

1.1 GENERAL REQUIREMENTS

Before a person offers any package or overpack of dangerous goods for transport by air that person must ensure that:

. . .

~~g) proper shipping names, UN numbers, labels, "limited quantities" (when applicable) and special handling instructions appearing on the interior packages are clearly visible or reproduced on the outside of the overpack (for an overpack containing packages of radioactive material, see 3.2.6);~~

~~h) packaging specification markings need not be reproduced on the overpack. The overpack marking is an indication that packages contained within comply with prescribed specifications;~~

~~i~~g) the dangerous goods are not included in any freight container/unit load device except for radioactive material as specified in 7;2.9 (subject to the approval of the operator, this does not apply to a unit load device containing consumer commodities prepared according to Packing Instruction 910 or dry ice used as a refrigerant for other than dangerous goods when prepared according to Packing Instruction 904 or magnetized material when prepared according to Packing Instruction 902);

~~j~~h) before a package or overpack is reused, all inappropriate dangerous goods labels and markings are removed or completely obliterated; and

~~k~~i) each package contained within an overpack is properly packed, marked, labelled and is free of any indication that its integrity has been compromised and in all respects is properly prepared as required in these Instructions. The "overpack" marking described in 2.4.9 is an indication of compliance with this requirement. The intended function of each package must not be impaired by the overpack.

Note.— For cooling purposes, an overpack may contain dry ice, provided that the overpack meets the requirements of Packing Instruction 904.

. . .

1.2 GENERAL PROVISIONS FOR CLASS 7

Editorial Note.— Paragraph 1.2.1 below is moved to 9.1.7, 9.1.8:

~~**1.2.1 Requirements before shipments**~~

~~1.2.1.1 *First shipment of a package*~~

~~Before the first shipment of any package, the following requirements must be fulfilled:~~

~~a) If the design pressure of the containment system exceeds 35 kPa (gauge), it must be ensured that the containment system of each package conforms to the approved design requirements relating to the capability of that system to maintain its integrity under that pressure;~~

~~b) For each Type B(U), Type B(M) and Type C package and for each package containing fissile material, it must be ensured that the effectiveness of its shielding and containment and, where necessary, the heat transfer characteristics and the effectiveness of the confinement system, are within the limits applicable to or specified for the approved design;~~

~~c) For packages containing fissile material, where, in order to comply with the requirements of 6;7.10.1 neutron poisons are specifically included as components of the package, checks must be performed to confirm the presence and distribution of those neutron poisons.~~

~~1.2.1.2 *Each shipment*~~

~~Before each shipment of any package, the following requirements must be fulfilled:~~

~~a) For any package it must be ensured that all the requirements specified in the relevant provisions of these Instructions have been satisfied;~~

~~b) It must be ensured that lifting attachments which do not meet the requirements of 6;7.1.2 have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with 6;7.1.3;~~

~~c) For each package requiring competent authority approval, it must be ensured that all the requirements specified in the approval certificates have been satisfied;~~

~~d) Each Type B(U), Type B(M) and Type C package must be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure unless an exemption from these requirements has received unilateral approval;~~

~~e) For each Type B(U), Type B(M) and Type C package, it must be ensured by inspection and/or appropriate tests that all closures, valves, and other openings of the containment system through which the radioactive contents might escape are properly closed and, where appropriate, sealed in the manner for which the demonstrations of compliance with the requirements of 6;7.7.7 and 6;7.9.3 were made;~~

~~f) For each special form radioactive material, it must be ensured that all the requirements specified in the approval certificate and the relevant provisions of these Instructions have been satisfied;~~

~~g) For packages containing fissile material, the measurement specified in 6;7.10.4 b) and the tests to demonstrate closure of each package as specified in 6;7.10.7 must be performed where applicable;~~

~~h) For each low dispersible radioactive material, it must be ensured that all the requirements specified in the approval certificate and the relevant provisions of these Instructions have been satisfied.~~

1.2.2~~1~~ Approval of shipments and notification

1.2.2~~1~~.1 *General*

In addition to the approval for package designs described in Part 6, Chapter 4, multilateral shipment approval is also required in certain circumstances (1.2.~~2~~.1.2 and 1.2.~~2~~.1.3). In some circumstances it is also necessary to notify competent authorities of a shipment (1.2.~~2~~.1.4).

1.2.2~~1~~.2 *Shipment approvals*

Multilateral approval must be required for:

a) The shipment of Type B(M) packages not conforming with the requirements of 6;7.6.5;

b) The shipment of Type B(M) packages containing radioactive material with an activity greater than 3000 A_1 or 3000 A_2, as appropriate, or 1000 TBq, whichever is the lower;

c) The shipment of packages containing fissile materials if the sum of the criticality safety indexes of the packages in a single freight container or in an aircraft exceeds 50; and

except that a competent authority may authorize transport into or through its country without shipment approval, by a specific provision in its design approval (see 1.2.~~3~~.2.1).

1.2.~~2~~1.3 *Shipment approval by special arrangement*

Provisions may be approved by a competent authority under which a consignment, which does not satisfy all of the applicable requirements of these Instructions may be transported under special arrangement (see 1;1.4.4).

1.2.1~~2~~.4 *Notifications*

Notification to competent authorities is required as follows:

a) Before the first shipment of any package requiring competent authority approval, the ~~consignor~~ shipper must ensure that copies of each applicable competent authority certificate applying to that package design have been submitted to the competent authority of each country through or into which the consignment is to be transported. The ~~consignor~~ shipper is not required to await an acknowledgement from the competent authority, nor is the competent authority required to make such acknowledgement of receipt of the certificate;

b) For each of the following types of shipments:

. . .

the ~~consignor~~ shipper must notify the competent authority of each country through or into which the consignment is to be transported. This notification must be in the hands of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance;

c) The ~~consignor~~ shipper is not required to send a separate notification if the required information has been included in the application for shipment approval;

. . .

1.2.~~3~~2 Certificates issued by the competent authority

1.2.2~~3~~.1 Certificates issued by the competent authority are required for the following:

a) Designs for:

i) special form radioactive material;

ii) low dispersible radioactive material;

iii) packages containing 0.1 kg or more of uranium hexafluoride;

iv) all packages containing fissile material unless excepted by 6;7.10.2;

v) Type B(U) packages and Type B(M) packages;

vi) Type C packages;

b) Special arrangements;

c) Certain shipments (1.2.~~2~~.1.2).

The certificates must confirm that the applicable requirements are met, and for design approvals, must attribute to the design an identification mark.

The package design and shipment approval certificates may be combined into a single certificate.

Certificates and applications for these certificates must be in accordance with the requirements in 6;7.22.

Editorial Note.— Second sentence of 1.2.3.2 below is moved to 4;9.1.8:

1.2.3~~2~~2.2 The ~~consignor~~ shipper must be in possession of a copy of each applicable certificate. ~~The consignor must also have a copy of any instructions with regard to the proper closing of the package and any preparation for shipment before making any shipment under the terms of the certificates.~~

1.2.3~~2~~2.3 For package designs where a competent authority issued certificate is not required, the ~~consignor~~ shipper must, on request, make available for inspection by the relevant competent authority, documentary evidence of the compliance of the package design with all the applicable requirements.

Editorial Note.— Paragraph 1.2.3 below is moved from 2;7.6:

~~7.6~~1.2.3 Determination of transport index (TI) and criticality safety index (CSI)

~~7.6.1~~1.2.3.1 Determination of transport index

~~7.6.1.1~~1.2.3.1.1 The transport index (TI) for a package, overpack or freight container, must be the number derived in accordance with the following procedure:

a) Determine the maximum radiation level in units of millisieverts per hour (mSv/h) at a distance of 1 m from the external surfaces of the package, overpack, or freight container. The value determined must be multiplied by 100 and the resulting number is the transport index. For uranium and thorium ores and their concentrates, the maximum radiation level at any point 1 m from the external surface of the load may be taken as:

0.4 mSv/h for ores and physical concentrates of uranium and thorium;

0.3 mSv/h for chemical concentrates of thorium;

0.02 mSv/h for chemical concentrates of uranium, other than uranium hexafluoride;

b) For freight containers, the value determined in step a) above must be multiplied by the appropriate factor from Table ~~2-11~~5-1;

c) The value obtained in steps a) and b) above must be rounded up to the first decimal place (e.g. 1.13 becomes 1.2), except that a value of 0.05 or less may be considered as zero.

~~7.6.1.2~~1.2.3.1.2 The transport index for each overpack or freight container must be determined as either the sum of the transport indices of all the packages contained, or by direct measurement of radiation level, except in the case of non-rigid overpacks for which the transport index must be determined only as the sum of the transport indices of all the packages.

~~**7.6.2 Determination of criticality safety index (CSI)**~~

~~7.6.2.1 The criticality safety index (CSI) for packages containing fissile material must be obtained by dividing the number 50 by the smaller of the two values of N derived in 6;7.10.11 and 6;7.10.12 (i.e. CSI = 50/N). The value of the criticality safety index may be zero, provided that an unlimited number of packages is subcritical (i.e. N is effectively equal to infinity in both cases).~~

Table ~~2-11~~5-1. Multiplication factors for freight containers

*Size of load**	*Multiplication factor*
size of load ≤ 1 m^2	1
1 m^2 < size of load ≤ 5 m^2	2
5 m^2 < size of load ≤ 20 m^2	3
20 m^2 < size of load	10
* Largest cross-sectional area of the load being measured.	

~~7.6.2.2~~1.2.3.1.3 The criticality safety index for each overpack or freight container must be determined as the sum of the CSIs of all the packages contained. The same procedure must be followed for determining the total sum of CSIs in a consignment or aboard an aircraft.

Editorial Note.— Paragraphs 1.2.3.1.4 moved from current 2;7.8.4 and 7.8.5:

~~7.8.4~~1.2.3.1.4 Packages and overpacks must be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table ~~2-15~~5-2 and with the following requirements:

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

b) the transport index must be determined following the procedures specified in ~~7.6.1.1~~1.2.3.1.1 and ~~7.6.1.2~~1.2.3.1.2;

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

≠ d) a package transported under a special arrangement must be assigned to category III-YELLOW ~~except under the provisions of 7.8.5~~ except when otherwise specified in the competent authority approval certificate of the country of origin of design (see 2;7.2.4.6);

≠ e) an overpack which contains packages transported under special arrangement must be assigned to category III-YELLOW except ~~under the provisions of 7.8.5~~ when otherwise specified in the competent authority approval certificate of the country of origin of design (see 2;7.2.4.6).

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

Table ~~2-15~~5-2. Categories of packages and overpacks

Conditions		
Transport index	*Maximum radiation level at any point on external surface*	*Category*
0*	Not more than 0.005 mSv/h	I-WHITE
More than 0 but not more than 1*	More than 0.005 mSv/h but not more than 0.5 mSv/h	II-YELLOW
More than 1 but not more than 10	More than 0.5 mSv/h but not more than 2 mSv/h	III-YELLOW
More than 10	More than 2 mSv/h but not more than 10 mSv/h	III-YELLOW**
* If the measured transport index is not greater than 0.05, the value quoted may be zero in accordance with 7.6.1.1 c). ** Must be transported under exclusive use and special arrangement.		

. . .

1.6 EMPTY PACKAGINGS

1.6.1 Other than for Class 7, a packaging which previously contained dangerous goods must be identified, marked, labelled and placarded as required for those dangerous goods unless steps such as cleaning, purging of vapours or refilling with a non-dangerous substance are taken to nullify any hazard.

1.6.2 Before an empty packaging which had previously contained an infectious substance is returned to the shipper, or sent elsewhere, it must be ~~thoroughly~~ disinfected or sterilized to nullify any hazard and any label or marking indicating that it had contained an infectious substance must be removed or obliterated.

1.6.3 Packagings used for the transport of radioactive material must not be used for the storage or transport of other goods unless decontaminated below the level of 0.4 Bq/cm2 for beta and gamma emitters and low toxicity alpha emitters and 0.04 Bq/cm2 for all other alpha emitters.

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Chapter 2

PACKAGE MARKINGS

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2.4.1 Marking with proper shipping name and UN number

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Note.— It is anticipated that displaying the UN number within a diamond for packages containing limited quantities of dangerous goods will become mandatory as of 1 January ~~2009~~2011.

. . .

2.4.5 Special marking requirements for radioactive material

2.4.5.1

~~a) each package of gross mass exceeding 50 kg must have its permissible gross mass legibly and durably marked on the outside of the packaging;~~

~~b~~a) each package which conforms to:

i) a Type IP-1 package, a Type IP-2 package or a Type IP-3 package design must be legibly and durably marked on the outside of the packaging with “TYPE IP-1”, “TYPE IP-2” or “TYPE IP-3” as appropriate;

ii) a Type A package design must be legibly and durably marked on the outside of the packaging with “TYPE A”;

iii) a Type IP-2 package, a Type IP-3 package or a Type A package design must be legibly and durably marked on the outside of the packaging with the international vehicle registration code (VRI Code) of the country of origin of design and either the name of the manufacturer, or other identification of the packaging specified by the competent authority of the country of origin of design.

~~c~~b) each package which conforms to a design approved by the competent authority must be legibly and durably marked on the outside of the packaging with:

i) the identification mark allocated to that design by the competent authority;

ii) a serial number to uniquely identify each packaging which conforms to that design;

iii) in the case of a Type B(U) or Type B(M) package design, with “TYPE B(U)” or “TYPE B(M)”; and

iv) in the case of a Type C package design, with “TYPE C”.

~~d~~c) each package which conforms to a Type B(U), Type B(M) or Type C package design must have the outside of the outermost receptacle which is resistant to the effects of fire and water plainly marked by embossing, stamping or other means resistant to the effects of fire and water with the trefoil symbol, as shown in Figure 5-1 below:

~~e~~d) each excepted package must be marked with the UN number, preceded by the letters "UN".

. . .

2.4.9 Special marking provisions for environmentally hazardous substances

2.4.9.1 Packages containing environmentally hazardous substances meeting the criteria of 2.9.3 of the UN Recommendations (UN Nos. 3077 and 3082) must be durably marked with the environmentally hazardous substance mark with the exception of single packagings and combination packagings containing inner packagings with:

— contents of 5 L or less for liquids; or
— contents of 5 kg or less for solids.

2.4.9.2 The environmentally hazardous substance mark must be located adjacent to the markings required by 2.4.1.1. The requirements of 2.2.2 must be met.

2.4.9.3 The environmentally hazardous substance mark must be as shown in Figure 5-X. For packagings, the dimensions must be 100 mm × 100 mm, except in the case of packages of such dimensions that they can only bear smaller marks.

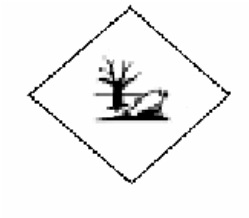


Figure 5-2. Symbol (fish and tree): black on white or suitable contrasting background

Editorial Note.— Renumber subsequent figures accordingly.

2.4.9~~10~~ Marking of overpacks

An overpack must be marked with the word "Overpack", with the proper shipping name, UN number, and special handling instructions appearing on interior packages for each item of dangerous goods contained in the overpack unless markings and labels representative of all dangerous goods in the overpack are visible, except as required in 3.2.6, and 3.5.1.1 h) to i) . Packaging specification markings must not be reproduced on the overpack.

2.4.~~10~~11 Additional ~~M~~markings of packages containing dangerous goods in limited quantities

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Chapter 3

LABELLING

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3.2 APPLICATION OF LABELS

3.2.6 Except ~~as provided for large freight containers in accordance with~~ when enlarged labels are used in accordance with 3.6, each package, overpack and freight container containing radioactive material must bear at least two labels which conform to Figures 5-17, 5-18 and 5-19 as appropriate according to the category (see ~~2;7.8.4~~ 5;1.2.3.1.4) of that package, overpack or freight container. Labels must be affixed to two opposite sides on the outside of the package or on the outside

of all four sides of the freight container. Each overpack containing radioactive material must bear at least two labels on opposite sides of the outside of the overpack. In addition, each package, overpack and freight container containing fissile material, other than fissile material excepted under the provisions of 6;7.10.2 must bear labels which conform to the model shown in Figure 5-20; such labels, where applicable, must be affixed adjacent to the labels for radioactive material. Labels must not cover the markings specified in Chapter 2. Any labels which do not relate to the contents must be removed or covered.

. . .

3.2.11 In addition to the class hazard labels specified in 3.1, handling labels must also be affixed to packages of dangerous goods as follows:

. . .

b) when required by the provisions of 4;1.1.13, either the "Package orientation" label (Figure 5-25), or pre-printed package orientation labels meeting the same specification as either Figure 5-25 or ISO Standard 780~~-1985~~:1997, must be affixed to or printed on at least two opposite vertical sides of the package with the arrows pointing in the correct direction. The words "Dangerous goods" may be inserted on the label below the line;

. . .

3.3.2 An overpack containing single packages with end closures containing liquid dangerous goods must be labelled with either the "Package Orientation" label (Figure 5-25), or pre-printed package orientation labels meeting the same specification as either Figure 5-25 or ISO Standard 780~~-1985~~:1997, unless such labels are affixed to the package and are visible from the outside of the overpack. Such labels must be affixed to or printed on at least two opposite vertical sides of the overpack with the arrows pointing in the direction required to indicate the orientation of the overpack required to ensure that end closures are upward, notwithstanding that such single packages may also have side closures.

. . .

3.5 LABEL SPECIFICATIONS

3.5.1 Class hazard label specifications

3.5.1.1 Class hazard labels must conform to the following specifications:

a) They must be in the form of a square with minimum dimensions of 100 mm × 100 mm, set at an angle of 45° (diamond shaped) except that labels of 50 mm × 50 mm may be used on packages containing infectious substances where the packages are of dimensions such that they can only bear smaller labels. ~~The labels must have a line of the same colour as the symbol, 5 mm inside the edge and running parallel to it.~~ They must have a line 5 mm inside the edge and running parallel with it. In the upper half of a label the line must have the same colour as the symbol and in the lower half it must have the same colour as the figure in the bottom corner. Labels are divided into halves. With the exception of Divisions 1.4, 1.5 and 1.6, the upper half of the label ~~is reserved for~~ must contain the pictorial symbol and the lower half ~~for texts and~~ must contain the class or division number (and for goods of Class 1, ~~and~~ the compatibility group letter) as appropriate. The label may include text such as the UN number or words describing the hazard class or division (e.g. "flammable") in accordance with f) provided the text does not obscure or detract from the other required label elements.

b) The symbols, texts and numbers must be shown in black on all labels except:

1) the Class 8 label, where the text (if any) and class number must appear in white;

2) labels with entirely green, red or blue backgrounds, where they may be shown in white; and

3) the Division 5.2 label, where the symbol may be shown in white.

c) Except for Divisions 1.4, 1.5 and 1.6, labels for Class 1 show in the lower half the division number and compatibility group letter for the substance or article. Labels for Divisions 1.4, 1.5 and 1.6 must show in the upper half the division number and in the lower half the compatibility group letter.

d) Cylinders for Class 2 may, on account of their shape, orientation and securing mechanisms for transport, bear labels representative of those specified in this chapter, which have been reduced in size, according to ISO 7225:~~1994~~2005, for display on the non-cylindrical part (shoulder) of such cylinders. Labels may overlap to the extent provided for by

ISO 7225:~~1994~~2005 “Gas cylinders — Precautionary labels”; however, in all cases the labels representing the primary hazard and the numbers appearing on any label must remain fully visible and the symbols recognizable.

. . .

Labelling of radioactive material

h) Each label conforming to Figures 5-17, 5-18 and 5-19 must be completed with the following information:

1) Contents:

A) except for LSA-I material, the name(s) of the radionuclide(s) as taken from Table 2-12, using the symbols prescribed therein. For mixtures of radionuclides, the most restrictive nuclides must be listed to the extent the space on the line permits. The group of LSA or SCO must be shown following the name(s) of the radionuclide(s). The terms “LSA-II”,“LSA-III”, “SCO-I” and “SCO-II” must be used for this purpose;

B) for LSA-I material, the term “LSA-I” is all that is necessary; the name of the radionuclide is not necessary;

2) Activity: The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with the appropriate SI prefix symbol. For fissile material, the mass of fissile material in units of grams (g), or multiples thereof, may be used in place of activity;

3) For overpacks and freight containers the “contents” and “activity” entries on the label must bear the information required in 3.5.1.1 g) 1 A) and B), respectively, totalled together for the entire contents of the overpack or freight container except that on labels for overpacks or freight containers containing mixed loads of packages containing different radionuclides, such entries may read “See Transport Documents”;

4) Transport index: ~~See 2;7.6.1.1 and 2;7.6.1.2~~The number determined in accordance with 1.2.3.1.1 and 1.2.3.1.2. (No transport index entry is required for category I-WHITE.)

. . .

3.5.2 Handling label specifications

An illustration of each of the handling labels showing the approved design and colour is given in Figures 5-23 to 5-25 and Figures 5-27 to 5-29. The minimum label dimensions are shown in the figures~~.~~: ~~h~~However~~,~~:

a) ~~-~~labels having dimensions not smaller than half of those indicated may be used on packages containing infectious substances when the packages are of dimensions such that they can only bear smaller labels~~.~~; and

b) orientation labels may meet the specification of either Figure 5-25 or ISO Standard 780-1985.

. . .

Replace Figure 24 with the following:



Colour: black on orange
Dimensions: 120 mm × 110 mm

Note.— Figure 5-24 as contained in the 2007-2008 Edition of these Instructions may continue to be used until 31 December ~~2010~~2012.

Figure 5-24. Cargo aircraft only

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Chapter 4

DOCUMENTATION

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Note.— These Instructions do not preclude the use of electronic data processing (EDP) and electronic data interchange (EDI) transmission techniques as an ~~aid~~ alternative to paper documentation, unless otherwise indicated.

4.1 DANGEROUS GOODS TRANSPORT ~~DOCUMENTATION~~ INFORMATION

4.1.1 General

4.1.1.1 The person who offers dangerous goods for transport by air must provide to the operator the information applicable to the consignment as set out in this paragraph. The information may be provided on a paper document or, where an agreement exists with the operator, by EDP or EDI techniques.

4.1.1.2 Where a paper document is used, the person who offers dangerous goods for transport by air must provide to the operator two copies of the dangerous goods transport document, completed and signed as provided for in this paragraph.

4.1.1.3 Where the dangerous goods transport information is provided by EDP or EDI techniques the data must be able to be produced as a paper document without delay, with the data in the sequence required by this chapter.

Note.— All references to "dangerous goods transport document" in this chapter also include provision of the required information by use of electronic data processing (EDP) and electronic data interchange (EDI) transmission techniques.

. . .

4.1.5 Information required in addition to the dangerous goods description

In addition to the dangerous goods description the following information must be included after the dangerous goods description on the dangerous goods transport document.

4.1.5.1 *Quantity of dangerous goods, number and type of packagings*

. . .

UN packaging codes may only be used to supplement the description of the kind of package (e.g. one fibreboard box (4G)). Where the letter "G" follows the quantity in column 10 or 12 of Table 3-1 the gross mass of each package must be indicated, rather than the net quantity; and:

. . .

e) for items where "No Limit" is shown in column 10 or 12 the quantity ~~shown should~~ must be the net mass or volume ~~of the~~ for substance~~s, except for UN 2800, UN 2807, UN 3072, UN 3166 and UN 3171 where the quantity shown should be the gross mass of the article~~ (e.g. UN 2964, UN 3291). For articles (e.g. UN 2794, UN 2800, UN 2990, UN 3166) the quantity must be the gross mass, followed by the letter G.

. . .

4.1.5.7.4 The applicable competent authority certificates need not necessarily accompany the consignment. The ~~consignor~~ shipper must make them available.

. . .

4.1.6.2 If the dangerous goods documentation is presented to the operator by means of electronic data processing (EDP) or electronic data interchange (EDI) transmission techniques, the signature(s) may be replaced by the name(s) (in capitals) of the person authorized to sign. Where the original consignment details are provided to an operator, by EDP or EDI techniques and subsequently the consignment is transhipped to an operator that requires a paper dangerous goods transport document, the paper document must indicate "Original Received Electronically" and the name of the signatory must be shown in capital letters.

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Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

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Chapter 1

APPLICABILITY, NOMENCLATURE AND CODES

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1.2 CODES FOR DESIGNATING TYPES OF PACKAGINGS

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1.2.6 The following capital letters must be used for the types of material:

A. Steel (all types and surface treatments)
B. Aluminium
C. Natural wood
D. Plywood
F. Reconstituted wood
G. Fibreboard
H. Plastic material
L. Textile
M. Paper, multiwall
N. Metal (other than steel or aluminium)
P. Glass, porcelain or stoneware (not used in these Instructions).

Note.— Plastics materials, is taken to include other polymeric materials such as rubber.

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Chapter 2

MARKING OF PACKAGINGS OTHER THAN INNER PACKAGINGS

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2.1 MARKING REQUIREMENTS FOR PACKAGINGS OTHER THAN INNER PACKAGINGS

2.1.1 Each packaging intended for use according to these Instructions must bear markings which are durable, legible and placed in a location and of such a size relative to the packaging as to be readily visible. For packages with a gross mass of more than 30 kg the markings, or a duplicate thereof, must appear on the top or on a side of the packaging. Letters, numerals and symbols must be at least 12 mm high, except for packagings of 30 L or 30 kg capacity or less, when they must be at least 6 mm in height and for packagings of 5 L or 5 kg or less when they must be of an appropriate size. The markings must show:

a) the United Nations packaging symbol 

This symbol must not be used for any purpose other than certifying that a packaging complies with the relevant requirements in Chapters 1~~3 and performance tests in Chapter 4~~ to 6. For embossed metal packagings the capital letters “UN” may be applied as the symbol;

. . .

Chapter 3

REQUIREMENTS FOR PACKAGINGS

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3.2.8 Plastic receptacles (aerosols) non-refillable (IP.7C)

3.2.8.1 *Receptacles (aerosols) IP.7C*

3.2.8.1.1 *Materials and construction*. The receptacle must be of polyethylene terephthalate (PET), polyethylene napthalate (PEN), polyamide (Nylon), or a blend containing some combination of PET, PEN, ethyl vinyl alcohol (~~EVOR~~EVOH) and Nylon. Thermoplastic processes ensuring uniformity of the completed container shall be applied. No used material other than production residues or re-grind from the same manufacturing process may be used. The packaging shall be adequately resistant to aging and to degradation caused either by the substance contained or by ultraviolet radiation. Maximum capacity must not exceed 500 mL.

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Chapter 4

PACKAGING PERFORMANCE TESTS

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4.1 PERFORMANCE AND FREQUENCY OF TESTS

4.1.1 The design type of each packaging must be tested as provided for in this Chapter in accordance with procedures established by the appropriate national authority.

4.1.2 ~~Tests must be~~Each packaging design type must successfully ~~performed on each packaging design type~~ pass the tests prescribed in this chapter before ~~such packaging is~~ being used. A packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes packagings which differ from the design type only in their lesser design height.

. . .

4.3.4 Target

The target must be a ~~rigid,~~ non-resilient~~, flat and~~ horizontal surface and must be:

a) integral and massive enough to be immovable;

b) flat with a surface kept free from local defects capable of influencing the test results;

c) rigid enough to be non-deformable under test conditions and not liable to become damaged by the tests; and

d) sufficiently large to ensure that the test package falls entirely upon the surface.

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Chapter 5

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES, AEROSOL DISPENSERS AND SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

5.1 GENERAL REQUIREMENTS

Note 1.— For aerosol dispensers ~~and~~, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas see 5.4.

Note 2.— For open cryogenic receptacles the requirements of Packing Instruction 202 must be met.

. . .

5.1.1.9 *Additional requirements for the construction of pressure receptacles for acetylene*

Editorial Note.— The text below is moved from 4;4.1.1.2:

Cylinders for UN 1001 **Acetylene, dissolved** and UN 3374 **Acetylene, solvent free** must be filled with a porous mass, uniformly distributed, of a type that conforms to the requirements and testing specified by the appropriate national authority and which:

a) is compatible with the cylinder and does not form harmful or dangerous compounds either with the acetylene or with the solvent in the case of UN 1001; and

b) is capable of preventing the spread of decomposition of the acetylene in the porous mass.

In the case of UN 1001, the solvent must be compatible with the cylinders.

. . .

5.1.3 Service equipment

5.1.3.1 Valves, piping and other fittings subjected to pressure, ~~Except for~~ excluding pressure relief devices~~, valves, piping, fittings and other equipment subjected to pressure~~ must be designed and constructed ~~to withstand at~~ so that the burst pressure is at least 1.5 times the test pressure of the cylinders and closed cryogenic receptacles.

. . .

Editorial Note.— Paragraph 5.1.4 below is moved from current 5.1.6:

~~5.1.6~~5.1.4 Approval of cylinders and closed cryogenic receptacles

5.1.6~~4~~.1 The conformity of cylinders and closed cryogenic receptacles must be assessed at the time of manufacture as required by the appropriate national authority. Cylinders and closed cryogenic receptacles must be inspected, tested and approved by an inspection body. The technical documentation must include full specifications on design and construction, and full documentation on the manufacturing and testing.

5.1.6~~4~~.2 Quality assurance systems must conform to the requirements of the appropriate national authority.

5.1.4~~5~~ Initial inspection and testing

≠ 5.1.4~~5~~.1 New cylinders must be subjected to inspection and testing during and after manufacture in accordance with the applicable design standards including the following:

On an adequate sample of cylinders:

a) testing of the mechanical characteristics of the material of construction;

b) verification of the minimum wall thickness;

c) verification of the homogeneity of the material for each manufacturing batch;

d) inspection of the external and internal conditions of the cylinders;

e) inspection of the neck threads;

f) verification of the conformance with the design standard;

For all cylinders:

g) a hydraulic pressure test. Cylinders must withstand the test pressure without expansion greater than that allowed in the design specifications;

Note.— With the agreement of the appropriate national authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

h) inspection and assessment of manufacturing defects and either repairing them or rendering the cylinders unserviceable. In the case of welded cylinders, particular attention must be paid to the quality of the welds;

i) an inspection of the markings on the cylinders;

j) in addition, cylinders intended for the transport of UN 1001 **Acetylene, dissolved**, and UN 3374 **Acetylene, solvent free**, must be inspected to ensure proper installation and condition of the porous mass and, if applicable, the quantity of solvent.

≠ 5.1.4~~5~~.2 On an adequate sample of closed cryogenic receptacles, the inspections and tests specified in 5.1.~~4~~.5.1 a), b), d) and f) must be performed. In addition, welds must be inspected by radiographic, ultrasonic or another suitable non-destructive test method on a sample of closed cryogenic receptacles according to the applicable design and construction standard. This weld inspection does not apply to the jacket. Additionally, all closed cryogenic receptacles must undergo the inspections and tests specified in 5.1.~~4~~.5.1 g), h) and i), as well as a leakproofness test and a test of the satisfactory operation of the service equipment after assembly.

5.1.5~~6~~ Periodic inspection and testing

5.1.5~~6~~.1 Refillable cylinders must be subjected to periodic inspections and tests by a body authorized by the appropriate national authority, in accordance with the following:

a) check of the external conditions of the cylinder and verification of the equipment and the external markings;

b) check of the internal conditions of the cylinder (e.g. internal inspection, verification of minimum wall thickness);

≠ c) check of the threads if there is evidence of corrosion or if the fittings are removed;

d) a hydraulic pressure test and, if necessary, verification of the characteristics of the material by suitable tests~~.~~:

Note 1.— With the agreement of the appropriate national authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

Note 2.— With the agreement of the appropriate national authority, the hydraulic pressure test of cylinders may be replaced by an equivalent method based on acoustic emission testing, ultrasonic examination or a combination of acoustic emission testing and ultrasound examination.

e) check of service equipment, other accessories and pressure-relief devices, if to be reintroduced into service.

5.1.5~~6~~.2 ~~For C~~cylinders intended for the transport of UN 1001 **Acetylene, dissolved**, and UN 3374 **Acetylene, solvent free**, must be examined only as specified in 5.1.6.1 a), c) and e). ~~only the external condition (corrosion, deformation) and the~~ In addition, the condition of the porous ~~mass~~ material (e.g. cracks, top clearance, loosening, settlement) must be examined.

Editorial Note.— Paragraph 5.1.6 below is moved to 5.1.4:

≠ ~~**5.1.6 Approval of cylinders and closed cryogenic receptacles**~~

≠ ~~5.1.6.1 The conformity of cylinders and closed cryogenic receptacles must be assessed at the time of manufacture as required by the appropriate national authority. Cylinders and closed cryogenic receptacles must be inspected, tested and approved by an inspection body. The technical documentation must include full specifications on design and construction, and full documentation on the manufacturing and testing.~~

~~5.1.6.2 Quality assurance systems must conform to the requirements of the appropriate national authority.~~

. . .

5.2.1.3 The following standards apply for the design, construction and initial inspection and test of UN acetylene cylinders except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5.

Note.— The maximum of 1 000 L volume as mentioned in the ISO standard ISO 21029-1:2004 Cryogenic vessels, does not apply for refrigerated liquefied gases in closed cryogenic receptacles installed in apparatus (e.g. MRI or cooling machines).

For the cylinder shell:

ISO 9809-1:1999 Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.

Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.

ISO 9809-3:2000 Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.

~~ISO 11118:1999 Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.~~

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5.2.2 Materials

≠ In addition to the material requirements specified in the cylinder and closed cryogenic receptacle design and construction standards, and any restrictions specified in the applicable Packing Instruction for the gas(es) to be transported (e.g. Packing Instruction 200 or Packing Instruction 202), the following standards apply to material compatibility:

ISO 11114-1:1997 Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials.

ISO 11114-2:2000 Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials.

Note.— The limitations imposed in ISO 11114-1 on high strength steel alloys at ultimate tensile strength levels up to 1 100 MPa do not apply to **Silane** *(UN 2203).*

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5.2.4 Periodic inspection and test

The following standards apply to the periodic inspection and testing of UN cylinders:

ISO 6406:~~1992~~2005 ~~Periodic inspection and testing of s~~Seamless steel gas cylinders — Periodic inspection and testing.

ISO 10461:~~1993~~2005/A1:2006 Seamless aluminium~~-~~alloy gas cylinders — Periodic inspection and testing.

ISO 10462:~~1994~~2005 Transportable ~~C~~cylinders for dissolved acetylene — Periodic inspection and maintenance.

SO 11623:2002 Transportable gas cylinders — Periodic inspection and testing of composite gas cylinders.

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5.2.7 Marking of UN refillable cylinders and closed cryogenic receptacles

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5.2.7.1 The following certification marks must be applied:

a) The UN packaging symbol (un)

≠ This symbol must ~~only be marked on cylinders and closed cryogenic receptacles that conform to the requirements of these Instructions for UN cylinders and closed cryogenic receptacles~~ not be used for any purpose other than certifying that a packaging complies with the relevant requirements in Chapters 1 to 6;

. . .

5.4 REQUIREMENTS FOR AEROSOL DISPENSERS, ~~AND~~ SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

5.4.1 Small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas

5.4.1.1 Each receptacle or fuel cell cartridge must be subjected to a test performed in a hot water bath; the temperature of the bath and the duration of the test must be such that the internal pressure reaches that which would be reached at 55°C (50°C if the liquid phase does not exceed 95 per cent of the capacity of the receptacle or the fuel cell cartridge at 50°C). If the contents are sensitive to heat or if the receptacles or the fuel cell cartridges are made of plastics material which softens at this test temperature, the temperature of the bath must be set at between 20°C and 30°C but, in addition, one receptacle or fuel cell cartridge in 2 000 must be tested at the higher temperature.

5.4.1.2 No leakage or permanent deformation of a receptacle or fuel cell cartridge may occur, except that a plastic receptacle or fuel cell cartridge may be deformed through softening provided it does not leak.

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5.4.2 Aerosol dispensers

. . .

5.4.2.2.3 *Testing of the aerosol dispensers after filling*

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

Each filled aerosol dispenser must be weighed and leak tested. The leak detection equipment must be sufficiently sensitive to detect at least a leak rate of 2.0×10^{-3} mbar.l.s^{-1} at 20°C.

Any filled aerosol dispenser which shows evidence of leakage, deformation or excessive ~~weight~~ mass must be rejected.

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Chapter 6

PACKAGINGS FOR INFECTIOUS SUBSTANCES OF CATEGORY A ~~PACKAGINGS~~

6.1 GENERAL

6.1.1 The requirements of this chapter apply to packagings intended for the transport of infectious substances of Category A.

Editorial Note.— Paragraph 6.1.2 below is moved to 6.5.2.1:

6.2 REQUIREMENTS FOR PACKAGINGS

Editorial Note.— Paragraph 6.2.1 below is almost the same as 6;1.1.2:

6.2.1 The requirements for packagings in this section are based on packagings, as specified in Chapter 2, currently used. In order to take into account progress in science and technology, there is no objection to the use of packagings having specifications different from those in this chapter provided that they are equally effective, acceptable to the competent authority and able successfully to withstand the tests described in 6.5. Methods of testing other than those described in these Instructions are acceptable provided they are equivalent.

Editorial Note.— Paragraph 6.2.2 below is almost the same as 4;1.1.2:

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

Editorial Note.— Paragraph 6.2.3 below almost the same as 6;1.1.3:

6.2.3 Manufacturers and subsequent distributors of packagings must provide information regarding procedures to be followed (including closure instructions for inner packagings and receptacles), a description of the types and dimensions of the closures (including required gaskets) and any other components needed to ensure that packages, as presented for transport, are capable of passing the applicable performance tests of this chapter.

6.3 CODE FOR DESIGNATING TYPES OF PACKAGINGS

6.3.1 The codes for designating types of packagings are set out in 6;1.2.

6.3.2 The letters “U” or “W” may follow the packaging code. The letter “U” signifies a special packaging conforming to the requirements of 6.5.1.6. The letter “W” signifies that the packaging, although, of the same type indicated by the code is manufactured to a specification different from that in Chapter 3 and is considered equivalent under the requirements of 6.2.1.

6.4 MARKING

Editorial Note.— Notes below are similar to 6;2, Introductory notes:

Note 1.— The marking indicates that the packaging which bears it corresponds to a successfully tested design type and that it complies with the provisions of this chapter which are related to the manufacture, but not to the use, of the packaging.

Note 2.— The marking is intended to be of assistance to packaging manufacturers, reconditioners, packaging users, operators and appropriate authorities.

Note 3.— The marking does not always provide full details of the test levels, etc., and these may need to be taken further into account, e.g. by reference to a test certificate, test reports or register of successfully tested packagings.

Editorial Note.— Paragraph 6.4.1 below similar to 6;2.1.1:

6.4.1 Each packaging intended for use according to these Instructions must bear markings which are durable, legible and placed in a location and of such a size relative to the packaging as to be readily visible. For packages with a gross mass of more than 30 kg the markings, or a duplicate thereof, must appear on the top or on a side of the packaging. Letters, numerals and symbols must be at least 12 mm high, except for packagings of 30 L or 30 kg capacity or less, when they must be at least 6 mm in height and for packagings of 5 L or 5 kg or less when they must be of an appropriate size.

6.4.2 A packaging that meets the requirements of this section and of 6.5 shall be marked with:

a) the United Nations packaging symbol: (un)

This symbol must not be used for any purpose other than certifying that a packaging complies with the relevant requirements in Chapters 1 to 6;

b) the code designating the type of packaging according to the requirements of 6;1.2;

c) the text “CLASS 6.2”;

d) the last two digits of the year of manufacture of the packaging;

e) the State authorizing the allocation of the mark, indicated by the distinguishing sign for motor vehicles in international traffic;

f) the name of the manufacturer or other identification of the packaging specified by the competent authority; and

g) for packagings meeting the requirements of 6.5.1.6, the letter “U”, inserted immediately following the marking required in b) above.

Editorial Note.— Paragraph 6.4.3 below is similar to 6;2.1.7:

6.4.3 Marking must be applied in the sequence of the sub-paragraphs in 6.4.2; each element of the marking required in these sub-paragraphs must be clearly separated, e.g. by a slash or space, so as to be easily identified. For examples see 6.4.4. Any additional markings authorized by a competent authority must still enable the parts of the mark to be correctly identified with reference to 6.4.1.

Editorial Note.— Paragraph 6.4.4 below is similar to 6;2.2.3:

6.4.4 *Example of marking*

(un) 4G/CLASS 6.2/06 as in 6.4.2 a), b), c) and d)
S/SP-9989-ERIKSSON as in 6.4.2 e) and f)

6.5 Test requirements for packagings

6.5.1 *Performance and frequency of tests*

6.5.1.1 The design type of each packaging must be tested as provided for in this Chapter in accordance with procedures established by the competent authority.

6.5.1.2 Each packaging design type must successfully pass the tests prescribed in this chapter before being used. A packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes packagings which differ from the design type only in their lesser design height.

6.5.1.3 Tests must be repeated on production samples at intervals established by the competent authority.

6.5.1.4 Tests must also be repeated after each modification which alters the design, material or manner of construction of a packaging.

Editorial Note.— Paragraph 6.5.1.5 is moved from 6;6.1.3:

6.5.1.5 The ~~appropriate national~~ competent authority may permit the selective testing of packagings that differ only in minor respects from a tested type, e.g. smaller sizes ~~of inner packagings or inner packagings of~~ or lower net mass of primary receptacles; and packagings such as drums~~, bags~~ and boxes which are produced with small reductions in external dimension(s).

Editorial Note.— Paragraph 6.5.1.6 is moved from 6.4:

6.5.1.6 ~~Inner~~Primary receptacles of any type may be assembled within a~~n intermediate (~~secondary~~)~~ packaging and transported without testing in the rigid outer packaging under the following conditions:

a) The ~~intermediate/~~ rigid outer packaging combination must have been successfully tested in accordance with ~~6.2~~ 6.5.2.2 with fragile (e.g. glass) ~~inner~~ primary receptacles;

b) The total combined gross mass of ~~inner~~ primary receptacles must not exceed one-half the gross mass of ~~inner~~ primary receptacles used for the drop test in a) above;

c) The thickness of cushioning between ~~inner~~ primary receptacles and between ~~inner~~ primary receptacles and the outside of the ~~intermediate~~ secondary packaging must not be reduced below the corresponding thicknesses in the originally tested packaging; and if a single ~~inner~~ primary receptacle was used in the original test, the thickness of cushioning between ~~inner~~ primary receptacles must not be less than the thickness of cushioning between the outside of the ~~intermediate~~ secondary packaging and the ~~inner~~ primary receptacle in the original test. When either fewer or smaller ~~inner~~ primary receptacles are used (as compared to the ~~inner~~ primary receptacles used in the drop test), sufficient additional cushioning material must be used to take up the void spaces;

d) The rigid outer packaging must have successfully passed the stacking test in 4.6 while empty. The total mass of identical packages must be based on the combined mass of ~~inner receptacles~~ packagings used in the drop test in a) above;

e) For ~~inner~~ primary receptacles containing liquids, an adequate quantity of absorbent material to absorb the entire liquid content of the ~~inner~~ primary receptacles must be present;

f) If the rigid outer packaging is intended to contain ~~inner~~ primary receptacles for liquids and is not leakproof, or is intended to contain ~~inner~~ primary receptacles for solids and is not siftproof, a means of containing any liquid or solid contents in the event of leakage must be provided in the form of a leakproof liner, plastic bag or other equally effective means of containment; and

g) ~~The marking required by 2.2.2 b) must be followed by the letter "U".~~ In addition to the markings prescribed in 6.4.2 (a) to (f), packagings shall be marked in accordance with 6.4.2 (g).

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

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

~~6.1.1 Other than for packagings for live animals and organisms, samples of each packaging must be prepared for testing as described in 6.1.2 and then subjected to the tests in 6.2 and 6.3. If the nature of the packaging makes it necessary, equivalent preparation and tests are permitted, providing that these may be demonstrated to be at least as effective.~~

6.5.2 *Preparation of packagings for testing*

~~6.1.2~~6.5.2.1 Samples of each packaging must be prepared as for transport except that the liquid or solid infectious substance must be replaced by water or, where conditioning at –18°C is specified in 6.2.1, by a water/antifreeze mixture. Each primary receptacle must be filled to not less than 98 per cent of its capacity.

Note 2.— The term water includes water/antifreeze solution with a minimum specific gravity of 0.95 for testing at –18°C.

Editorial Note.— Paragraph 6.1.3 below is moved to 6.5.1.5:

~~6.1.3 The appropriate national authority may permit the selective testing of packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and packagings such as drums, bags and boxes which are produced with small reductions in external dimension(s).~~

~~6.1.4 Provided an equivalent level of performance is maintained, the following variations in the primary receptacles placed within a secondary packaging are allowed without further testing of the completed package:~~

~~a) primary receptacles of equivalent or smaller size as compared to the tested primary receptacles, provided:~~

~~1) the primary receptacles are of similar design to the tested primary receptacle (e.g. shape: round, rectangular, etc.);~~

~~2) the material of construction of the primary receptacle (glass, plastic, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested primary receptacle;~~

~~3) the primary receptacles have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc.);~~

~~4) sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the primary receptacles; and~~

~~5) the primary receptacles are oriented within the secondary packaging in the same manner as in the tested package;~~

~~b) a lesser number of the tested primary receptacles, or of the alternate types of primary receptacles identified in a), providing sufficient cushioning is added to fill the void spaces and to prevent significant movement of the primary receptacles.~~

6~~.1.5~~.5.2.2 *Tests and number of samples required*

Table 6-4. Tests required for packaging types

Material of					Tests required				
outer packaging			inner packaging		refer to 6.2				refer to 6.3
Fibreboard	Plastic	Other	Plastic	Other	a	b	c	d	
x			x			x	x	when dry ice is used	x
x				x		x			x
	x		x				x		x
	x			x			x		x
		x	x				x		x
		x		x	x				x

Type of packaging[a]			Tests required					
	Primary receptacle		Water spray 6.5.3.6.1	Cold conditioning 6.5.3.6.2	Drop 6.5.3	Additional drop 6.5.3.6.3	Puncture 6.5.4	Stack 6.4.6
Rigid outer packaging	Plastics	Other	No. of samples	No. of samples	No. of samples	No. of samples	No. of samples	No. of samples
Fibreboard box	X		5	5	10	Required on one sample when the packaging is intended to contain dry ice.	2	Required on three samples when testing a "U"-marked packaging as defined in 6.3.5.1.6 for specific provisions.
		X	5	0	5		2	
Fibreboard drum	X		3	3	6		2	
		X	3	0	3		2	
Plastics box	X		0	5	5		2	
		X	0	5	5		2	
Plastics drum/ jerrican	X		0	3	3		2	
		X	0	3	3		2	
Boxes of other material	X		0	5	5		2	
		X	0	0	5		2	
Drums/ jerricans of other material	X		0	3	3		2	
		X	0	0	3		2	

[a] *Type of packaging* categorizes packagings for test purposes according to the kind of packaging and its material characteristics.

Note 1:— In instances where a primary receptacle is made of two or more materials, the material most liable to damage determines the appropriate test.

Note 2.— The material of the secondary packagings are not taken into consideration when selecting the test or conditioning for the test.

6.5.2.2.1 *Explanation for use of the table*

6.5.2.2.1.1 If the packaging to be tested consists of a fibreboard outer box with a plastics primary receptacle, five samples must undergo the water spray test (see 6.5.3.6.1) prior to dropping and another five must be conditioned to –18°C (see 6.5.3.6.2) prior to dropping. If the packaging is to contain dry ice then one further single sample must be dropped five times after conditioning in accordance with 6.5.3.6.3.

6.5.2.2.1.2 Packagings prepared as for transport must be subjected to the tests in 6.5.3 and 6.5.4. For outer packagings, the headings in the table relate to fibreboard or similar materials whose performance may be rapidly affected by moisture; plastics which may embrittle at low temperature; and other materials such as metal whose performance is not affected by moisture or temperature.

6.2~~5~~5.3 *Drop test ~~procedure~~*

6.5.3.1~~a)~~ Samples must be subjected to free-fall drops from a height of 9 metres onto a ~~rigid,~~ non-resilient~~, flat~~, horizontal, flat, massive and rigid surface ~~from a height of 9 metres~~ in conformity with 6;4.3.4.

6.5.3.2 Where the samples are in the shape of a box, five must be dropped ~~in sequence~~ one in each of the following orientations:

~~1~~a) flat on~~to~~ the base;
~~2~~b) flat on~~to~~ the top;
~~3~~c) flat on~~to~~ the longest side;
~~4~~d) flat on~~to~~ the shortest side;
~~5~~e) on~~to~~ a corner.

6.5.3.3 Where the samples are in the shape of a drum, three must be dropped ~~in sequence~~ one in each of the following orientations:

~~6~~a) diagonally on~~to~~ the top chime, with the centre of gravity directly above the point of impact;
~~7~~b) diagonally on~~to~~ the base chime;
~~8~~c) flat on~~to~~ the side.

Editorial Note.— Paragraph 6.5.3.4 below is moved from current Note under new 6.5.3.5 below:

6.5.3.4 While the sample must be released in the required orientation, it is accepted that for aerodynamic reasons the impact may not take place in that orientation.

6.5.3.5 Following the appropriate drop sequence, there must be no leakage from the primary receptacle(s), which must remain protected by cushioning/absorbent material in the secondary packaging.

~~*Note.— While the sample must be released in the required orientation, it is accepted that for aerodynamic reasons the impact may not take place in that orientation.*~~

6.5.3.6 *Special preparation of test sample for the drop test*

6.5.3.6.1 *Fibreboard — water spray test*

~~b)~~ Fibreboard outer packagings: The sample must be subjected to a water spray that simulates exposure to rainfall of approximately 5 cm per hour for at least one hour. It must then be subjected to the test described in ~~a)~~ 6.5.3.1 ~~above~~.

6.5.3.6.2 *Plastics material — cold conditioning*

~~c)~~ Plastics primary receptacles or outer packagings: The ~~samples must be conditioned in an atmosphere of~~ temperature of the test sample and its contents shall be reduced to –18°C or ~~less~~ lower for a period of at least 24 hours and within 15 minutes of removal from that atmosphere the test sample must be subjected to the test described in ~~a) above~~ 6.5.3.1. Where the sample contains dry ice, the conditioning period may be reduced to 4 hours.

6.5.3.6.3 *Packagings intended to contain dry ice — additional drop test*

~~d)~~ Where the packaging is intended to contain dry ice, a test additional to that specified in ~~a) or b) or c)~~ 6.5.3.1 and, when appropriate, in 6.5.3.6.1 or 6.5.3.6.2 must be carried out. One sample must be stored so that all the dry ice dissipates and then that sample ~~be subjected to the test described in a)~~ must be dropped in one of the orientations described in 6.5.3.2 which must be that most likely to result in failure of the packaging.

~~6.3~~6.5.4 *Puncture test*

6.5.4.1 *Packagings with a gross mass of 7 kg or less ~~must be subjected to the test described in a) below and packagings with a gross mass exceeding 7 kg must be subjected to the test described in b) below.~~*

~~a)~~ Samples must be placed on a level, hard surface. A cylindrical steel rod with a mass of at least 7 kg, a diameter ~~not exceeding~~ 38 mm and the impact end edges of a radius not exceeding 6 mm must be dropped in a vertical free fall from a height of one metre measured from the impact end to the impact surface of the sample. One sample must be placed on its base. A second sample must be placed in an orientation perpendicular to that used for the first sample. In each instance, the

steel rod must be aimed to impact the primary receptacle. Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s).

6.5.4.2 *Packagings with a gross mass exceeding 7 kg*

b) Samples are dropped onto the end of a cylindrical steel rod. The rod must be set vertically on a level, hard surface. It must have a diameter of 38 mm with the upper end edges of a radius not exceeding 6 mm. The rod must protrude from the surface a distance at least equal to the distance between the centre of the primary receptacle(s) and the outer surface of the outer packaging, with a minimum protrusion of 200 mm. One sample is dropped with its top face lowermost in a vertical free fall from a height of 1 m, measured from the top of the steel rod. A second sample is dropped from the same height in an orientation perpendicular to that used for the first sample. In each instance, the packaging must be so orientated that the steel rod would be capable of penetrateing the primary receptacle(s). Following each impact, penetration of the secondary packaging is acceptable provided that there is no leakage from the primary receptacle(s).

6.4 SPECIAL PACKAGING

Editorial Note.— Moved to 6;5.1.6

Inner receptacles of any type may be assembled within an intermediate (secondary) packaging and transported without testing in the outer packaging under the following conditions:

a) The intermediate/outer packaging combination must have been successfully tested in accordance with 6.2 with fragile (e.g. glass) inner receptacles;

b) The total combined gross mass of inner receptacles must not exceed one-half the gross mass of inner receptacles used for the drop test in a) above;

c) The thickness of cushioning between inner receptacles and between inner receptacles and the outside of the intermediate packaging must not be reduced below the corresponding thicknesses in the originally tested packaging; and if a single inner receptacle was used in the original test, the thickness of cushioning between inner receptacles must not be less than the thickness of cushioning between the outside of the intermediate packaging and the inner receptacle in the original test. When either fewer or smaller inner receptacles are used (as compared to the inner receptacles used in the drop test), sufficient additional cushioning material must be used to take up the void;

d) The outer packaging must have successfully passed the stacking test in 4.6 while empty. The total mass of identical packages must be based on the combined mass of inner receptacles used in the drop test in a) above;

e) For inner receptacles containing liquids, an adequate quantity of absorbent material to absorb the entire liquid content of the inner receptacles must be present;

f) If the outer packaging is intended to contain inner receptacles for liquids and is not leakproof, or is intended to contain inner receptacles for solids and is not siftproof, a means of containing any liquid or solid contents in the event of leakage must be provided in the form of a leakproof liner, plastic bag or other equally effective means of containment; and

g) The marking required by 2.2.2 b) must be followed by the letter "U".

6.5.5 *Test report*

6.5.5.1 A written test report containing at least the following particulars must be prepared and must be available to the users of the packaging:

a) name and address of the test facility;

b) name and address of the applicant (where appropriate);

c) a unique test report identification;

d) date of the test and of the report;

e) manufacturer of the packaging;

f) description of the packaging design type (e.g. dimensions, materials, closures, thickness, etc.), including method of manufacture (e.g. blow moulding) and which may include drawing(s) and/or photograph(s);

g) maximum capacity;

h) ~~characteristics of the~~ test contents~~, e.g. viscosity and relative density for liquids and particle size for solids~~;

i) test descriptions and results;

j) a signature and the name and status of the signatory.

6.5.~~.5.~~2 The test report must contain statements that the packaging prepared for transport was tested in accordance with the appropriate requirements of this chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report must be available to the appropriate national authority.

Chapter 7

REQUIREMENTS FOR THE CONSTRUCTION, TESTING AND APPROVAL OF PACKAGES AND MATERIAL OF CLASS 7

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7.4 REQUIREMENTS FOR INDUSTRIAL PACKAGES

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7.4.4 Alternative requirements for industrial packages Types 2 and 3 (Types IP-2 and IP-3)

7.4.4.1 Packages may be used as a Type IP-2 package, provided that:

a) they satisfy the requirements of 7.4.1;

b) they are designed to ~~conform to the standards prescribed~~ satisfy the requirements prescribed for packing group I or II in Part 6, Chapters 1 to ~~3~~ 4~~, or other requirements at least equivalent to those standards~~ of these Instructions; and

c) when subjected to the tests required for Packing Group I or II in Part 6, Chapter 4, they would prevent:

i) loss or dispersal of the radioactive contents; and

≠ ii) more than a 20 per cent increase in the maximum radiation level at any external surface of the package.

7.4.4.2 Freight containers of a permanent enclosed character may also be used as Industrial package Types 2 or 3 (Types IP-2 or IP-3), provided that:

. . .

7.7 REQUIREMENTS FOR TYPE B(U) PACKAGES

. . .

7.7.8 A package must be so designed that, if it were subjected to:

. . .

Where mixtures of different radionuclides are present, the provisions of 2;~~7.7.2.4~~7.2.2.4 to 2;~~7.7.2.6~~7.2.2.6 must apply except that for krypton-85, an effective A_2(i) value equal to 10 A_2 may be used. For case a) above, the assessment must take into account the external contamination limits of 4;9.1.2.

. . .

7.9 REQUIREMENTS FOR TYPE C PACKAGES

. . .

7.9.3 A package must be designed so that, if it were at the maximum normal operating pressure and subjected to:

. . .

Where mixtures of different radionuclides are present, the provisions of 2;~~7.7.2.4~~7.2.2.4 to 2;~~7.7.2.6~~7.2.2.6 must apply, except that for krypton-85 an effective A_2(i) value equal to 10 A_2 may be used. For case a) above, the assessment must take into account the external contamination limits of 4;9.1.2.

. . .

7.10 REQUIREMENTS FOR PACKAGES CONTAINING FISSILE MATERIAL

. . .

7.10.2 Fissile material meeting one of the provisions in a) to d) ~~below~~ of 2;7.2.3.5 is excepted from the requirement to be transported in packages that comply with 7.10.3 to 7.10.12, as well as the other requirements of these Instructions that apply to fissile material. Only one type of exception is allowed per consignment:

Editorial Note.— The remaining paragraph 7.10.2 has been moved to 2;7.2.3.5:

~~a) A mass limit per consignment such that:~~

$$\frac{\text{mass of uranium - 235(g)}}{X} + \frac{\text{mass of other fissile material (g)}}{Y} < 1$$

~~where X and Y are the mass limits defined in Table 6-5, provided that the smallest external dimension of each package is not less than 10 cm and that either:~~

~~i) each individual package contains not more than 15 g of fissile material;~~

~~ii) the fissile material is a homogeneous hydrogenous solution or mixture where the ratio of fissile nuclides to hydrogen is less than 5 per cent by mass; or~~

~~iii) there are not more than 5 g of fissile material in any 10 L volume of material.~~

~~Neither beryllium nor deuterium in hydrogeneous material enriched in deuterium must be present in quantities exceeding 1 per cent of the applicable consignment mass limits provided in Table 6-5, except for deuterium in natural concentration in hydrogen.~~

~~b) Uranium enriched in uranium-235 to a maximum of 1 per cent by mass, and with a total plutonium and uranium-233 content not exceeding 1 per cent of the mass of uranium-235, provided that the fissile material is distributed essentially homogeneously throughout the material. In addition, if uranium-235 is present in metallic, oxide or carbide forms, it must not form a lattice arrangement;~~

~~c) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 per cent by mass, with a total plutonium and uranium-233 content not exceeding 0.002 per cent of the mass of uranium, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2;~~

~~d) Packages containing, individually, a total plutonium mass not more than 1 kg, of which not more than 20 per cent by mass may consist of plutonium-239, plutonium-241 or any combination of those radionuclides.~~

~~Table 6-5. Consignment mass limits for exceptions from the requirements for packages containing fissile material~~

~~*Fissile material*~~	~~*Fissile material mass (g) mixed with substances having an average hydrogen density less than or equal to water*~~	~~*Fissile material mass (g) mixed with substances having an average hydrogen density greater than water*~~
~~Uranium 235 (X)~~ ~~Other fissile material (Y)~~	~~400~~ ~~250~~	~~290~~ ~~180~~

. . .

7.10.12 A number “N” must be derived, such that two times “N” must be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:

a) hydrogenous moderation between packages, and the package arrangement reflected on all sides by at least 20 cm of water; and

b) the tests specified in 7.14 followed by whichever of the following is the more limiting:

i) the tests specified in 7.16.2 b) and, either 7.16.2 c) for packages having a mass not greater than 500 kg and an overall density not greater than 1 000 kg/m^3 based on the external dimensions, or 7.16.2 a) for all other packages; followed by the test specified in 7.16.3 and completed by the tests specified in 7.18.1 to 7.18.3; or

ii) the test specified in 7.16.4; and

c) where any part of the fissile material escapes from the containment system following the tests specified in 7.10.12 b), it must be assumed that fissile material escapes from each package in the array and all of the fissile material must be arranged in the configuration and moderation that results in the maximum neutron multiplication with close reflection by at least 20 cm of water.

7.10.13 The criticality safety index (CSI) for packages containing fissile material must be obtained by dividing the number 50 by the smaller of the two values of N derived in 7.10.11 and 7.11.12 (i.e. CSI = 50/N). The value of the criticality safety index may be zero, provided that an unlimited number of packages is subcritical (i.e. N is effectively equal to infinity in both cases).

. . .

7.11 TEST PROCEDURES

7.11.1 Demonstration of compliance with the performance standards required in 2;~~7.3.3~~7.2.3.1.3, 2;~~7.3.4~~7.2.3.1.4, 2;~~7.4.1~~7.2.3.3.1, 2;~~7.4.2~~7.2.3.3.2, 2;~~7.10.1~~7.2.3.4.1, 2;~~7.10.2~~7.2.3.4.2 and 6;7.1 to 6;7.10 must be accomplished by any of the methods listed below or by a combination thereof:

a) Performance of tests with specimens representing LSA-III material, or special form radioactive material, or low dispersible radioactive material or with prototypes or samples of the packaging, where the contents of the specimen or

the packaging for the tests must simulate, as closely as practicable, the expected range of radioactive contents and the specimen or packaging to be tested must be prepared as presented for transport;

b) Reference to previous satisfactory demonstrations of a sufficiently similar nature;

c) Performance of tests with models of appropriate scale incorporating those features which are significant with respect to the item under investigation when engineering experience has shown results of such tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as penetrator diameter or compressive load, must be taken into account;

d) Calculation, or reasoned argument, when the calculation procedures and parameters are generally agreed to be reliable or conservative.

7.11.2 After the specimen, prototype or sample has been subjected to the tests, appropriate methods of assessment must be used to assure that the requirements for the test procedures have been fulfilled in compliance with the performance and acceptance standards prescribed in 2;~~7.3.3~~7.2.3.1.3, 2;~~7.3.4~~7.2.3.1.4, 2;~~7.4.1~~7.2.3.3.1, 2;~~7.4.2~~7.2.3.3.2, 2;~~7.10.1~~7.2.3.4.1, 2;~~7.10.2~~7.2.3.4.2 and 6;7.1 to 6;7.10.

. . .

7.13 TARGET FOR DROP TESTS

The target for the drop tests specified in 2;~~7.4.5~~7.2.3.3.5 a), 7.14.4, 7.15 a), 7.16.2 and 7.19.2 must be a flat, horizontal surface of such a character that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase the damage to the specimen.

. . .

7.21 APPROVALS OF PACKAGE DESIGNS AND MATERIALS

7.21.1 The approval of designs for packages containing 0.1 kg or more of uranium hexafluoride requires that:

a) each design that meets the requirements of 7.5.4 requires multilateral approval;

b) each design that meets the requirements of 7.5.1 to 7.5.3 must require unilateral approval by the competent authority of the State of Origin of the design, unless multilateral approval is otherwise required by these Instructions.

7.21.2 Each Type B(U) and Type C package design requires unilateral approval, except that:

≠ a) a package design for fissile material, which is also subject to 5;1.2.~~3~~.2.1 and 7.21.4 must require multilateral approval; and

≠ b) a Type B(U) package design for low dispersible radioactive material must require multilateral approval.

7.21.3 Each Type B(M) package design, including those for fissile material which are also subject to 5;1.2.~~3~~.2.1 and 7.21.4 and those for low dispersible radioactive material, must require multilateral approval.

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7.23 TRANSITIONAL MEASURES FOR CLASS 7

7.23.1 Packages not requiring competent authority approval of design under the 1985 and 1985 (As Amended 1990) editions of IAEA Safety Series No. 6

7.23.1.1 Excepted packages, Industrial packages Type IP-1, Type IP-2 and Type IP-3 and Type A packages that did not require approval of design by the competent authority and which meet the requirements of the 1985 or 1985 (As Amended 1990) editions of the IAEA *Regulations for the Safe Transport of Radioactive Material* (IAEA Safety Series No. 6) may continue to be used subject to the mandatory programme of quality assurance in accordance with the requirements of 1;1.4.3 and the activity limits and material restrictions of 2;~~7.7~~2;7.2.4.

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7.23.2 Packages approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 1990) editions of IAEA Safety Series No. 6

7.23.2.1 Packagings manufactured to a package design approved by the competent authority under the provisions of the 1973 or 1973 (As Amended) editions of IAEA Safety Series No. 6 may continue to be used subject to: multilateral approval of package design; the mandatory programme of quality assurance in accordance with the applicable requirements

of 1;1.4.3; the activity limits and material restrictions of 2;~~7.7~~2;7.2.4; and, for a package containing fissile material and transported by air, the requirements of 7.10.10. No new manufacture of such packaging must be permitted to commence. Changes in the design of the packaging or in the nature or quantity of the authorized radioactive contents which, as determined by the competent authority, would significantly affect safety, must meet the requirements of these Instructions in full. A serial number according to the provision of 5;2.4.5.1 c) must be assigned to and marked on the outside of each packaging.

7.23.2.2 Packagings manufactured to a package design approved by the competent authority under the provisions of the 1985 or 1985 (As Amended 1990) editions of IAEA Safety Series No. 6 may continue to be used subject to the multilateral approval of package design; the mandatory programme of quality assurance in accordance with the requirements of 1;1.4.3; the activity limits and material restrictions of 2;~~7.7~~2;7.2.4; and, for a package containing fissile material and transported by air, the requirements of 7.10.10. Changes in the design of the packaging or in the nature or quantity of the authorized radioactive contents which, as determined by the competent authority, would significantly affect safety must meet the requirements of these Instructions in full. All packagings for which manufacture begins after 31 December 2006 must meet the requirements of these Instructions in full.

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Part 7

OPERATOR'S RESPONSIBILITIES

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Chapter 1

ACCEPTANCE PROCEDURES

. . .

1.1 below moved to 1.4:

~~**1.1 ACCEPTANCE OF DANGEROUS GOODS BY OPERATORS**~~

~~1.1.1 An operator must not accept from a shipper a freight container or a unit load device containing dangerous goods other than:~~

~~a) a freight container for radioactive material (see 6;7.1);~~

~~b) a unit load device or other type of pallet containing consumer commodities prepared according to Packing Instruction 910;~~

≠ ~~c) a unit load device or other type of pallet containing dry ice used as a refrigerant for other than dangerous goods prepared according to Packing Instruction 904; or~~

~~d) a unit load device or other type of pallet containing magnetized material.~~

new 1.1 below moved from 1.4:

1.1 CARGO ACCEPTANCE PROCEDURES

1.1.1 Operators' acceptance staff must be adequately trained to assist them in identifying and detecting dangerous goods presented as general cargo.

1.1.2 Cargo acceptance staff should seek confirmation from shippers about the contents of any item of cargo where there are suspicions that it may contain dangerous goods, with the aim of preventing undeclared dangerous goods from being loaded on an aircraft as general cargo. Many innocuous-looking items may contain dangerous goods, and a list of general descriptions which, experience has shown, are often applied to such items is shown in Chapter 6.

1.2 ACCEPTANCE OF DANGEROUS GOODS BY OPERATORS

1~~.1~~.2.1 An operator must not accept for transport aboard an aircraft a package or overpack containing dangerous goods or a freight container containing radioactive material or a unit load device or other type of pallet containing the dangerous goods as described in ~~1.1.1~~1.3 b) and c) unless:

a) it is accompanied by two copies of the dangerous goods transport document; or~~,~~

b) the information applicable to the consignment is provided in electronic form; or

c) where permitted, by ~~the~~ alternative documentation.

1.2.2 Where a document is provided, ~~O~~one copy ~~of the document~~ must accompany the consignment to final destination and one copy must be retained by the operator at a location on the ground where it will be possible to obtain access to it within a reasonable period; the document must be retained at this point until the goods have arrived at final destination, after which time it may be stored elsewhere.

1.2.3 When the information applicable to the consignment is provided in electronic form, the information must be available to the operator at all times during transport to final destination. The data must be able to be produced as a paper document without delay. When a paper document is produced, the data must be presented as required by 5;4.

1.3 THE ACCEPTANCE CHECK

1.3.1 ~~The~~An operator must ~~also~~ not accept ~~the package, overpack, freight container or a unit load device mentioned above unless the operator has inspected it, found it to be properly marked and labelled and determined that there is no leakage or other indication that its integrity has been compromised. With regard to overpacks and the packages they contain, the operator must take all reasonable steps to establish that:~~ for transport aboard an aircraft a package or overpack containing dangerous goods or a freight container containing radioactive material or a unit load device or other type of pallet containing dangerous goods as described in 1.3 unless the operator has, by use of a checklist, verified the following:

Original a) moved to h), original b) moved to j), original c) moved to e):

a) below moved from existing 1.3 b) (no changes):

a) the documentation or, when provided, the electronic data, complies with the detailed requirements specified in 5;4;

b) the quantity of dangerous goods stated on the dangerous goods transport document is within the limits per package on a passenger or cargo aircraft as appropriate;

c) the marking of the package, overpack or freight container accords with the details stated on the accompanying dangerous goods transport document and are clearly visible;

d) where required, the letter in the packaging specification marking designating the packing group for which the design type has been successfully tested is appropriate for the dangerous goods contained within. This does not apply to overpacks where the specification marking is not visible;

~~c~~e) proper shipping names, UN numbers, labels, ~~"limited quantities" (when applicable)~~ and special handling instructions appearing on the interior package(s) are clearly visible or reproduced on the outside of ~~the~~ an overpack~~.~~;

f) the labelling of the package, overpack or freight container is as required by 5;3;

g) the outer packaging of a package is of the type stated on the accompanying dangerous goods transport document and is permitted by the applicable packing instruction;

~~a~~h) the package or overpack does not contain ~~packages of~~ different dangerous goods which require segregation from each other according to Table 7-1;

i) the package, overpack, freight container or unit load device is not leaking and there is no indication that its integrity has been compromised;

~~b~~j) ~~the~~an overpack does not contain packages bearing the "Cargo aircraft only" label unless:

1) the packages are assembled in such a way that clear visibility and easy access to them is possible; or

2) the packages are not required to be accessible under 7;2.4.1; or

3) not more than one package is involved;

~~With regard to freight containers containing radioactive material, the operator must ensure that all four sides of the container are correctly labelled.~~

~~• When an operator accepts a unit load device or other type of pallet containing consumer commodities, dry ice or magnetized material as permitted by 1.1.1 b), c) or d), the operator must attach an identification tag as required by 2.7.1 to the unit load device.~~

Note 1.— Minor discrepancies, such as the omission of dots and commas in the proper shipping name appearing on the transport document~~s~~ or on package markings, or minor variations in hazard labels which do not affect the obvious meaning of the label, are not considered as errors if they do not compromise safety and should not be considered as reason for rejecting a consignment.

Note 2 and Note 3 below moved from 1.3, Note 1 and Note 2:

Note 2.— Where packages are contained in an overpack or freight container, as permitted by 1.3, the checklist should establish the correct marking and labelling of such overpack or other type of pallet or freight container and not the individual packages contained in them. Where packages are contained in a unit load device, as permitted by 1.3.1, the checklist should not require the checking of packages individually for the correct marking and labelling.

Note 3.— An acceptance check is not required for dangerous goods in excepted quantities and radioactive material in excepted packages.

1.4 ACCEPTANCE OF FREIGHT CONTAINERS AND UNIT LOAD DEVICES

1.4.1 below moved from existing 1.1.1:

1.4.1 An operator must not accept from a shipper a freight container or a unit load device containing dangerous goods other than:

a) a freight container for radioactive material (see 6;7.1);

b) a unit load device or other type of pallet containing consumer commodities prepared according to Packing Instruction 910;

≠ c) a unit load device or other type of pallet containing dry ice used as a refrigerant for other than dangerous goods prepared according to Packing Instruction 904; or

d) a unit load device or other type of pallet containing magnetized material.

1.4.2 below taken from 1.1.2, last paragraph with reference changed (1.4.1):

1.4.2 When an operator accepts a unit load device or other type of pallet containing consumer commodities, dry ice or magnetized material as permitted by 1.4.1, the operator must attach an identification tag as required by 2.7.1 to the unit load device.

~~1.3 ACCEPTANCE CHECKLIST~~

~~To assist in carrying out their responsibilities with respect to the acceptance of dangerous goods, operators must use a checklist. This checklist must include all reasonable steps to establish that:~~

~~a) the package(s), overpack(s) or freight container(s), as applicable, is correctly marked and labelled in accordance with 5;2 and 5;3;~~

b) below moved to 1.2 a):

~~b) the documentation complies with the detailed requirements specified in 5;4; and~~

~~c) the requirements of 1.1.2 have been fulfilled.~~

Notes 1 and 2 below moved to 1.2 Notes 2 and 3:

~~*Note 1.— Where packages are contained in an overpack or freight container, as permitted by 1.1.1, the checklist should establish the correct marking and labelling of such overpack or other type of pallet or freight container and not the individual packages contained in them. Where packages are contained in a unit load device, as permitted by 1.1.1, the checklist should not require the checking of packages individually for the correct marking and labelling.*~~

~~*Note 2.— A checklist is not required for dangerous goods in excepted quantities and radioactive material in excepted packages.*~~

1.4 below moved to 1.1:

~~**1.4 CARGO ACCEPTANCE PROCEDURES**~~

~~1.4.1 Operators' acceptance staff must be adequately trained to assist them in identifying and detecting dangerous goods presented as general cargo.~~

~~1.4.2 Cargo acceptance staff should seek confirmation from shippers about the contents of any item of cargo where there are suspicions that it may contain dangerous goods, with the aim of preventing undeclared dangerous goods from being loaded on an aircraft as general cargo. Many innocuous-looking items may contain dangerous goods, and a list of general descriptions which, experience has shown, are often applied to such items is shown in Chapter 6.~~

~~1.2~~1.5 SPECIAL RESPONSIBILITIES IN ACCEPTING INFECTIOUS SUBSTANCES

Routing

Whatever the mode used, transport must be made by the quickest possible routing. If trans-shipment is necessary, precautions must be taken to ensure special care, expeditious handling and monitoring of the substances in transit.

~~1.5~~1.6 UNDELIVERABLE CONSIGNMENTS OF RADIOACTIVE MATERIAL

Where a consignment is undeliverable, the consignment must be placed in a safe location and the appropriate competent authority must be informed as soon as possible and a request made for instructions on further action.

Chapter 2

STORAGE AND LOADING

. . .

2.1 LOADING RESTRICTIONS ON THE FLIGHT DECK AND FOR PASSENGER AIRCRAFT

2.1.1 Dangerous goods must not be carried in an aircraft cabin occupied by passengers or on the flight deck of an aircraft, except as permitted by 1;2.2.1 and 8;1 and for radioactive material, excepted packages under 2;~~7.9~~7.2.4.1.2. Dangerous goods may be carried in a main deck cargo compartment of a passenger aircraft provided that compartment meets all the certification requirements for a Class B or a Class C aircraft cargo compartment. Dangerous goods bearing the "Cargo aircraft only" label must not be carried on a passenger aircraft.

. . .

2.4 LOADING AND SECURING OF DANGEROUS GOODS

2.4.1 Loading on cargo aircraft

Editorial Note.— For additional proposed amendments to 2.4.1, see the report on Agenda Item 5.1.

. . .

Note — When transporting goods in a non-pressurized cargo hold, there will be a large pressure differential at high altitudes. Packages that are filled at a normal atmospheric pressure may not be capable of withstanding this pressure differential. Confirmation of the suitability of the packaging from the shipper may be required.

2.4.2 Securing of dangerous goods

The operator must secure dangerous goods in the aircraft in a manner that will prevent any movement~~ in flight which would change the orientation of the packages~~. For packages or overpacks containing radioactive material, the securing must be adequate to ensure that the separation requirements of 2.9.3 are met at all times.

2.4.3 General loading requirements

When dangerous goods subject to the provisions herein are loaded in an aircraft, the operator must protect the packages of dangerous goods from being damaged, including by the movement of baggage, mail, stores or other cargo. Particular attention must be paid to the handling of packages during their preparation for transport, the type of aircraft on which they are to be carried and the method required to load that aircraft, so that accidental damage is not caused through dragging or mishandling of the packages.

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2.9.1 Limitation of exposure of persons to radiation

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2.9.1.3 The practice should be followed of keeping exposure to radiation as low as reasonably achievable. The separation distances shown in Tables 7-5 and 7-6 are minimum values, and greater distances should be used where feasible. As far as possible, packages of radioactive materials stowed in underfloor cargo compartments of passenger aircraft should be placed on the compartment floor.

Note.— The separation distances from packages of radioactive material to passengers specified in Table 7-5 are based on a 0.02 mSv/h reference dose rate at a seat height of 0.4 m.

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2.9.3 Stowage during transport and storage in transit

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2.9.3.3 Loading of freight containers and accumulation of packages, overpacks and freight containers must be controlled as follows:

a) Except under the condition of exclusive use, the total number of packages, overpacks and freight containers aboard a single aircraft must be so limited that the total sum of the transport indexes aboard the aircraft does not exceed the values shown in Table 7-3. For consignments of LSA-I material, there is no limit on the sum of the transport indexes;

b) Where a consignment is transported under exclusive use, there is no limit on the sum of the transport indexes aboard a single aircraft, but the requirement on minimum segregation distances established in 2.9.6 applies;

. . .

2.10 LOADING OF MAGNETIZED MATERIAL

Magnetized material must not be loaded in such a position that it will have a significant effect on the direct-reading magnetic compasses or on the master compass detector units. The significant effect will be produced if the magnetic field strength of the magnetized materials reaches 0.418 A/m at the location of aircraft compasses or compass detector units. The minimum stowage distance of the magnetized material to the aircraft compasses or compass detector units will depend on the intensity of the magnetized material's field strength and varies from 1.5 m for material which just meets the threshold level of the magnetized material definition in 2;9, to 4.6 m for materials which possesses the maximum field strength permitted by Packing Instruction 902 in 4;11. If the minimum stowage distance of a specific item, in its packed form, from the compass or detector units is not known and cannot be estimated, or if material which is to be transported affects the aircraft's compasses, a special minimum stowage distance check must be made on the freight to be transported. Multiple packages may produce a cumulative effect. See Packing Instruction 902 for determination of shielding requirements.

Note.— Masses of ferro-magnetic metals such as automobiles, automobile parts, metal fencing, piping and metal construction material, even if not meeting the definition of magnetized materials may be subject to the operator's special

stowage requirements since they may affect aircraft instruments, particularly the compasses. Additionally, packages or items of material which individually do not meet the definition of magnetized materials but cumulatively may do so, may also be subject to the operator's special stowage requirements.

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Chapter 4

PROVISION OF INFORMATION

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4.1 INFORMATION TO THE PILOT-IN-COMMAND

4.1.1 The operator of an aircraft in which dangerous goods are to be carried must provide the pilot-in-command, as early as practicable before departure of the aircraft, with accurate and legible written or printed information concerning dangerous goods that are to be carried as cargo.

Note.— This includes information about dangerous goods loaded at a previous departure point and which are to be carried on the subsequent flight.

Except as otherwise provided, ~~T~~this information must include the following:

a) the air waybill number (when issued);

b) the proper shipping name (supplemented with the technical name(s) if appropriate; see 3;1) and UN Number or ID number as listed in these Instructions. When chemical oxygen generators contained in protective breathing equipment (PBE) are being transported under Special Provision A144, the proper shipping name of "oxygen generator, chemical" must be supplemented with the statement "Aircrew protective breathing equipment (smoke hood) in accordance with Special Provision A144".

c) the class or division, and subsidiary risk(s) corresponding to the subsidiary risk label(s) applied, by numerals, and in the case of Class 1, the compatibility group;

d) the packing group shown on the dangerous goods transport document;

e) the number of packages and their exact loading location. For radioactive material see g) below;

f) the net quantity, or gross mass if applicable, of each package, except that this does not apply to radioactive material or other dangerous goods where the net quantity or gross mass is not required on the dangerous goods transport document (see 5;4.1.3). For a consignment consisting of multiple packages containing dangerous goods bearing the same proper shipping name and UN number or ID number, only the total quantity and an indication of the quantity of the largest and smallest package at each loading location need to be provided. For unit load devices or other types of pallets containing consumer commodities accepted from a single shipper, the number of packages and the average gross mass;

4.1.2 For UN 1845, Carbon dioxide, solid (dry ice), only the UN number, proper shipping name, class, total quantity in each hold on the aircraft and the aerodrome at which the package(s) is to be unloaded need be provided.

. . .

4.4 REPORTING OF DANGEROUS GOODS ACCIDENTS AND INCIDENTS

An operator must report dangerous goods accidents and incidents to the appropriate authorities of the State of the Operator and the State in which the accident or incident occurred in accordance with the reporting requirements of those appropriate authorities.

Note.— This includes incidents involving dangerous goods that are not subject to all or part of the Technical Instructions through the application of an exception or of a special provision (for example, an incident involving the short circuiting of a dry cell battery that is required to meet short circuit prevention conditions in a special provision of 3;3).

. . .

4.9 TRAINING

An operator must ensure training is provided in accordance with the detailed requirements of 1;4 to all relevant employees, including those of agencies employed to act on the operator's behalf, to enable them to carry out their responsibilities with regard to the transport of dangerous goods, passengers and their baggage, cargo, mail and stores.

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Chapter 5

PROVISIONS CONCERNING PASSENGERS AND CREW

. . .

5.1.2 An operator or the operator's handling agent and the airport operator must ensure that notices warning passengers of the types of dangerous goods which they are forbidden to transport aboard an aircraft are prominently displayed, in sufficient number, at each of the places at an airport where tickets are issued, passengers are checked in and aircraft boarding areas are maintained, and at any other location where passengers are checked in. These notices must include visual examples of dangerous goods forbidden from transport aboard an aircraft.

Note.— Existing notices that do not include visual examples of dangerous goods may continue in place until 31 December 2009 after which time the requirements specified above will apply.

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Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

Chapter 1

PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

. . .

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

. . .

r) fuel cell systems used to power portable electronic devices (for example cameras, cellular phones, laptop computers and camcorders) ~~powered by fuel cell systems,~~ and spare fuel cartridges, under the following conditions:

1) fuel cell cartridges may only contain flammable liquids ~~(including methanol), formic acid and butane~~, corrosive substances, liquefied flammable gas, water reactive substances or hydrogen in metal hydride;

~~2) fuel cell cartridges must comply with International Electrotechnical Commission (IEC) PAS 62282-6-1 Ed. 1;~~

~~3~~2) fuel cell cartridges must not be refillable by the user. Refuelling of fuel cell systems is not permitted except that the installation of a spare cartridge is allowed. Fuel cell cartridges which are used to refill fuel cell systems but which are not designed or intended to remain installed (fuel cell refills) are not permitted to be carried;

~~4~~3) the maximum quantity of fuel in any fuel cell cartridge must not exceed:

a) for liquids 200 mL;

b) for solids 200 grams;

c) for liquefied gases, 120 mL for non-metallic fuel cell cartridges or 200 ~~ml~~ mL for metal fuel cell cartridges;

~~d)~~

For hydrogen in metal hydride, the fuel cell cartridges must have a water capacity of 120 mL or less;

~~5~~4) each fuel cell system and each fuel cell cartridge ~~must be marked with a manufacturer's certification that it~~ must conform~~s~~ to IEC PAS 62282-6-1 Ed. 1, and must be marked with a manufacturer's certification that it conforms to the specification. In addition, each fuel cell cartridge must be marked with the maximum quantity and type of fuel in the cartridge;

~~6) each fuel cell system must conform to IEC PAS 62282-6-1 Ed. 1, and must be marked with a manufacturer's certification that it conforms to the specification;~~

5) fuel cell cartridges containing hydrogen in metal hydride must comply with the requirements in Special Provision A162.

~~7~~6) no more than two spare fuel cell cartridges may be carried by a passenger;

~~8~~7) fuel cell systems containing fuel and fuel cell cartridges including spare cartridges are permitted in carry-on baggage only;

~~9~~8) interaction between fuel cells and integrated batteries in a device must conform to IEC PAS 62282-6-1 Ed. 1. Fuel cell systems whose sole function is to charge a battery in the device are not permitted;

~~10~~9) fuel cell systems must be of a type that will not charge batteries when the portable electronic device is not in use and must be durably marked by the manufacturer: “APPROVED FOR CARRIAGE IN AIRCRAFT CABIN ONLY” to so indicate; and

~~11~~10) in addition to the languages which may be required by the State of Origin for the markings specified above, English should be used.

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ATTACHMENT A

PROPOSED AMENDMENTS TO TABLE 3-1 — UN NUMBER ORDER

The format for displaying the amendments to Table 3-1 is as follows:

Modified entries

- both the original and the modified entry are printed;
- both modified and non-modified fields are printed;
- the original entry is printed in a shaded box with an asterisk in the left margin;
- check boxes are printed above the field(s) which have been modified;
- the modified entry is shown without shading below the original entry; and
- the "≠" symbol is printed in the left margin.

Deleted entries

- deleted entries are displayed in a shaded box with an asterisk in the left margin;
- check boxes are shown above each field; and
- the ">" symbol is displayed in the left margin below the shaded box to indicate that the entry will be deleted.

New entries

New entries are shown without shading with the "+" symbol in the left margin.

Table 3-1. Dangerous Goods List

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
+	**Signals, distress, ship**	0505	1.4G		Explosive 1.4				FORBIDDEN		135	75 kg
+	**Signals, distress, ship**	0506	1.4S		Explosive 1.4				135	25 kg	135	100 kg
+	**Signals, smoke** †	0507	1.4S		Explosive 1.4				135	25 kg	135	100 kg
+	**1-Hydroxybenzotriazole, anhydrous**, dry or wetted with less than 20% water, by mass	0508	1.3C						FORBIDDEN		FORBIDDEN	
*	**Argon, compressed**	1006	2.2		Gas non-flammable		☑		200	75 kg	200	150 kg
≠	**Argon, compressed**	1006	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
*	**Chlorine**	1017	2.3	☑ 8		AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A2		FORBIDDEN		FORBIDDEN	
≠	**Chlorine**	1017	2.3	5.1 8		AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A2		FORBIDDEN		FORBIDDEN	
*	**Helium, compressed**	1046	2.2		Gas non-flammable		☑		200	75 kg	200	150 kg
≠	**Helium, compressed**	1046	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
*	**Neon, compressed**	1065	2.2		Gas non-flammable		☑		200	75 kg	200	150 kg
≠	**Neon, compressed**	1065	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
*	**Nitrogen, compressed**	1066	2.2		Gas non-flammable		☑		200	75 kg	200	150 kg
≠	**Nitrogen, compressed**	1066	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Ethanol**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethanol**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
*	**Ethanol solution**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethanol solution**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
*	**Ethyl alcohol**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethyl alcohol**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
*	**Ethyl alcohol solution**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethyl alcohol solution**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
							☑	☑	☑	☑		☑
*	**Methyltrichlorosilane**	1250	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	I	FORBIDDEN		304	2.5 L
≠	**Methyltrichlorosilane**	1250	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3		II	306	1 L	304	5 L
							☑	☑	☑	☑		☑
*	**Vinyltrichlorosilane**	1305	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	I	FORBIDDEN		304	2.5 L
≠	**Vinyltrichlorosilane**	1305	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3		II	306	1 L	304	5 L
+	**Picric acid, wetted** with not less than 30% water, by mass	1344	4.1		Solid flammable	BE 3	A40	I	416	1 kg	412	15 kg
+	**TNT, wetted** with not less than 30% water, by mass	1356	4.1		Solid flammable	BE 3	A40	I	416	0.5 kg	416	0.5 kg
							☑					
*	**Magnesium nitrate**	1474	5.1		Oxidizer			III	516 Y516	25 kg 10 kg	518	100 kg
≠	**Magnesium nitrate**	1474	5.1		Oxidizer		A155	III	516 Y516	25 kg 10 kg	518	100 kg
							☑					
*	**Alcohols, n.o.s.***	1987	3		Liquid flammable		A3 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Alcohols, n.o.s.***	1987	3		Liquid flammable		A3	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Flammable liquid, n.o.s.***	1993	3		Liquid flammable		☑ A3 A148	I II III	302 305 Y305 309 Y309	1 L 5 L 1 L 60 L 10 L	303 307 310	30 L 60 L 220 L
≠	**Flammable liquid, n.o.s.***	1993	3		Liquid flammable		A3	I II III	302 305 Y305 309 Y309	1 L 5 L 1 L 60 L 10 L	303 307 310	30 L 60 L 220 L
*	☑ **Nitric acid**, other than red fuming, with not more than 70% nitric acid	2031	8	☑	☑ Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	II	FORBIDDEN		813	30 L
≠	**Nitric acid**, other than red fuming, with at least 65% but not more than 70% nitric acid	2031	8	5.1	Corrosive & Oxidizer	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	II	FORBIDDEN		813	30 L
+	**Nitric acid**, other than red fuming, with less than 65% nitric acid	2031	8		Corrosive			II	807 Y807	1 L 0.5 L	813	30 L
*	**Xenon**	2036	2.2		Gas non-flammable		☑		200	75 kg	200	150 kg
≠	**Xenon**	2036	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
*	**Batteries, wet, filled with acid**, electric storage †	2794	8		Corrosive		☑ A51		800	30 kg G	800	No limit
≠	**Batteries, wet, filled with acid**, electric storage †	2794	8		Corrosive		A51 A164		800	30 kg G	800	No limit
*	**Batteries, wet, filled with alkali**, electric storage †	2795	8		Corrosive		☑ A51		800	30 kg G	800	No limit
≠	**Batteries, wet, filled with alkali**, electric storage †	2795	8		Corrosive		A51 A164		800	30 kg G	800	No limit

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Batteries, wet, non-spillable**, electric storage	2800	8		Corrosive		A48 A67		806	No limit	806	No limit
≠	**Batteries, wet, non-spillable**, electric storage	2800	8		Corrosive		A48 A67 A164		806	No limit	806	No limit
*	**Radioactive material, excepted package – empty packaging**	2908	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – empty packaging**	2908	7		None		A130		See Part 1;6			
*	**Radioactive material, excepted package – articles manufactured from natural uranium** or **depleted uranium** or **natural thorium**	2909	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – articles manufactured from natural uranium** or **depleted uranium** or **natural thorium**	2909	7		None		A130		See Part 1;6			
*	**Radioactive material, excepted package – limited quantity of material**	2910	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – limited quantity of material**	2910	7		None		A130		See Part 1;6			
*	**Radioactive material, excepted package – instruments** or **articles**	2911	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – instruments** or **articles**	2911	7		None		A130		See Part 1;6			
*	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II)**, non-fissile or fissile excepted	2913	7		Radioactive	CA 1	A78 A139		See Part 2;7		and Part 4;9	
≠	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II)**, non-fissile or fissile excepted	2913	7		Radioactive	CA 1	A78 A139 A159		See Part 2;7		and Part 4;9	

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Radioactive material, Type B(U) package**, non-fissile or fissile excepted	2916	7		Radioactive	CA 1	☑ A78 A139		See Part 2;7 and Part 4;9			
≠	**Radioactive material, Type B(U) package**, non-fissile or fissile excepted	2916	7		Radioactive	CA 1	A78 A139 A160		See Part 2;7 and Part 4;9			
*	**Radioactive material, Type B(M) package**, non-fissile or fissile excepted	2917	7		Radioactive	CA 1	☑ A78 A139		See Part 2;7 and Part 4;9			
≠	**Radioactive material, Type B(M) package**, non-fissile or fissile excepted	2917	7		Radioactive	CA 1	A78 A139 A160		See Part 2;7 and Part 4;9			
*	**Environmentally hazardous substance, solid, n.o.s.***	3077	9		Miscellaneous	CA 13 DE 5 US 4	☑ A97	III	911 Y911	400 kg 30 kg G	911	400 kg
≠	**Environmentally hazardous substance, solid, n.o.s.***	3077	9		Miscellaneous	CA 13 DE 5 US 4	A97 A158	III	911 Y911	400 kg 30 kg G	911	400 kg
*	**Environmentally hazardous substance, liquid, n.o.s.***	3082	9		Miscellaneous	CA 13 DE 5 US 4	☑ A97	III	914 Y914	450 L 30 kg G	914	450 L
≠	**Environmentally hazardous substance, liquid, n.o.s.***	3082	9		Miscellaneous	CA 13 DE 5 US 4	A97 A158	III	914 Y914	450 L 30 kg G	914	450 L
*	☑ **Lithium batteries** †	3090	9		Miscellaneous	US 2 US 3	☑ A45 A88 A99 A154	II	☑ 903	☑ 5 kg G	☑ 903	35 kg G
≠	**Lithium metal batteries** (including lithium alloy batteries) †	3090	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164	II	9X1	2.5 kg G	9X1	35 kg G

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Lithium batteries contained in equipment** †	3091	9		Miscellaneous	US 2 US 3	A45 A48 A154		see 912		see 912	
≠	**Lithium metal batteries contained in equipment** (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	A48 A154 A164		see 9X3		see 9X3	
*	**Lithium batteries packed with equipment** †	3091	9		Miscellaneous	US 2 US 3	A45 A154		see 918		see 918	
≠	**Lithium metal batteries packed with equipment** (including lithium alloy batteries)†	3091	9		Miscellaneous	US 2 US 3	A154 A164		see 9X2		see 9X2	
*	**Toxic liquid, water-reactive, n.o.s.***	3123	6.1	4.3	Toxic & Danger if wet		A4 A137	I II	FORBIDDEN 609	 1 L	604 611	1 L 5 L
≠	**Toxic liquid, water-reactive, n.o.s.***	3123	6.1	4.3	Toxic & Danger if wet		A4 A137	I II	FORBIDDEN 609	 1 L	6XX 611	1 L 5 L
*	**Toxic solid, water-reactive, n.o.s.***	3125	6.1	4.3	Toxic & Danger if wet		A5	I II	606 613 Y613	5 kg 15 kg 1 kg	607 615	15 kg 50 kg
≠	**Toxic solid, water-reactive, n.o.s.***	3125	6.1	4.3	Toxic & Danger if wet		A5	I II	6XX 613 Y613	5 kg 15 kg 1 kg	6XX 615	15 kg 50 kg
*	**Battery-powered equipment**	3171	9		Miscellaneous		A21 A67 A87 A94		900	No limit	900	No limit
≠	**Battery-powered equipment**	3171	9		Miscellaneous		A21 A67 A87 A94 A164		900	No limit	900	No limit

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Battery-powered vehicle**	3171	9		Miscellaneous		☑ A21 A67 A87 A94		900	No limit	900	No limit
≠	**Battery-powered vehicle**	3171	9		Miscellaneous		A21 A67 A87 A94 A164		900	No limit	900	No limit
*	**Polyester resin kit** †	3269	3		Liquid flammable		☑ A66	II III	312 Y312 312 Y312	5 kg 1 kg 5 kg 1 kg	312 312	5 kg 5 kg
≠	**Polyester resin kit** †	3269	3		Liquid flammable		A66 A163	II III	312 Y312 312 Y312	5 kg 1 kg 5 kg 1 kg	312 312	5 kg 5 kg
*	**Chemical kit**	3316	9		Miscellaneous		☑ A44		915 Y915	10 kg 1 kg	915	10 kg
≠	**Chemical kit**	3316	9		Miscellaneous		A44 A163		915 Y915	10 kg 1 kg	915	10 kg
*	**First aid kit**	3316	9		Miscellaneous		☑ A44		915 Y915	10 kg 1 kg	915	10 kg
≠	**First aid kit**	3316	9		Miscellaneous		A44 A163		915 Y915	10 kg 1 kg	915	10 kg
*	**Radioactive material, low specific activity (LSA-II)**, non-fissile or fissile excepted	3321	7		Radioactive	CA 1	☑ A23 A78 A139		See Part 2;7 and Part 4;9			
≠	**Radioactive material, low specific activity (LSA-II)**, non-fissile or fissile excepted	3321	7		Radioactive	CA 1	A23 A78 A139 A159		See Part 2;7 and Part 4;9			

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Radioactive material, low specific activity (LSA-III)**, non-fissile or fissile excepted	3322	7		Radioactive	CA 1	☑ A23 A78 A139		See Part 2;7		and Part 4;9	
≠	**Radioactive material, low specific activity (LSA-III)**, non-fissile or fissile excepted	3322	7		Radioactive	CA 1	A23 A78 A139 A159		See Part 2;7		and Part 4;9	
*	**Radioactive material, low specific activity (LSA-II) fissile**	3324	7		Radioactive	CA 1	☑ A76 A78		See Part 2;7		and Part 4;9	
≠	**Radioactive material, low specific activity (LSA-II) fissile**	3324	7		Radioactive	CA 1	A76 A78 A159		See Part 2;7		and Part 4;9	
*	**Radioactive material, low specific activity (LSA-III) fissile**	3325	7		Radioactive	CA 1	☑ A76 A78		See Part 2;7		and Part 4;9	
≠	**Radioactive material, low specific activity (LSA-III) fissile**	3325	7		Radioactive	CA 1	A76 A78 A159		See Part 2;7		and Part 4;9	
*	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II), fissile**	3326	7		Radioactive	CA 1	☑ A76 A78		See Part 2;7		and Part 4;9	
≠	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II), fissile**	3326	7		Radioactive	CA 1	A76 A78 A159		See Part 2;7		and Part 4;9	
*	**Radioactive material, Type B(U) package, fissile**	3328	7		Radioactive	CA 1	☑ A78		See Part 2;7		and Part 4;9	
≠	**Radioactive material, Type B(U) package, fissile**	3328	7		Radioactive	CA 1	A78 A160		See Part 2;7		and Part 4;9	
*	**Radioactive material, Type B(M) package, fissile**	3329	7		Radioactive	CA 1	☑ A78		See Part 2;7		and Part 4;9	
≠	**Radioactive material, Type B(M) package, fissile**	3329	7		Radioactive	CA 1	A78 A160		See Part 2;7		and Part 4;9	

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
+	**Pentaerythritol tetranitrate mixture desensitized, solid, n.o.s.*** with more than 10% but not more than 20% PETN, by mass	3344	4.1			BE 3			FORBIDDEN		FORBIDDEN	
+	**PETN mixture desensitized, solid, n.o.s.*** with more than 10% but not more than 20% PETN, by mass	3344	4.1			BE 3			FORBIDDEN		FORBIDDEN	
+	**Hydrogen in a metal hydride storage system contained in equipment**	3468	2.1		Gas flammable		A1 A143		FORBIDDEN		214	100 kg G
+	**Hydrogen in a metal hydride storage system packed with equipment**	3468	2.1		Gas flammable		A1 A143		FORBIDDEN		214	100 kg G
										☑		☑
*	**Fuel cell cartridges** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 L	313	60 L
≠	**Fuel cell cartridges** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 kg	313	50 kg
+	**Fuel cell cartridges contained in equipment** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 kg	313	50 kg
+	**Fuel cell cartridges packed with equipment** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 kg	313	50 kg
+	**1-Hydroxybenzotriazole, anhydrous, wetted** with not less than 20% water, by mass	3474	4.1		Solid flammable		A40	I	416	0.5 kg	416	0.5 kg
+	**Ethanol and motor spirit mixture**, with more than 10% ethanol	3475	3		Liquid flammable		A156	II	305 Y305	5 L 1 L	307	60 L
+	**Ethanol and gasoline mixture**, with more than 10% ethanol	3475	3		Liquid flammable		A156	II	305 Y305	5 L 1 L	307	60 L
+	**Ethanol and petrol mixture**, with more than 10% ethanol	3475	3		Liquid flammable		A156	II	305 Y305	5 L 1 L	307	60 L
+	**Fuel cell cartridges**, containing water-reactive substances	3476	4.3		Danger if wet		A146 A157		436	5 kg	436	50 kg
+	**Fuel cell cartridges contained in equipment**, containing water-reactive substances	3476	4.3		Danger if wet		A146 A157		436	5 kg	436	50 kg
+	**Fuel cell cartridges packed with equipment**, containing water-reactive substances	3476	4.3		Danger if wet		A146 A157		436	5 kg	436	50 kg
+	**Fuel cell cartridges**, containing corrosive substances	3477	8		Corrosive		A146 A157		827	5 kg	827	50 kg

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
+	**Fuel cell cartridges contained in equipment**, containing corrosive substances	3477	8		Corrosive		A146 A157		827	5 kg	827	50 kg
+	**Fuel cell cartridges packed with equipment**, containing corrosive substances	3477	8		Corrosive		A146 A157		827	5 kg	827	50 kg
+	**Fuel cell cartridges**, containing liquefied flammable gas	3478	2.1		Gas flammable		A146 A161		215	1 kg	215	15 kg
+	**Fuel cell cartridges contained in equipment**, containing liquefied flammable gas	3478	2.1		Gas flammable		A146 A161		216	1 kg	216	15 kg
+	**Fuel cell cartridges packed with equipment**, containing liquefied flammable gas	3478	2.1		Gas flammable		A146 A161		217	1 kg	217	15 kg
+	**Fuel cell cartridges**, containing hydrogen in metal hydride	3479	2.1		Gas flammable		A146 A162		215	1 kg	215	15 kg
+	**Fuel cell cartridges contained in equipment**, containing hydrogen in metal hydride	3479	2.1		Gas flammable		A146 A162		216	1 kg	216	15 kg
+	**Fuel cell cartridges packed with equipment**, containing hydrogen in metal hydride	3479	2.1		Gas flammable		A146 A162		217	1 kg	217	15 kg
+	**Lithium ion batteries** (including lithium ion polymer batteries)	3480	9		Miscellaneous		A88 A99 A154 A164	II	9X4	5 kg G	9X4	35 kg G
+	**Lithium ion batteries contained in equipment** (including lithium ion polymer batteries)	3481	9		Miscellaneous		A48 A154 A164		see 9X6		see 9X6	
+	**Lithium ion batteries packed with equipment** (including lithium ion polymer batteries)	3481	9		Miscellaneous		A88 A154 A164		see 9X5		see 9X5	

ATTACHMENT B

PROPOSED AMENDMENTS TO TABLE 3-1 — ALPHABETICAL ORDER

The format for displaying the amendments to Table 3-1 is as follows:

Modified entries

- both the original and the modified entry are printed;
- both modified and non-modified fields are printed;
- the original entry is printed in a shaded box with an asterisk in the left margin;
- check boxes are printed above the field(s) which have been modified;
- the modified entry is shown without shading below the original entry; and
- the "≠" symbol is printed in the left margin.

Deleted entries

- deleted entries are displayed in a shaded box with an asterisk in the left margin;
- check boxes are shown above each field; and
- the ">" symbol is displayed in the left margin below the shaded box to indicate that the entry will be deleted.

New entries

New entries are shown without shading with the "+" symbol in the left margin.

Table 3-1. Dangerous Goods List

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Alcohols, n.o.s.***	1987	3		Liquid flammable		☑ A3 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Alcohols, n.o.s.***	1987	3		Liquid flammable		A3	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
*	**Argon, compressed**	1006	2.2		Gas non-flammable		☑		200	75 kg	200	150 kg
≠	**Argon, compressed**	1006	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
*	**Batteries, wet, filled with acid**, electric storage †	2794	8		Corrosive		☑ A51		800	30 kg G	800	No limit
≠	**Batteries, wet, filled with acid**, electric storage †	2794	8		Corrosive		A51 A164		800	30 kg G	800	No limit
*	**Batteries, wet, filled with alkali**, electric storage †	2795	8		Corrosive		☑ A51		800	30 kg G	800	No limit
≠	**Batteries, wet, filled with alkali**, electric storage †	2795	8		Corrosive		A51 A164		800	30 kg G	800	No limit
*	**Batteries, wet, non-spillable**, electric storage	2800	8		Corrosive		☑ A48 A67		806	No limit	806	No limit
≠	**Batteries, wet, non-spillable**, electric storage	2800	8		Corrosive		A48 A67 A164		806	No limit	806	No limit
*	**Battery-powered equipment**	3171	9		Miscellaneous		☑ A21 A67 A87 A94		900	No limit	900	No limit
≠	**Battery-powered equipment**	3171	9		Miscellaneous		A21 A67 A87 A94 A164		900	No limit	900	No limit

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Battery-powered vehicle**	3171	9		Miscellaneous		A21 A67 A87 A94		900	No limit	900	No limit
≠	**Battery-powered vehicle**	3171	9		Miscellaneous		A21 A67 A87 A94 A164		900	No limit	900	No limit
*	**Chemical kit**	3316	9		Miscellaneous		A44		915 Y915	10 kg 1 kg	915	10 kg
≠	**Chemical kit**	3316	9		Miscellaneous		A44 A163		915 Y915	10 kg 1 kg	915	10 kg
*	**Chlorine**	1017	2.3	8		AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A2		FORBIDDEN		FORBIDDEN	
≠	**Chlorine**	1017	2.3	5.1 8		AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A2		FORBIDDEN		FORBIDDEN	
*	**Environmentally hazardous substance, liquid, n.o.s.***	3082	9		Miscellaneous	CA 13 DE 5 US 4	A97	III	914 Y914	450 L 30 kg G	914	450 L
≠	**Environmentally hazardous substance, liquid, n.o.s.***	3082	9		Miscellaneous	CA 13 DE 5 US 4	A97 A158	III	914 Y914	450 L 30 kg G	914	450 L
*	**Environmentally hazardous substance, solid, n.o.s.***	3077	9		Miscellaneous	CA 13 DE 5 US 4	A97	III	911 Y911	400 kg 30 kg G	911	400 kg
≠	**Environmentally hazardous substance, solid, n.o.s.***	3077	9		Miscellaneous	CA 13 DE 5 US 4	A97 A158	III	911 Y911	400 kg 30 kg G	911	400 kg

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Ethanol**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethanol**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
+	**Ethanol and gasoline mixture**, with more than 10% ethanol	3475	3		Liquid flammable		A156	II	305 Y305	5 L 1 L	307	60 L
+	**Ethanol and motor spirit mixture**, with more than 10% ethanol	3475	3		Liquid flammable		A156	II	305 Y305	5 L 1 L	307	60 L
+	**Ethanol and petrol mixture**, with more than 10% ethanol	3475	3		Liquid flammable		A156	II	305 Y305	5 L 1 L	307	60 L
*	**Ethanol solution**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethanol solution**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
*	**Ethyl alcohol**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethyl alcohol**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
*	**Ethyl alcohol solution**	1170	3		Liquid flammable		☑ A3 A58 A148	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
≠	**Ethyl alcohol solution**	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
							☑					
*	**First aid kit**	3316	9		Miscellaneous		A44		915 Y915	10 kg 1 kg	915	10 kg
≠	**First aid kit**	3316	9		Miscellaneous		A44 A163		915 Y915	10 kg 1 kg	915	10 kg
							☑					
*	**Flammable liquid, n.o.s.***	1993	3		Liquid flammable		A3 A148	I II III	302 305 Y305 309 Y309	1 L 5 L 1 L 60 L 10 L	303 307 310	30 L 60 L 220 L
≠	**Flammable liquid, n.o.s.***	1993	3		Liquid flammable		A3	I II III	302 305 Y305 309 Y309	1 L 5 L 1 L 60 L 10 L	303 307 310	30 L 60 L 220 L
+	**Fuel cell cartridges**, containing corrosive substances	3477	8		Corrosive		A146 A157		827	5 kg	827	50 kg
										☑		☑
*	**Fuel cell cartridges** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 L	313	60 L
≠	**Fuel cell cartridges** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 kg	313	50 kg
+	**Fuel cell cartridges**, containing hydrogen in metal hydride	3479	2.1		Gas flammable		A146 A162		215	1 kg	215	15 kg
+	**Fuel cell cartridges**, containing liquefied flammable gas	3478	2.1		Gas flammable		A146 A161		215	1 kg	215	15 kg
+	**Fuel cell cartridges**, containing water-reactive substances	3476	4.3		Danger if wet		A146 A157		436	5 kg	436	50 kg

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
+	**Fuel cell cartridges contained in equipment**, containing corrosive substances	3477	8		Corrosive		A146 A157		827	5 kg	827	50 kg
+	**Fuel cell cartridges contained in equipment** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 kg	313	50 kg
+	**Fuel cell cartridges contained in equipment**, containing hydrogen in metal hydride	3479	2.1		Gas flammable		A146 A162		216	1 kg	216	15 kg
+	**Fuel cell cartridges contained in equipment**, containing liquefied flammable gas	3478	2.1		Gas flammable		A146 A161		216	1 kg	216	15 kg
+	**Fuel cell cartridges contained in equipment**, containing water-reactive substances	3476	4.3		Danger if wet		A146 A157		436	5 kg	436	50 kg
+	**Fuel cell cartridges packed with equipment**, containing corrosive substances	3477	8		Corrosive		A146 A157		827	5 kg	827	50 kg
+	**Fuel cell cartridges packed with equipment** containing flammable liquids	3473	3		Liquid flammable		A146		313	5 kg	313	50 kg
+	**Fuel cell cartridges packed with equipment**, containing hydrogen in metal hydride	3479	2.1		Gas flammable		A146 A162		217	1 kg	217	15 kg
+	**Fuel cell cartridges packed with equipment**, containing liquefied flammable gas	3478	2.1		Gas flammable		A146 A161		217	1 kg	217	15 kg
+	**Fuel cell cartridges packed with equipment**, containing water-reactive substances	3476	4.3		Danger if wet		A146 A157		436	5 kg	436	50 kg
*	**Helium, compressed**	1046	2.2		Gas non-flammable		☑		200	75 kg	200	150 kg
≠	**Helium, compressed**	1046	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
+	**Hydrogen in a metal hydride storage system contained in equipment**	3468	2.1		Gas flammable		A1 A143		FORBIDDEN		214	100 kg G
+	**Hydrogen in a metal hydride storage system packed with equipment**	3468	2.1		Gas flammable		A1 A143		FORBIDDEN		214	100 kg G
+	**1-Hydroxybenzotriazole, anhydrous**, dry or wetted with less than 20% water, by mass	0508	1.3C						FORBIDDEN		FORBIDDEN	
+	**1-Hydroxybenzotriazole, anhydrous, wetted** with not less than 20% water, by mass	3474	4.1		Solid flammable		A40	I	416	0.5 kg	416	0.5 kg

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
+	**Lithium ion batteries** (including lithium ion polymer batteries)	3480	9		Miscellaneous		A88 A99 A154 A164	II	9X4	5 kg G	9X4	35 kg G
+	**Lithium ion batteries contained in equipment** (including lithium ion polymer batteries)	3481	9		Miscellaneous		A48 A154 A164		see 9X6		see 9X6	
+	**Lithium ion batteries packed with equipment** (including lithium ion polymer batteries)	3481	9		Miscellaneous		A88 A154 A164		see 9X5		see 9X5	
*	**Lithium batteries** †	3090	9		Miscellaneous	US 2 US 3	A45 A88 A99 A154	II	903	5 kg G	903	35 kg G
≠	**Lithium metal batteries** (including lithium alloy batteries) †	3090	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164	II	9X1	2.5 kg G	9X1	35 kg G
*	**Lithium batteries contained in equipment** †	3091	9		Miscellaneous	US 2 US 3	A45 A48 A154		see 912		see 912	
≠	**Lithium metal batteries contained in equipment** (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	A48 A154 A164		see 9X3		see 9X3	
*	**Lithium batteries packed with equipment** †	3091	9		Miscellaneous	US 2 US 3	A45 A154		see 918		see 918	
≠	**Lithium metal batteries packed with equipment** (including lithium alloy batteries)†	3091	9		Miscellaneous	US 2 US 3	A154 A164		see 9X2		see 9X2	
*	**Magnesium nitrate**	1474	5.1		Oxidizer			III	516 Y516	25 kg 10 kg	518	100 kg
≠	**Magnesium nitrate**	1474	5.1		Oxidizer		A155	III	516 Y516	25 kg 10 kg	518	100 kg

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
							☑	☑	☑	☑		☑
*	**Methyltrichlorosilane**	1250	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	I	FORBIDDEN		304	2.5 L
≠	**Methyltrichlorosilane**	1250	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3		II	306	1 L	304	5 L
							☑					
*	**Neon, compressed**	1065	2.2		Gas non-flammable				200	75 kg	200	150 kg
≠	**Neon, compressed**	1065	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
	☑			☑	☑							
*	**Nitric acid**, other than red fuming, with not more than 70% nitric acid	2031	8		Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	II	FORBIDDEN		813	30 L
≠	**Nitric acid**, other than red fuming, with at least 65% but not more than 70% nitric acid	2031	8	5.1	Corrosive & Oxidizer	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	II	FORBIDDEN		813	30 L
+	**Nitric acid**, other than red fuming, with less than 65% nitric acid	2031	8		Corrosive			II	807 Y807	1 L 0.5 L	813	30 L
							☑					
*	**Nitrogen, compressed**	1066	2.2		Gas non-flammable				200	75 kg	200	150 kg
≠	**Nitrogen, compressed**	1066	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg
+	**Pentaerythritol tetranitrate mixture desensitized, solid, n.o.s.*** with more than 10% but not more than 20% PETN, by mass	3344	4.1			BE 3			FORBIDDEN		FORBIDDEN	
+	**PETN mixture desensitized, solid, n.o.s.*** with more than 10% but not more than 20% PETN, by mass	3344	4.1			BE 3			FORBIDDEN		FORBIDDEN	
+	**Picric acid, wetted** with not less than 30% water, by mass	1344	4.1		Solid flammable	BE 3	A40	I	416	1 kg	412	15 kg

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Polyester resin kit †**	3269	3		Liquid flammable		A66	II III	312 Y312 312 Y312	5 kg 1 kg 5 kg 1 kg	312 312	5 kg 5 kg
≠	**Polyester resin kit †**	3269	3		Liquid flammable		A66 A163	II III	312 Y312 312 Y312	5 kg 1 kg 5 kg 1 kg	312 312	5 kg 5 kg
*	**Radioactive material, excepted package – articles manufactured from natural uranium** or **depleted uranium** or **natural thorium**	2909	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – articles manufactured from natural uranium** or **depleted uranium** or **natural thorium**	2909	7		None		A130		See Part 1;6			
*	**Radioactive material, excepted package – empty packaging**	2908	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – empty packaging**	2908	7		None		A130		See Part 1;6			
*	**Radioactive material, excepted package – instruments** or **articles**	2911	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – instruments** or **articles**	2911	7		None		A130		See Part 1;6			
*	**Radioactive material, excepted package – limited quantity of material**	2910	7		None		A130		See Part 2;7			
≠	**Radioactive material, excepted package – limited quantity of material**	2910	7		None		A130		See Part 1;6			
*	**Radioactive material, low specific activity (LSA-II)**, non-fissile or fissile excepted	3321	7		Radioactive	CA 1	A23 A78 A139		See Part 2;7		and Part 4;9	
≠	**Radioactive material, low specific activity (LSA-II)**, non-fissile or fissile excepted	3321	7		Radioactive	CA 1	A23 A78 A139 A159		See Part 2;7		and Part 4;9	

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Radioactive material, low specific activity (LSA-II) fissile**	3324	7		Radioactive	CA 1	☑ A76 A78		See Part 2;7 and Part 4;9			
≠	**Radioactive material, low specific activity (LSA-II) fissile**	3324	7		Radioactive	CA 1	A76 A78 A159		See Part 2;7 and Part 4;9			
*	**Radioactive material, low specific activity (LSA-III)**, non-fissile or fissile excepted	3322	7		Radioactive	CA 1	☑ A23 A78 A139		See Part 2;7 and Part 4;9			
≠	**Radioactive material, low specific activity (LSA-III)**, non-fissile or fissile excepted	3322	7		Radioactive	CA 1	A23 A78 A139 A159		See Part 2;7 and Part 4;9			
*	**Radioactive material, low specific activity (LSA-III) fissile**	3325	7		Radioactive	CA 1	☑ A76 A78		See Part 2;7 and Part 4;9			
≠	**Radioactive material, low specific activity (LSA-III) fissile**	3325	7		Radioactive	CA 1	A76 A78 A159		See Part 2;7 and Part 4;9			
*	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II)**, non-fissile or fissile excepted	2913	7		Radioactive	CA 1	☑ A78 A139		See Part 2;7 and Part 4;9			
≠	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II)**, non-fissile or fissile excepted	2913	7		Radioactive	CA 1	A78 A139 A159		See Part 2;7 and Part 4;9			
*	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II), fissile**	3326	7		Radioactive	CA 1	☑ A76 A78		See Part 2;7 and Part 4;9			
≠	**Radioactive material, surface contaminated objects (SCO-I** or **SCO-II), fissile**	3326	7		Radioactive	CA 1	A76 A78 A159		See Part 2;7 and Part 4;9			

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
*	**Radioactive material, Type B(M) package**, non-fissile or fissile excepted	2917	7		Radioactive	CA 1	☑ A78 A139		See Part 2;7 and Part 4;9			
≠	**Radioactive material, Type B(M) package**, non-fissile or fissile excepted	2917	7		Radioactive	CA 1	A78 A139 A160		See Part 2;7 and Part 4;9			
*	**Radioactive material, Type B(M) package, fissile**	3329	7		Radioactive	CA 1	☑ A78		See Part 2;7 and Part 4;9			
≠	**Radioactive material, Type B(M) package, fissile**	3329	7		Radioactive	CA 1	A78 A160		See Part 2;7 and Part 4;9			
*	**Radioactive material, Type B(U) package**, non-fissile or fissile excepted	2916	7		Radioactive	CA 1	☑ A78 A139		See Part 2;7 and Part 4;9			
≠	**Radioactive material, Type B(U) package**, non-fissile or fissile excepted	2916	7		Radioactive	CA 1	A78 A139 A160		See Part 2;7 and Part 4;9			
*	**Radioactive material, Type B(U) package, fissile**	3328	7		Radioactive	CA 1	☑ A78		See Part 2;7 and Part 4;9			
≠	**Radioactive material, Type B(U) package, fissile**	3328	7		Radioactive	CA 1	A78 A160		See Part 2;7 and Part 4;9			
+	**Signals, distress, ship**	0505	1.4G		Explosive 1.4				FORBIDDEN		135	75 kg
+	**Signals, distress, ship**	0506	1.4S		Explosive 1.4				135	25 kg	135	100 kg
+	**Signals, smoke** †	0507	1.4S		Explosive 1.4				135	25 kg	135	100 kg
+	**TNT, wetted** with not less than 30% water, by mass	1356	4.1		Solid flammable	BE 3	A40	I	416	0.5 kg	416	0.5 kg
*	**Toxic liquid, water-reactive, n.o.s.***	3123	6.1	4.3	Toxic & Danger if wet		A4 A137	I II	FORBIDDEN 609	 1 L	☑ 604 611	1 L 5 L
≠	**Toxic liquid, water-reactive, n.o.s.***	3123	6.1	4.3	Toxic & Danger if wet		A4 A137	I II	FORBIDDEN 609	 1 L	6XX 611	1 L 5 L

	Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12
									☑		☑	
*	**Toxic solid, water-reactive, n.o.s.***	3125	6.1	4.3	Toxic & Danger if wet		A5	I II	606 613 Y613	5 kg 15 kg 1 kg	607 615	15 kg 50 kg
≠	**Toxic solid, water-reactive, n.o.s.***	3125	6.1	4.3	Toxic & Danger if wet		A5	I II	6XX 613 Y613	5 kg 15 kg 1 kg	6XX 615	15 kg 50 kg
							☑	☑	☑	☑		☑
*	**Vinyltrichlorosilane**	1305	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	I	FORBIDDEN		304	2.5 L
≠	**Vinyltrichlorosilane**	1305	3	8	Liquid flammable & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3		II	306	1 L	304	5 L
							☑					
*	**Xenon**	2036	2.2		Gas non-flammable				200	75 kg	200	150 kg
≠	**Xenon**	2036	2.2		Gas non-flammable		A69		200	75 kg	200	150 kg

ATTACHMENT C

EXCEPTED QUANTITY CODES FOR NEW COLUMN 9 OF TABLE 3-1

Add E0 in column 9 for:

a) All goods of Classes 1 and 7 and all goods of Divisions 2.1, 2.3, 5.2 and 6.2;

b) All goods of Division 2.2 with a subsidiary risk in column (4) and UN Nos. 1044, 1950, 2037, 2857 and 3164;

c) UN Nos. 1204, 2059, 3064, 3256, 3269, 3343, 3357, 3379 and 3473 in Class 3;

d) All goods of Class 3 with a subsidiary risk in column (4), packing group I;

e) All goods of Division 4.1, packing group I, and UN Nos. 2304, 2448, 2555, 2556, 2557, 2907, 3176 (packing groups II and III), 3221 to 3240, 3319 and 3344;

f) All goods of Division 4.2, packing group I, and UN;

g) All goods of Division 4.3, packing group I, and UN 3292;

h) All goods of Division 5.1, packing group I and UN 2426 and 3356;

i) All goods of Class 8, packing group I, and UN Nos. 1774, 2028, 2215 (MOLTEN), 2576, 2794, 2795, 2800, 2803, 2809 and 3028;

j) UN Nos. 1845, 2807, 2990, 3072, 3090, 3091, 3166, 3171, 3245, 3257, 3258, 3268, 3316, 3334, 3335 and 3363 of Class 9;

k) UN Nos. 1600, 1700, 2016, 2017, 2312 and 3250 of Division 6.1.

Add E1 in column 9 for:

a) All goods of Division 2.2 without subsidiary risk in column (4);

b) All goods of Class 3 without a subsidiary risk in column (4), packing group III, except for UN Nos. 2059, 3256 and 3269;

c) All goods of Class 3 with a subsidiary risk in column (4), packing group III;

d) All goods of Division 4.1, packing group III, except for UN Nos. 2304, 2448 and 3176;

e) All goods of Division 4.2, packing group III;

f) All goods of Division 4.3, packing group III;

g) All goods of Division 5.1, packing group III;

h) All goods of Division 6.1, packing group III;

i) All goods of Class 8, packing group III, except for UN Nos. 2215 (MOLTEN), 2803 and 2809;

j) All goods of Class 9, packing group III, except for UN 1845, 2807, 3257, 3258 and 3268.

Add *E2* in column 9 for:

a) All goods of Class 3 without a subsidiary risk in column (4), packing group II, except for UN Nos. 1204, 2059, 3064, 3269 and 3357;

b) All goods of Class 3 with a subsidiary risk in column (4), packing group II;

c) All goods of Division 4.1, packing group II, except for UN Nos. 2555, 2556, 2557, 2907, 3176, 3319 and 3344;

d) All goods of Division 4.2, packing group II;

e) All goods of Division 4.3, packing group II, except for UN 3292;

f) All goods of Division 5.1, packing group II except for UN 3356;

g) All goods of Class 8, packing group II, except for UN Nos. 1774, 2028 and 2576;

h) All goods of Class 9, packing group II, except for UN Nos. 3090, 3091, 3480 and 3481.

Add E3 in column 9 for all goods of Class 3 without a subsidiary risk in column (4), packing group I, except for UN Nos. 2059 and 3379.

Add E4 in column 9 for all goods of Division 6.1, packing group II, except for UN Nos. 1600, 1700, 2016, 2017, 2312 and 3250.

Add E5 in column 9 for all goods of Division 6.1, packing group I.

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Agenda Item 3: Development of recommendations for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009-2010 Edition

3.1 ADDITION OF A NEW APPENDIX TO THE SUPPLEMENT LISTING TOXIC BY INHALATION LIQUIDS (DGP/21-WP/14)

3.1.1 DGP-WG07 had agreed to the adoption of a new appendix in the Supplement to the Technical Instructions which lists toxic by inhalation liquids. The secretary proposed that notes be added to the table providing explanations for the terms RTECS and SVC. This was agreed. It was noted that the standard spelling of "sulphide" should be included. Introductory text to the new Appendix 7 was provided.

3.2 TRANSPORT OF FLAMES (DGP/21-WP/61)

3.2.1 A proposal to add guidance material in the Supplement for the transport of symbolic flames such as the Olympic Flame was discussed. Although the intent was welcomed, it was suggested further clarification on a number of issues was necessary. These included:

a) operational controls such as securing the lamp or apparatus;

b) whether cabin crew or the designated official accompanying the flame would be responsible for operating a fire extinguisher in the event of an incident;

c) whether or not a maximum number of lamps should be specified; and

d) desirability of a written notification in addition to verbal information being communicated to the pilot in command.

3.2.2 Based on the discussions, a revision to the new special provision was proposed and agreed to, subject to the following amendments:

a) reversal of sub-paragraphs d) and e) to allow for a more logical sequence;

b) clarification that all crew members must be given a verbal briefing;

c) replacement of "constant supervision of the accompanying person" with constant "supervision of an accompanying person";

d) removal of reference to a specific fire extinguisher; and

e) minor editorial amendments.

3.3 APPROVAL BY THE APPROPRIATE AUTHORITY (DGP/21-WP/82)

3.3.1 A request for clarification regarding the wording of Special Provision A202 in the Supplement regarding who is required to request the approval was made. Although several panel members reported that their competent authorities issued approvals almost exclusively to operators, others said their authorities also issued approvals to the shipper. Some reported that approvals are issued to third parties other than operators or shippers.

3.4 RECOMMENDATION

3.4.1 In light of the foregoing discussions, the meeting developed the following recommendation:

Recommendation 3/1 — Amendment to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284, Supp)

That the Supplement to the Technical Instructions be amended as indicated in the appendix to the report on this agenda item.

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APPENDIX

PROPOSED AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

Part S-3

DANGEROUS GOODS LIST AND LIMITED QUANTITIES EXCEPTIONS

(ADDITIONAL INFORMATION FOR PART 3 OF THE TECHNICAL INSTRUCTIONS)

. . .

Chapter 2

DANGEROUS GOODS LIST

. . .

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12
. . .											
Chlorine	1017	2.3	5.1 8	Gas toxic & Oxidizer & Corrosive	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A2		See 213		See 213	
. . .											
Hydrocarbons, liquid, n.o.s.	3295	3		Liquid flammable		A224	I II III	302 305 Y305 309 Y309	1 L 5 L 1 L 60 L 10 L	303 307 310	30 L 60 L 220 L
. . .											

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12
Hydrogen in a metal hydride storage system contained in equipment	3468	2.1		Gas flammable		A1 A143		FORBIDDEN		214	100 kg G
Hydrogen in a metal hydride storage system packed with equipment	3468	2.1		Gas flammable		A1 A143		FORBIDDEN		214	100 kg G
• • •											
1-Hydroxybenzotriazole, anhydrous, dry or wetted with less than 20% water, by mass	0508	1.3C		Explosive				FORBIDDEN		FORBIDDEN	
• • •											
Kerosene	1223	3		Liquid flammable		A224	III	309 Y309	60 L 10 L	310	220 L
• • •											
~~**Methyltrichlorosilane**~~	~~1250~~	~~3~~	~~8~~	~~Liquid flammable & Corrosive~~	~~AU 1 CA 7 GB 3 IR 3 NL 1 US 3~~	~~A1~~	~~I~~	~~FORBIDDEN~~		~~304~~	~~2.5 L~~
• • •											
Nitric acid, other than red fuming, with at least 65% but not more than 70% nitric acid	2031	8	5.1	Corrosive & Oxidizer	AU 1 CA 7 GB 3 IR 3 NL 1 US 3	A1	II	807	(1 L)	813	30 L
• • •											
Pentaerythritol tetranitrate mixture desensitized, solid, n.o.s.* with more than 10% but not more than 20% PETN, by mass	3344	4.1		Solid flammable	BE 3			FORBIDDEN		FORBIDDEN	
• • •											
PETN mixture desensitized, solid, n.o.s.* with more than 10% but not more than 20% PETN, by mass	3344	4.1		Solid flammable	BE 3			FORBIDDEN		FORBIDDEN	
• • •											
Signals, distress, ship	0505	1.4G		Explosive 1.4				FORBIDDEN		135	75 kg
• • •											
Toxic liquid, water-reactive, n.o.s.*	3123	6.1	4.3	Toxic & Danger if wet		A4 A137	I	FORBIDDEN		~~604~~ 6XX	1L
• • •											
~~**Vinyltrichlorosilane**~~	~~1305~~	~~3~~	~~8~~	~~Liquid flammable & Corrosive~~	~~AU 1 CA 7 GB 3 IR 3 NL 1 US 3~~	~~A1~~	~~I~~	~~FORBIDDEN~~		~~304~~	~~2.5 L~~

• • •

Add A223 in Column 7 of Table S-3-1 for each of the substances listed in the new Appendix 7 to the Supplement, List of Toxic by Inhalation Liquids.

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Chapter 3

SPECIAL PROVISIONS

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A223 This substance is toxic by inhalation.

A224 For the purpose of transporting a symbolic flame, the appropriate States of Origin, of destination and of the Operator may approve the carriage of lamps fuelled by UN 1223 — **Kerosene**, or UN 3295 — **Hydrocarbons, liquid, n.o.s.**, carried by a passenger as carry on baggage only. Lamps must be of a "Davy" type or similar apparatus. In addition, the following conditions apply as a minimum:

a) no more than four lamps may be carried on board the aircraft;

b) lamps may contain no more fuel than the quantity adequate for the duration of the flight and the fuel must be contained in a leakproof reservoir;

c) lamps must be adequately secured;

d) whilst on board the aircraft, the lamps must be under the constant supervision of an accompanying person, who must not be a member of the operating crew;

e) lamps may be lit by the accompanying person, but must not be refilled on board the aircraft;

f) at least one fire extinguisher must be kept within reach of the accompanying person at all times. The accompanying person must be trained in the use of the extinguisher;

g) the crew members of the aircraft must be given a verbal briefing about the carriage of the lamps and the pilot-in-command must be provided with a copy of the approval; and

h) Part 7;4.1.1b), c), e), 4.3, 4.4 and 4.8 of the Technical Instructions must apply.

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Editorial Note.— The following is a consequential amendment agreed to by DGP/20 as a result of Amendment 9 to Annex 18, which will become applicable on 20 November 2008:

Part S-7
STATE'S RESPONSIBILITIES

. . .

Chapter 4
PROVISION OF INFORMATION

4.1 DANGEROUS GOODS ACCIDENTS AND INCIDENTS

4.1.1 The effectiveness and possible need for the modification of dangerous goods regulations and practices can only be measured if dangerous goods accidents and incidents, and discoveries of undeclared or misdeclared dangerous goods in cargo, are investigated, reported and analysed.

4.1.2 Each State must establish procedures for investigating and compiling information concerning dangerous goods accidents and incidents, and discoveries of undeclared or misdeclared dangerous goods in cargo, which occur on its territory and which involve the transport of dangerous goods originating in or destined for another State.

4.1.3 Each State should establish procedures for investigating and compiling information concerning dangerous goods accidents and incidents, and discoveries of undeclared or misdeclared dangerous goods in cargo, which occur on its territory, other than those described in 4.1.2.

. . .

4.6 UNDECLARED OR MISDECLARED DANGEROUS GOODS IN CARGO

The State in which undeclared or misdeclared dangerous goods are discovered in cargo, involving goods originating or destined for another State must carry out an investigation into the circumstances of the discovery such as is considered appropriate to its seriousness

~~4.6~~4.7 COMPLIANCE ASSURANCE

The competent authority should ensure compliance with the Technical Instructions. Means to discharge this responsibility include the establishment and execution of a programme for monitoring the design, manufacture, testing, inspection and maintenance of packaging, the classification of dangerous goods and the preparation, documentation, handling and stowage of packages by consignors and carriers, to provide evidence that the provisions of the Technical Instructions are being met in practice.

Insert new appendix as follows:

Appendix 7
LIST OF TOXIC BY INHALATION LIQUIDS

The substances in the following table have been identified as posing an inhalation toxicity risk. Where specific data is available, this data has been included in columns 6 to 8 of the table. In cases where supporting data is incomplete, column 9 provides a rationale for the substance's inclusion in the table. These substances are forbidden from transport aboard passenger or cargo aircraft unless approved by the appropriate authority of the State of Origin.

UN No.	*Name*	*Class*	*UN packing group*	*Sub-sidiary risk*	*RTECS[1]*	*LC_{50} (ppm)*	*SVC[2] (ppm)*	*Notes*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1541	Acetone cyanohydrin, stabilized	6.1			OD9275	--	13200	Decomposes to acetone and highly toxic hydrogen cyanide at room temperatures.
1092	Acrolein, stabilized	6.1		3	AS1050	25	289000	
1098	Allyl alcohol	6.1		3	BA5075	253	26000	
1722	Allyl chloroformate	6.1		3, 8	LQ5775	61	20400	
2334	Allylamine	6.1		3	BA5425	590	261000	
1560	Arsenic trichloride	6.1			CG1750	--	11500	Capable of forming highly toxic arsine gas. Explosion hazard in dust form when exposed to flame.
2692	Boron tribromide	8			ED7400	--	73700	Decomposes to highly toxic hydrogen bromide at high temperatures. Fire and explosion may result in contact with water, steam, or alcohol.
1745	Bromine pentafluoride	5.1		6.1, 8	EF9350	--	453000	Decomposition produces highly toxic hydrogen fluoride and hydrogen bromide. Contact with combustibles produces fire or explosion. Contact with water produces explosion.
1746	Bromine trifluoride	5.1		6.1, 8	EF9360	50	9200	
1569	Bromoacetone	6.1		3	UC0525	--	11900	Decomposition produces highly toxic hydrogen bromide.
2743	n-Butyl chloroformate	6.1		3, 8	LQ5890	--	9870	As with all chloroformates, decomposition produces toxic gases.
2485	n-Butyl isocyanate	6.1		3	NQ8250	105	13900	
2484	tert-Butyl isocyanate	6.1		3	NQ8300	22	19700	
1695	Chloroacetone, stabilized	6.1		3, 8	UC0700	262	41900	

UN No.	*Name*	*Class*	*UN packing group*	*Sub-sidiary risk*	*RTECS[1]*	*LC_{50} (ppm)*	*SVC[2] (ppm)*	*Notes*
2668	Chloroacetonitrile	6.1	II	3	AL8225	--	13200	Decomposes to produce toxic and flammable vapors including hydrogen cyanide. Reacts with strong oxidants, reducing agents, acids, bases, steam, producing highly toxic and flammable fumes.
1752	Chloroacetyl chloride	6.1		8	AO6475	660	24600	
2232	2-Chloroethanal	6.1			AB2450	160	24300	
1580	Chloropicrin	6.1			PB6300	--	26100	Decomposes to form toxic gases including oxides of nitrogen, chlorine and carbon monoxide. Extremely noxious with an odor threshold of only 1.1 ppm.
1754	Chlorosulphonic acid (with or without sulphur trioxide)	8			FX5730	16	1320	
1143	Crotonaldehyde, stabilized	6.1		3	GP9499	93	42100	
2488	Cyclohexyl isocyanate	6.1		3	NQ8650	15	2170	
2521	Diketene, stabilized	6.1		3	RQ8225	551	10500	
1595	Dimethyl sulphate	6.1		8	WS8225	17	1000	
2382	Dimethylhydrazine, symmetrical	6.1		3	MV2625	680	92000	
1163	Dimethylhydrazine, unsymmetrical	6.1		3, 8	MV2450	504	206000	
1182	Ethyl chloroformate	6.1		3, 8	LQ6125	145	55300	
2826	Ethyl chlorothioformate	8		3	LQ6950	138	10900	
1892	Ethyldichloroarsine	6.1			CH3500	36	2800	
1135	Ethylene chlorohydrin	6.1		3	KK0875	74	6450	
1605	Ethylene dibromide	6.1			KH9275	650	11300	
1185	Ethyleneimine, stabilized	6.1		3	KX5075	76	217000	
2646	Hexachlorocyclopentadiene	6.1			GY1225	3	100	
3294	Hydrogen cyanide, solution in alcohol with not more than 45% hydrogen cyanide	6.1		3	--			Concentrations of HCN solution up to 45% HCN may give off toxic HCN vapors.
1051	Hydrogen cyanide, stabilized containing less than 3% water	6.1		3	MW6825	40	842000	
1052	Hydrogen fluoride, anhydrous	8		6.1	MW7875	1300	1020000	
1994	Iron pentacarbonyl	6.1		3	NO4900	6	30300	
2407	Isopropyl chloroformate	6.1		3, 8	LQ6475	299	36800	
2483	Isopropyl isocyanate	3		6.1	NQ9230			
3079	Methacrylonitrile, stabilized	3		6.1	UD1400	656	84200	
3246	Methanesulphonyl chloride	6.1		8	--			Decomposition products include highly toxic chlorine gas.

UN No.	*Name*	*Class*	*UN packing group*	*Sub-sidiary risk*	*RTECS[1]*	*LC_{50} (ppm)*	*SVC[2] (ppm)*	*Notes*
2605	Methoxymethyl isocyanate	3		6.1	NQ9240	--	--	Decomposition products include toxic gases such as hydrogen cyanide, oxides of nitrogen and carbon monoxide. Classified by analogy to methyl isocyanate. Odorless at concentrations in air far above safe levels.
1647	Methyl bromide and ethylene dibromide mixture, liquid	6.1			PA5300	--	--	Methyl bromide is a Division 2.3 gas and ethlene dibromide is a toxic by inhalation liquid with an LC_{50} of 650 and an SVC of 11300. Mixtures of any ratio will be toxic by inhalation.
1238	Methyl chloroformate	6.1		3, 8	FG3675	88	135000	
1239	Methyl chloromethyl ether	6.1		3	KN6650	160	210000	
3023	2-Methyl-2-heptanethiol	6.1		3	MJ1500	102	5000	
2644	Methyl iodide	6.1			PA9450	448	414000	
2480	Methyl isocyanate	6.1		3	NQ9450	22	458000	
2477	Methyl isothiocyanate	6.1		3	PA9625	635	27400	
2606	Methyl orthosilicate	6.1		3	VV9800	200	13300	
1251	Methyl vinyl ketone, stabilized	6.1		3, 8	EM9800	5	93400	
1244	Methylhydrazine	6.1		3, 8	MV5600	68	50300	
1259	Nickel carbonyl	6.1		3	QR6300	18	422000	
2032	Nitric acid, red fuming	8		5.1, 6.1	QU5900	134	55300	
1380	Pentaborane	4.2		6.1	RY8925	12	225000	
1670	Perchloromethyl mercaptan	6.1			PB0370	--	32900	Classification based on analogy with hydrogen sulphide and on human experience. Considered approximately 20 times more toxic than hydrogen sulfide. Exposure causes lacrimation, eye inflammation; nose, throat irritation; cough; dyspnea; deep breath pain, coarse rales; vomiting; pallor; tachycardia; acidosis; anuria.
2487	Phenyl isocyanate	6.1		3	DA3675	16	2470	
2337	Phenyl mercaptan	6.1		3	DC0525	66	1450	

UN No.	*Name*	*Class*	*UN packing group*	*Sub-sidiary risk*	*RTECS*[1]	*LC_{50} (ppm)*	*SVC*[2] *(ppm)*	*Notes*
1672	Phenylcarbylamine chloride	6.1			NJ6700	--	--	Classification is based on human experience. Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Decomposes to produce corrosive and toxic gases.
1810	Phosphorus oxychloride	8			TH4897	96	35500	
2740	n-Propyl chloroformate	6.1		3, 8	LQ6830	319	25500	
2482	n-Propyl isocyanate	6.1		3	NR0190	44	69700	
1809	Phosphorus trichloride	6.1		8	TH3675	208	125000	
1829	Sulphur trioxide, stabilized	8			WT4830	347	98700	
1834	Sulphuryl chloride	8			WT4870	131	142000	
1510	Tetranitromethane	5.1		6.1	PB4025	36	11000	
2474	Thiophosgene	6.1			XN2450	--	150000	Classification is based on human experience. May be fatal if inhaled, swallowed or absorbed through the skin. Causes burns. Severe skin, eye and respiratory irritant. Also reacts violently with water to produce toxic fumes.
1838	Titanium tetrachloride	8			XR1925	119	12800	
2442	Trichloroacetyl chloride	8			A07140	128	22700	
2438	Trimethylacetyl chloride	6.1		3, 8	AO7200	507	35500	

[1] Registry of toxic effects of chemical substances
[2] Saturated vapour concentration

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Agenda Item 4: Amendments to the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) for incorporation in the 2009-2010 Edition

4.1 GUIDANCE ON PORTABLE ELECTRONIC DEVICE FIRES IN AIRCRAFT CABINS (DGP/21-WP/15 AND WP/44)

4.1.1 It was recalled that at the DGP-WG/07, it had been agreed to incorporate guidance into the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) for in-flight fires involving portable electronic devices. Subsequent to that meeting, further testing had indicated that cooling the device with water (or other non-flammable liquid) produced the best results and prevented ignition of cells in the battery pack not initially involved in the fire. The testing also indicated that moving the device before the fire was fully extinguished could prove to be extremely dangerous. Further revisions to the guidance material agreed at the last working group meeting (DGP/21-WP/15) were therefore proposed.

4.1.2 There was general support for this proposal. A minor concern was a possible reaction between lithium and water to produce some hydrogen; however it was explained that the lithium burning took place very rapidly and would be complete before water could be added. It was also noted that the advice was to not move the article involved, but at some stage after the fire had been extinguished it would presumably be desirable to move it. In response, it was pointed out that the advice was intended to cover only the active phase of the incident; after the fire was out the clean-up phase could involve moving the article. The meeting agreed to the material proposed with minor changes to the text.

4.1.3 **Recommendation**

4.1.4 In light of the foregoing discussions, the meeting developed the following recommendation:

Recommendation 4/1 — Amendment to the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481)

That the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) be amended as indicated in the appendix to the report on this agenda item.

4.2 DETECTION AND SUPPRESSION OF FIRE IN CARGO HOLDS (DGP/21-WP/50)

4.2.1 Whether cargo holds should be required to be equipped with a fire detection system when dangerous goods of classes or divisions 1, 2.1, 3, 4, 5 and lithium batteries are carried on aircraft was discussed at DGP-WG07. The group recognized the importance of fire suppression systems in cargo holds containing certain dangerous goods while at the same time noted that some fleets do not have Class C compartments and retrofitting existing compartments would place a huge burden on the airline industry. The secretary reported that the issue was raised with the Airworthiness Panel (AIRP) Working Group of the Whole Meeting (8 to 17 May 2007) who agreed to process the issue as a new task through the ANIP process. This was noted.

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APPENDIX

PROPOSED AMENDMENTS TO THE *EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS*

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Editorial Note.— Proposed amendments to paragraph 2.5 are shown in Appendix A to the report on Agenda Item 5 (sub-item 5.1: principals governing the transport of dangerous goods on cargo only aircraft).

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3.3 CABIN CREW CHECKLIST FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT

INITIAL ACTION

- Notify pilot-in-command
- Identify the item

In case of fire:

- Use standard procedure / check use of water

In case of fire involving a portable electronic device:

- Use standard procedure / obtain and use fire extinguisher
- Remove external electrical power from device (if applicable)
- Douse device with water (or other non-flammable liquid) to cool cells and prevent ignition of adjacent cells
- Do not move device
- Remove power to remaining electrical outlets until the aircraft's system can be determined to be free of faults, if the device was previously plugged in

In case of spillage or leakage:

- Collect emergency response kit or other useful items
- Don rubber gloves and smoke hood or smoke mask — portable oxygen
- Move passengers away from area and distribute wet towels or cloths
- Place dangerous goods item in polyethylene bags
- Stow polyethylene bags

- Treat affected seat cushions / covers in the same manner as dangerous goods item
- Cover spillage on carpet / floor
- Regularly inspect items stowed away / contaminated furnishings

AFTER LANDING

- Identify to ground personnel dangerous goods item and where stowed
- Make appropriate entry in maintenance log

3.4 AMPLIFIED CABIN CREW CHECKLIST FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT

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IN CASE OF FIRE

USE STANDARD PROCEDURE / CHECK USE OF WATER

Standard emergency procedures must be used to deal with any fire. In general, water should not be used on a spillage or when fumes are present since it may spread the spillage or increase the rate of fuming. Consideration should also be given to the possible presence of electrical components when using water extinguishers.

IN CASE OF FIRE INVOLVING A PORTABLE ELECTRONIC DEVICE

USE STANDARD PROCEDURE / OBTAIN AND USE FIRE EXTINGUISHER

Standard emergency procedures must be used to deal with any fire. Although Halon has been shown to not be effective against lithium metal fires, Halon will be effective in fighting the subsequent fire of surrounding materials, or in fighting a lithium ion battery fire.

REMOVE EXTERNAL ELECTRICAL POWER FROM DEVICE (IF APPLICABLE)

A battery has a higher likelihood of catching fire through thermal runway during or immediately following a charging cycle, although the effects of thermal runaway may be delayed for some period of time. By removing external power from the device, it will be assured that additional energy is not being fed to the battery to promote a fire.

DOUSE DEVICE WITH WATER (OR OTHER NON-FLAMMABLE LIQUID) TO COOL CELLS AND PREVENT IGNITION OF ADJACENT CELLS

If available, a water extinguisher should be used to cool the cells in a battery that have ignited, preventing the spread of heat to adjacent cells. If a water extinguisher is not available, any non-flammable liquid may be used to cool the cells and device.

DO NOT MOVE DEVICE

A battery pack involved in a fire has been shown to reignite and emit flames multiple times as heat is transferred to other cells in the pack. It is preferable to cool the device using water (or other non-flammable liquid); injuries may occur if the device reignites while it is being moved.

REMOVE POWER TO REMAINING ELECTRICAL OUTLETS UNTIL THE AIRCRAFT'S SYSTEM CAN BE DETERMINED TO BE FREE OF FAULTS, IF THE DEVICE WAS PREVIOUSLY PLUGGED IN

By removing power to the remaining electrical outlets it can be assured that a malfunctioning aircraft system does not contribute to additional failures of passenger portable electronic devices.

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Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel

5.1 Principles governing the transport of dangerous goods on cargo only aircraft

5.1 ACCESSIBILITY REQUIREMENTS FOR CARGO AIRCRAFT ONLY DANGEROUS GOODS (DGP/21WP/66)

5.1.1 Two members presented a paper on this topic which arose out of discussions at the last working group meeting. Changes to the current requirements were being proposed in four main areas, as discussed in the following paragraphs.

5.1.2 The current requirement for accessibility

5.1.2.1 The current requirement for accessibility required CAO dangerous goods to be loaded such that "a crew member or other authorized person can see, handle and, where size and mass permit, separate such packages or overpacks from other cargo in flight." This requirement had been in place since the very first edition (1983) of the Technical Instructions. At that time, aircraft routinely operated with three flight crew and commonly a loadmaster, thus providing for a crew member not actually engaged in flying the aircraft to enter the main deck cargo compartment with a view to taking action if possible. However, many modern aircraft typically flew with only two flight crew members and no loadmaster and so the ability for physical intervention was now limited.

5.1.2.2 It had been suggested that the current requirement should be replaced with a requirement for CAO dangerous goods to be loaded in a Class C cargo compartment, however not all aircraft were equipped with such holds; this would also effectively remove what might be a last resort action available to the crew. Consequently, it was proposed that as an alternative to accessibility, CAO dangerous goods should be permitted for carriage in a Class C cargo compartment or indeed a unit load device which had its own fire detection and suppression system equivalent to that required by the certification requirements for a Class C cargo compartment.

5.1.2.3 It was also suggested that the current wording in respect of accessibility would benefit from revision in two respects. Firstly, it was believed that requiring the crew to "see" a package was not required, since appropriate response actions may be possible without the offending package being visible. It was believed that using the word "access" would be more appropriate, because this provided for new systems being developed whereby a fire in a ULD could be dealt with remotely, not necessarily involving the intervention of the crew (as demonstrated at WG07).

5.1.2.4 In summary, it was proposed to allow three alternatives of loading

a) in a Class C cargo compartment;

b) in a ULD with a fire detection/suppression system equivalent to that of a Class C cargo compartment; and

c) loaded in such a way that the crew can either physically or remotely access a package/overpack.

However, in respect of c) above, the co-sponsors of the paper offered new wording which could be added to the existing requirement (which requires dangerous goods packages to be stowed so that the crew can handle them and possibly separate them from other cargo) or could provide an alternative to the existing requirement. The new wording would allow stowage so that the crew could use any appropriate emergency response equipment carried aboard the aircraft. The meeting was invited to choose one of these two options (for convenience described as the "and" and "or" options henceforth).

5.1.2.5 It was noted that the "and" option referred to above would be more stringent than the current requirements. On the other hand it was considered that the "or" option resulted in a weak requirement since aircraft were not actually required to carry emergency response equipment. Members were equally divided about which alternative to select and agreed to seek additional advice on airworthiness aspects before making a final decision.

5.1.2.6 The meeting generally agreed that it should be permitted to stow CAO dangerous goods in a Class C cargo compartment. Concerning a ULD equipped with its own fire detection/suppression system, it was pointed out that such ULDs do not at present exist. It was suggested that, if developed, the devices would need airworthiness certification by appropriate national authorities and this might give rise to difficulties if the devices were transferred between operators from different States. It was noted however that the same situation existed at present with normal ULDs and had been resolved without difficulties. The meeting agreed to seek advice from an airworthiness expert before making a decision on this issue.

5.1.2.7 The secretary of the Airworthiness Panel (AIRP), Technical Officer, Flight Safety Section, briefly advised of the current content of Annex 8 — *Airworthiness of Aircraft* as it relates to cargo compartment fire Standards. He explained that in fact little information is available on cargo compartment fire Standards but that the Annex does include information such as:

a) compartments the crew can access;

b) compartments the crew cannot access, and

c) having sufficient extinguishment to cope with expected types of fire.

5.1.2.8 He then outlined why the current content of Annex 8 does not adequately address main deck cargo installations of all cargo aircraft. He noted that essentially, aircraft design had centred upon the carriage of passengers on a main deck and the carriage of mail and freight in the under floor holds. He explained how a modified cargo container would be treated as a "component" by the airworthiness staff and that the current Annex 8 does have adequate guidance on how to approve component changes. In response to a question from a panel member, it was confirmed that any modification which met the Annex 8 minimum would automatically be acceptable in all other States.

5.1.2.9 It was explained that research is currently being undertaken for halon extinguisher replacements and that weight penalties were inevitable. He suggested that having multiple modified containers could have serious weight implications. One panel member suggested that weight penalties should not be considered a drawback as this would not be an additional requirement, it would be an option. In fact, only a limited number of modified containers would be needed for the declared dangerous goods. Another member commented that most incidents result from undeclared dangerous goods which could result in a need for all containers to be modified.

5.1.2.10 The panel was satisfied with the officer's briefing, particularly with the explanation that that any modification which met the Annex 8 minimum would automatically be acceptable in all other States.

5.1.2.11 It was suggested that 7;2.4.1 be expanded by adding the words "as determined by the appropriate national authority to the end of b). The proposed addition of 7;2.4.1.1 c) 2) was not agreed in the absence of guidance material for appropriate emergency response equipment.

5.1.2.12 The proposal, as modified, was agreed.

5.1.2.13 A consequential amendment to paragraph 2.5 of the Doc 9481, *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* was also agreed.

5.1.3 **Crew inspection of dangerous goods before departure**

5.1.3.1 A requirement was proposed that CAO dangerous goods should be made available to the crew for inspection, if requested, and it was suggested that this should only be a recommended practice, as there was no corresponding requirement for the crew to conduct such an inspection. Furthermore, a requirement would place enforcement agencies in the position of potentially having to investigate and prosecute an operator or handling agent who, for reasons of practicality, was unable to make such packages available.

5.1.3.2 Several members were opposed to this proposal. It was considered that it would give rise to many practical difficulties and would give rise to conflicts between loading personnel and flight crews. It was pointed out that ULD were usually made up well before departure and sometimes at a location away from the airport. Loading onto the aircraft was often completed before crew arrival at the aircraft and inspection could be difficult thereafter, especially in a Class C underfloor compartment. The optional nature of the requirement could also be confusing for States. It was also pointed out that the flight crew was ultimately responsible for the safety of the aircraft and could always conduct an inspection if they thought it necessary, whether there was a requirement such as this or not.

5.1.3.3 A member emphasized that the objective of such an inspection was the overall furtherance of safety and not to cause conflict with loading personnel. Furthermore this practice was already employed without problems by some operators. He acknowledged that flight crews could always carry out inspections for safety reasons but noted that without a provision such as the one required delays to the aircraft departure might ensure leading to difficulties between flight crews and operator's management.

5.1.3.4 After a thorough discussion of the issues, the meeting agreed by a large majority not to include the proposal.

5.1.4 **Gases in Division 2.3**

5.1.4.1 It was questioned why gases in Division 2.3 were not treated in the same way as toxic material in solid or liquid form; currently they are not listed as an item of CAO dangerous goods which does not have to be accessible to the crew. Consequently, it was proposed that this apparent anomaly be addressed.

5.1.4.2 Some members were not in favour of this proposal. It was suggested that a fire in a Class C cargo compartment could cause gas pressure to rise and gas to be released – eventually finding its way into the rest of the aircraft. The opposing view was that it would be better if flight crews did not have access to cylinders containing Division 2.3 gases and that in any case, the fire suppression system in a Class C compartment should prevent a pressure rise in a cylinder. After further discussion it was decided by a significant margin not to add gases of Division 2.3 to the list of items to which the CAO loading provisions did not apply.

5.1.5 In light of the discussions in paragraph 5.1 of the report on this agenda item, the meeting developed the following recommendation:

Recommendation 5/1 — Amendment to provisions related to the transport of dangerous goods on cargo only aircraft

That provisions related to the transport of dangerous goods on cargo only aircraft in the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) and the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods (*Doc 9481) be amended as indicated in Appendix A to the report on this agenda item.

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel
5.2 Reformatting of the packing instructions

5.2 REFORMATTING OF THE PACKING INSTRUCTIONS

5.2.1 The DGP had been working on reformatting the packing instructions for a number of years and a working group had been pursuing the subject actively since DGP/20. Work had now developed to the point where a final version of the reformatted packing instructions could be presented to the panel for its review. Many panel members and representatives of industry groups had been involved in this effort and report on progress had already been made to DGP-WG07. Based on discussions at DGP-WG07, the working group had revised the proposed new packing instructions, which were presented to this meeting for its review and comment. The meeting made an overall review of the working group’s proposals, together with other working papers on the subject prepared by individual members and advisers.

5.2.2 The working group introduced the proposed reformatted packing instructions (DGP/21-WP/4) as well as some additional comments and amendments (DGP/21-WP/58). The proposed new system used a more rational numbering system for the packing instructions, as well as removing many of the anomalies and inconstancies in the present system. All the packing instructions were, as far as possible, consistent in structure and would also facilitate the allocation of packing instructions to new substances which might be added to the dangerous goods list in the future. The numbering system had been chosen to avoid any confusion between the present system and the new system. Particular points of note included:

a) IP codes for inner packagings had been removed from the packing instructions. This was consistent with the approach taken in the UN Model Regulations. The packing instructions would contain a reference to Part 6;3.2, which would continue to describe the requirements for the different inner packagings;

b) The packing instructions would retain the three numeric numbering scheme with the first number identifying the applicable class. To ensure that there was no confusion between the existing packing instructions and the reformatted packing instructions all new numbers had been applied. The new numbers would also allow the substances and articles to be broken up by passenger aircraft/cargo aircraft, solid/liquid within each class/division; and

c) The requirement for inner liners, which had been introduced for liquid dangerous goods had been removed from all packing instructions except those for substances in Packing Group I. This had been replaced by a requirement that there must be positive means of ensuring that closures remain effective. This requirement was specifically identified in each packing instruction by reference to Part 4;1.1.4. A liner would however still be required where secondary means of closure could not be applied.

5.2.3 The working group noted that the packing instructions in the Supplement to the Technical Instructions would need to be aligned with the new system. Also the major question of a transition to the new system and whether any overlap of existing and new systems should be allowed had not been addressed and needed to be decided by the full panel. The new system, if agreed, would need to be made available to all users as soon as possible to allow the maximum time for electronic system changes and the retraining of personnel.

5.2.4 An adviser presented comments on the proposed reformatted packing instructions (DGP/21-WP/78). While appreciating the considerable and well intended effort put into the packing instruction reformatting exercise, he did not consider the overall benefit of adopting them to be justifiable based on the potentially significant disruption resulting from their implementation. He therefore reiterated the recommendation made at the DGP Working Group of the Whole held in Memphis that the proposed packing instructions not be adopted at DGP/21 and that instead the panel should seek to improve the existing packing instructions with a view to adopting changes at DGP/22.

5.2.5 While he noted that the presentation of the packing instruction requirements was somewhat improved by the proposal, he did not consider the benefits of their adoption to outweigh the considerable costs associated with their implementation. The proposal was in essence a reorganization of the existing packing instruction requirements. While the substantive changes were quite minimal, implementation would be costly and could be disruptive. In addition, there was concern that the

presentation of the packing instruction requirements was in some respects less user friendly and more prone to user error than the manner in which the existing requirements are presented.

5.2.6 Another adviser introduced (DGP/21-WP/59) the results of a detailed study of the proposed reformatted packing instructions undertaken since DGP-WG/07. This had revealed many inconsistencies and possible errors in the proposals, although some of these had been resolved already (DGP/21-WP/58). Of particular concern were the increased list of substances previously allowed for transport but now forbidden under the new proposals; the problem of "in-stock" substances; and the questionable need to indicate packing group in the proposed new packing instructions.

5.2.7 A member introduced a paper on behalf of the working group (DGP/21-WP/65) which responded in detail to most of the points raised by the previous paper (see 5.2.6 above). The working group appreciated the effort taken in analysing and commenting on the reformatted packing instructions. The reformatting exercise had been a lengthy and sometimes difficult process and it was inevitable that some errors or omissions had been made. It was noted that some of the points raised had already been addressed (in DGP/21-WP/58), some had been accepted but for others there were good reasons for the changes proposed. In a very few cases it might be necessary to refer the matter to the UN Sub-Committee for clarification. The adviser quoted in 5.2.6 above noted with appreciation the response to DGP/21-WP/59 but noted (DGP/21-WP/83) that some outstanding issues remained that would need to be addressed.

5.2.8 Some specific items addressed were:

a) **the increased list of forbidden entries in the dangerous goods list.** The working group noted that during the reformatting process, the provisions of the UN Model Regulations were consulted to ensure that where possible the ICAO packing instruction provisions would align with, or be consistent with, those in the Model Regulations. The majority of the UN numbers identified were assigned to P099 in the Model Regulations. P099 requires that only packagings approved by the competent authority for the substance may be used. The working group believed that it was inconsistent for these substances to be generally approved, in air transport, when for other modes of transport competent authority approval was required. The working group was of the opinion that these substances had been adopted into the Technical Instructions by omission rather than by a deliberate decision of the panel. The panel was invited to consider if it was appropriate for these substances to be allowed in air transport, and if so, under what conditions.

b) **removal of the IP codes.** The working group noted that, as identified at the DGP Working Group of the Whole Meeting in Memphis, the IP codes were removed from the packing instructions consistent with the approach taken in the UN Model Regulations and the modal regulations. Selection of an appropriate type of inner packaging based on the allowable category, e.g. steel or aluminium inner packagings where "metal" is indicated, was for the shipper to determine based on the characteristics of the substance.

c) **the question of "in-stock" substances.** The working group considered that this matter would be covered by any transition arrangements that the panel might decide upon.

d) **indication of packing groups.** The working group believed that having the packing group shown in the packing instruction provided an additional check for the users of the packing instructions and there was value in retaining this information.

5.2.9 **General discussion**

5.2.9.1 The meeting held a general discussion on the foregoing papers before considering its further course of action.

5.2.9.2 One member suggested that the meeting should take a decision at this point on whether or not it intended to recommend the reformatting of the packing instructions to the Air Navigation Commission (ANC). He feared that much time would be wasted on further detailed discussions if it were ultimately decided not to proceed. However, it was pointed out that some important details, such as the timing of introducing new packing instructions and transition measures, would have a vital bearing on the final decision and these matters had yet to be discussed.

5.2.9.3 One member noted that numerous inconsistencies had crept into the packing instructions system during its twenty-five year life span, during which time it had never been comprehensively overhauled. He considered the new proposals to be a vast improvement on the existing system, being much more simple and rational. The experience of his administration was that the current system was not well understood by the industry, as evidenced by the very large number of requests for clarification received. Nevertheless it was essential to introduce the new system in such a way that the burden on all concerned was kept to a minimum. Consultation with all parties involved in the industry had been undertaken at each step of the process to ensure that concerns were taken into account as far as possible.

5.2.9.4 An adviser reiterated his view that the reasons for changing the system were not so evident to everyone involved. There was a danger of underestimating the changes required to computer systems or retraining of personnel. He considered a better course of action would be to take advantage of the work done to improve the present system. Moreover the proposed system introduced more redundancy and duplication, which the panel had hitherto been trying to reduce. He also agreed with another adviser that the proposed new provisions concerning closures did not properly form part of the reformatting exercise.

5.2.9.5 A member reminded the meeting that the starting point for this exercise had been to try to remove the anomalies in the present system. However, it had become apparent that these were in many cases inherent in the system and could not be eliminated without changing the system itself. He considered the new system to be clear and rational. He considered that a sufficiently long notice period (such as 3 years) should be sufficient for changing computer programmes and for retraining — which was an ongoing process in any case.

5.2.9.6 Another member noted that resistance to change was a natural phenomenon but considered that most objections to the change had been dealt with. A further member mentioned that the new system was timely and could have beneficial effects on insurance aspects of dangerous goods transport.

5.2.9.7 A member was concerned that the basic reasons for making a change needed to be clearly established. He was reminded that these had been stated several times in the past and included anomalies, internal inconsistencies and irrationalities in the present system, differences from the UN Model

Regulations, and provision of a structure which facilitated the inclusion of new dangerous goods in a logical manner.

5.2.9.8 A member again expressed concern about the removal of the IP codes which shippers were accustomed to using. In response it was reiterated that only the codes (e.g IP1, IP2) were being removed; the shipper's responsibility to ensure that the proper inner packaging was still retained (in 6;3.2). Furthermore, these codes did not appear in the other modal regulations; the characters IP did however, appear both in the Technical Instructions and in the modal regulations in relation to radioactive materials, with a different meaning, which was a potential source of confusion.

5.2.10 **Detailed discussions**

5.2.10.1 Following the general discussions reported in 5.2.9 above, the meeting began a detailed discussion of the points raised in the working papers and in the general discussion.

5.2.10.2 The meeting first discussed those items whose resolution appeared to be necessary before a decision could be made whether or not to endorse the reformatting work. These items were resolved as follows:

a) applicability date and transition arrangements: it was agreed that the new system of the packing instructions should become applicable from 1 January 2011 – effectively giving the industry a "notice" period of over three years. To assist the industry in familiarizing itself with the new system, ICAO was requested to post a comparative list of the present and reformatted packing instructions on the Organization's public website as soon as the ICAO Council had approved the new system. As a transition measure, it was agreed that shipments prepared on or before 31 December 2010 should be accepted for transport until 31 March 2011. This transition arrangement should take care of any "in stock" dangerous goods shipments;

b) on further examination of past proceedings of DGP, it had been noted that a decision to remove the IP codes had already been taken at the meeting of the working group of the whole held in Singapore in 2001, for purposes of alignment with the UN Model Regulations. This decision had never been implemented because it had been intended to include it as part of the packing instructions reformatting task − which had subsequently taken much longer than expected;

c) detailed changes had been made to the proposed amendment to 4;1.1.4 concerning closures which made it generally acceptable.

5.2.10.3 In light of the resolution of these concerns, it was agreed that a decision could be made on the general acceptability of the reformatted packing instructions. The meeting subsequently agreed by an overwhelming majority to accept the introduction of the reformatted packing instructions. It was agreed that many other detailed points remained to be resolved, but these would not affect the overall agreement to introduce the new packing instructions system.

5.2.11 **Recommendation**

5.2.11.1 In light of the foregoing discussions, the meeting developed the following recommendation:

Recommendation 5/2 — Approval of the new packing instruction system

That ICAO approve the introduction of the new packing instruction system shown in Appendix B to the report on this agenda item and that it be:

a) included in the 2009/2010 Edition of the Technical Instructions as a draft for information purposes only;

b) that it be published on the ICAO public website for information purposes only as soon as possible; and

c) that it be introduced for full use in the 2011/2012 Edition of the Technical Instructions.

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel
5.3 Review of provisions for dangerous goods carried by passengers and crew

5.3 **AMENDMENTS TO THE TECHNICAL INSTRUCTIONS PART 8 (DGP/21-WP/12)**

5.3.1 The meeting reviewed the draft amendments to Part 8 of the Technical Instructions to reflect the decisions taken by WG/06 and WG/07.

5.3.2 The meeting agreed to several further detailed changes to the text, especially “Articles used in Dressing and Grooming”. The need for introduction of the sub-titles was questioned. It was recalled that this had been done to make it clear that toilet cleaning substances were not included in the provisions. It was also pointed out that the new arrangement would be interpreted as providing for the maximum allowance under each heading, which was not intended. New text was added to clarify this point. It was also noted that further changes would be required as a result of the work on lithium batteries and fuel cells.

5.3.3 **Recommendation**

5.3.3.1 In light of the foregoing discussions, the meeting developed the following recommendation:

Recommendation 5/3 — Amendment to provisions related to dangerous goods carried by passengers and crew

That provisions related to dangerous goods carried by passengers and crew in the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) be amended as indicated in Appendix C to the report on this agenda item.

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel
5.4 Review of provisions for dangerous goods relating to lithium batteries

5.4 REVIEW OF PROVISIONS FOR DANGEROUS GOODS RELATING TO LITHIUM BATTERIES (DGP/21-WP/19, 20, 21, 23, 42, 43, 47, 52, 56, 71, 77, 79, 80 AND 84, DGP/21-IP/2 AND 5)

5.4.1 **General discussion**

5.4.1.1 As a result of proposals submitted to the DGP Working Group of the Whole in Memphis (30 April to 4 May 2007), the panel had agreed to convene an ad-hoc working group to address lithium battery safety in air transport. The report from that meeting (DGP/21-WP/71) was presented to the panel, the highlights of which are presented below.

5.4.1.2 A summary of three presentations presented to the ad hoc group was provided to the panel. The first offered the results of an analysis which indicated that incidents are mostly caused by external short-circuit, internal short-circuit, in use situations related to charging and discharging, and non-compliance situations. It also identified that there had been progress made by the battery industry in improving designs, manufacturing quality controls, and safety testing methods to detect potential defects. In addition, there was significant work being done by IEEE to enhance safety standards for cells, battery packs, and host devices. The second presentation had informed the group of the various use applications for lithium batteries. Additional discussion on the incidents and possible solutions had also been provided. Difficulties which would result if a proposal to prohibit the transport of lithium batteries by air were adopted and the implications to the industry were outlined. The last presentation provided an overview of the PRBA's role in addressing the safe transport of batteries. The presenter had suggested that lithium battery incidents had largely resulted from non-compliance and therefore advocated collaborative efforts to educate shippers on the regulatory requirements applicable to lithium batteries.

5.4.1.3 Various outreach and enforcement efforts underway had been discussed. The importance of a multi-faceted approach that included outreach, standards development, voluntary industry practices, regulatory amendments, and enforcement was emphasized. The willingness and importance of partnering with industry and governments to leverage resources to maximize the effectiveness of outreach

programmes was also emphasized, and a suggestion was made that ICAO host passenger awareness information based on material already produced by States. It was agreed that the secretary would investigate this option.

5.4.1.4 Working papers relating to the potential review of special provision A45 were then discussed. The first suggested applying a “quasi-regulatory” scheme to lithium battery shipments would be ineffective and would cause difficulties. It was pointed out that the Technical Instructions provide a system for packaging, marking, labelling, documentation, pilot notification, etc. to address dangerous goods in transport and that the current regulatory scheme works as intended. Other members felt this might be too extreme and expressed concern over the cost of eliminating A45 for all packaged lithium battery shipments.

5.4.1.5 It was suggested that recent changes to SP 188 in the 15th Revised Edition of the UN Model Regulations provide enhancements which, if adopted in A45, would significantly improve safety if amendments to differentiate lithium metal and lithium ion descriptions were also made. The group agreed that DGP/21 should evaluate the effectiveness of these provisions before making any additional amendments.

5.4.1.6 A proposal to require training for individuals preparing and transporting lithium battery shipments in accordance with the A45 provisions was discussed. It was identified that many of the reported incidents were the result of non-compliance; therefore, shippers of lithium batteries should be required to complete training commensurate with their responsibilities.

5.4.1.7 A proposal to prohibit the transport of lithium metal batteries as cargo on passenger aircraft (except when installed in equipment under specific conditions) had been discussed. The proposal was based on evaluations of the risk posed by lithium metal batteries in air transport, and the inability of standard aircraft fire suppression systems to extinguish fires involving such batteries was emphasized. Some members expressed concern that the panel would agree that a shipment of lithium metal batteries posed a significant enough hazard to prohibit shipment by passenger aircraft while at the same time be considered excepted under A45 for transport on cargo aircraft.

5.4.1.8 Transport of lithium metal/lithium ion batteries on passenger aircraft was then discussed. The group expressed general support for a proposal to prohibit the transport of lithium metal batteries as cargo on passenger aircraft, except under specific conditions. However, some panel members had stated they would have difficulty if the A45 exception for transport of lithium batteries on cargo aircraft were maintained. A suggestion to greatly reduce the application of A45 for lithium metal batteries was thought could possibly resolve the concern of those panel members and result in their agreement in principle to the prohibition.

5.4.1.9 It was suggested that Special Provision A1 should be added to UN 3090 – Lithium metal batteries to permit the competent authority to approve the transport of these batteries on passenger aircraft to address circumstances where movement on cargo aircraft was not possible. Some members had commented that there should be some specific guidance to competent authorities added to the Supplement to the Technical Instructions to address this issue.

5.4.1.10 A number of airlines had recommended that there should also be provision to permit aircraft spares, such as lithium metal batteries for defibrillators, to be moved on passenger aircraft. It was thought that this could perhaps be addressed through a specific special provision similar to A144 for PBE.

5.4.1.11 Transport of lithium metal/lithium ion batteries on cargo aircraft was then discussed. Concern was expressed over the lack of fire suppression capability on cargo aircraft related to the transport of lithium metal batteries. It had been suggested that that the risk posed in the event of a fire is significant enough to prohibit the transport of lithium metal batteries by all aircraft. Most working group members did not agree and identified the difficulties that would be encountered by a complete prohibition of lithium metal batteries by air.

5.4.1.12 Difficulties with the application of special provision A154 regarding batteries recalled for safety reasons were raised. After some discussion it was decided that the text in A154 was adequate but the problem may be in ensuring proper implementation. Again, the importance of outreach was emphasized and the importance of each panel member communicating the requirement to their respective industries. It was also suggested that guidance could be placed on the ICAO website and this would be investigated by the DGP secretary.

5.4.1.13 The decision by the panel at WG06 to eliminate the passenger exception for lithium batteries containing an aggregate equivalent lithium content of more than 8 grams but not more than 25 grams was revisited. A proposal to increase the lithium battery size was not agreed.

5.4.1.14 Potential recommendations to the UN on revisions to the testing regime and clarifications to the requirements were discussed.

5.4.1.15 Following the presentation of the report, brief introductions to all the working papers presented at the ad hoc working group were made.

5.4.1.16 As an outcome of the recommendation by the ad hoc working group to prohibit lithium metal batteries on passenger aircraft, a proposal in DGP/21-WP/79 for provisions for operators to be able to transport on passenger aircraft lithium metal batteries required for aircraft equipment was made. It was suggested the prohibition could cause significant challenges for those operators, in regions where movement by cargo aircraft was difficult.

5.4.1.17 The issue of permitting lithium batteries in checked baggage had been raised at the ad hoc working group; it was now suggested in DGP/21-WP/77 consideration should be given to recommending these should only be carried in the passenger cabin.

5.4.1.18 In DGP/21-WP/80, the lithium battery industry expressed difficulties with the outcome of the ad hoc working group report and proposed elimination of the exception for lithium metal and cells and batteries shipped on passenger aircraft under Special Provision A45, adoption of new requirements for lithium metal cells and batteries shipped on passenger aircraft and a reduction in the packaging weight limitation for lithium metal cells and batteries and lithium ion cells and batteries shipped under special provision.

5.4.1.19 A proposal in DGP/21-WP/84 to permit a transition period for the new watt-hour marking or alternative marking on lithium batteries was made.

5.4.1.20 DGP/21-IP/2 and IP/5 were presented for the information of the panel. Members were invited to submit comments on the draft outreach material on lithium batteries contained in IP/5.

5.4.2 **Detailed discussion**

5.4.2.1 It was suggested that a decision in principle be made regarding the proposal submitted in DGP/21-WP/19 which, if accepted, would prohibit lithium metal batteries on passenger and cargo aircraft except for small lithium batteries packed in or with equipment. If that proposal was not supported, the panel could then turn to DGP/21-WP/21 which proposed to prohibit the transport of lithium metal batteries on passenger aircraft except when packed with or installed in equipment under special conditions. This was agreed.

5.4.2.2 The presenter of DGP/21-WP/19 reiterated that his proposal was based on the flammability characteristics of lithium metal batteries and of the inability of aircraft suppression systems to be successfully used against a fire involving them. Once ignited, the batteries burn at a temperature above the melting point of aluminium, with a pressure pulse that may cause the cargo liner to fail with a molten lithium spray, that may in return perforate the cargo liner. It was also identified that Halon, the fire suppression agent used on aircraft, had no effect on the progress of the fire. It was unclear how the shipment of large numbers of batteries on a cargo aircraft could be allowed under a special provision, while the same batteries would be completely forbidden from transport as cargo on passenger aircraft. The proposal was not agreed.

5.4.2.3 The panel then discussed the proposal made in DGP/21-WP/43 to change the cargo aircraft weight limitations for lithium batteries contained in equipment. The working paper suggested that there was an inconsistency in relation to the weight restrictions in Packing Instructions 912, 903 and 918, which apply to lithium batteries, that could be resolved with minor changes to Packing Instruction 912. Although there was support for the proposal, some members indicated there was confusion over the distinction between net and gross weight of batteries, packed separately, packed with or contained in equipment. It was therefore decided that further clarification was required.

5.4.2.4 The panel was asked in DGP/21-WP/43 to reconsider a decision made at the Working Group of the Whole Meeting in Beijing (DGP-WG06) to eliminate the passenger exception for lithium batteries containing an aggregate equivalent lithium content of more than 8 grams but not more than 25 grams (i.e. equivalent to a range of 100 to 320 watt hours). The industry listed three existing scenarios in which lithium ion batteries used by passengers and one industry segment exceed 100 watt-hours and are frequently brought onboard passenger aircraft, none of which exceed 160 watt-hours. These are: audio/video equipment carried by camera crews, portable oxygen concentrators which provide critical supplemental oxygen to individuals with medical disabilities, and numerous “universal” lithium ion batteries on the market that are designed to power a variety of portable electronic equipment. It was therefore proposed to replace the proposed deletion by permitting batteries with a watt-hour rating of more than 100 Wh and less than 160 Wh. It was explained that the change to watt-hour as a measure of capacity for lithium ion batteries was consistent with a UN decision and that 160 Wh represented approximately 13 g lithium equivalent.

5.4.2.5 Although there was support for changing grams to watt hour, some members were not in favour of the proposal. It was cited that there had been incidents both on and off aircraft related to lithium ion batteries with only 40 watt hours which resulted in fires. It was suggested it was difficult to justify allowing the carriage of four times that amount. Others felt that it would be preferable to allow the carriage of equipment onboard versus having it placed in checked baggage; if an incident did occur, it could be addressed by the cabin crew. One suggestion was to require operator approval which would help ensure safety; there was some consensus for this. Another proposed that each type of specialized

application should be discussed separately, although there were some members who did not support this proposal.

5.4.2.6 New text which provides examples of packing to prevent short circuit was proposed. Examples included placement in original retail packaging, taping over exposed terminals, or placing each battery in separate plastic bags or protective pouches. It was proposed to clarify that the maximum quantities referred to *installed* batteries in addition to spare batteries.

5.4.2.7 The proposal was agreed subject to the modifications listed in 5.4.2.6 and operator approval for lithium ion batteries with a watt-hour rating of more than 100 Wh but not more than 160 Wh provision in carry-on baggage.

5.4.2.8 The panel then turned to a proposal in DGP/21-WP/77 to add a recommendation in the Instructions that lithium batteries/battery powered equipment permitted for carriage by passengers be placed in carry-on baggage only. It was suggested that following a number of incidents involving these items, it was reasonable for the Instructions to treat them in a similar way to safety matches and lighters. A proposal to require carriage in the cabin had been brought to the attention of the Ad Hoc Working Group on Lithium Batteries. The general view of the ad hoc working group was such a requirement would be problematic for a number of reasons — carry-on baggage is not always carried in the cabin; operator staff would have difficulty in differentiating between lithium and other types of batteries which would not be so restricted; the risk of an incident had to be balanced against the potential delay/disruption at check-in; and finally that compliance would depend on passenger education programmes. It was therefore suggested that it would be more realistic to recommend that lithium batteries permitted for carriage by passengers be carried in the cabin. Some members felt that the proposal would not necessarily achieve anything in that it would be difficult to make passengers aware of the recommendation. Although understanding this argument, others felt that the recommendation would at least provide operators with a basis to develop their own guidance material which would be based on guidance from ICAO and that it provided a greater opportunity for action to be taken in the event of an incident. The proposal was agreed.

5.4.2.9 Because of the complexity of this issue and the differing opinions expressed it was agreed to establish a working group to discuss the matter further outside of the DGP/21 Meeting. The report of this working group is discussed in the following paragraphs.

5.4.3 Final report of the Lithium Battery working group (DGP/21-WPs/19, 20, 21, 23, 79, 80)

5.4.3.1 A report of the Lithium Battery Working Group, which included work undertaken by the Ad Hoc Lithium Battery Working Group held from 4 to 5 October 2007, was presented to the panel.

5.4.3.2 Three main issues were identified:

a) carriage of lithium metal batteries under Special Provision A45;

b) lithium metal batteries on passenger aircraft; and

c) lithium ion batteries subject to Special Provision A45.

5.4.3.3 The meeting was reminded of a proposal which had been presented earlier in the week in DGP/21-WP/19 for the total prohibition of lithium metal batteries on both passenger and cargo aircraft. There was no agreement to a complete ban on the transport of lithium metal batteries.

5.4.3.4 Discussions on the transport of lithium ion batteries were then summarized. At the October meeting of the working group there was considerable debate on the current per package mass of 30 kg for lithium ion batteries meeting the requirements of Special Provision A45. It was reported that a number of those present believed that, at least for passenger aircraft, this seemed to be excessive given the 5 kg gross mass limit for packages containing fully regulated batteries. Based on the results of the discussions in October, a proposal to lower the gross mass for A45 lithium ion batteries to 15 kg had been presented (DGP/21-WP/80). While there was some support for the proposal, a number of members were of the opinion that 15 kg was still excessive and that 5 kg gross, in line with that for the fully regulated batteries on passenger aircraft, was a more appropriate value. It was argued that the changes to A45 (resulting from alignment to UN SP188), provide enhancements in packing, marking, and documentation requirements and that 15 kg was not an unreasonable number but to address the concerns of working group members a reduction of the package mass to 10 kg could be considered. While there had still been concern expressed that a package mass of 10 kg represented a significant number of batteries, the majority of members believed that 10 kg gross mass per package was a reasonable compromise and were prepared to accept that package mass for lithium ion batteries meeting A45.

5.4.3.5 With respect to A45 a number of members believed that the wording had become so detailed it would create confusion for shippers. It was therefore suggested that the applicable provisions in A45 relating to batteries should be transferred to a packing instruction to more clearly detail the requirements. A similar approach would also be taken for batteries under A45 packed with or contained in equipment.

5.4.3.6 The group then returned to the consideration of lithium metal batteries. At the October working group meeting there had been discussion regarding restricting lithium metal batteries to cargo aircraft as proposed in DGP/21-WP/21. A number of members expressed the opinion that while the prohibition had been in effect in one State for almost three years, that State was well served by both cargo aircraft and surface transport, which meant that lithium batteries could still be transported with relative ease. However, this is not the case in other States where fewer cargo aircraft are available and remote areas which are sometimes only accessible by passenger aircraft. Prohibition on the transport of lithium metal batteries would cause significant difficulties in those States. It was therefore suggested that provision in the Technical Instructions to be able to ship these batteries on a passenger aircraft was required.

5.4.3.7 A proposal for lithium metal batteries to be permitted on passenger aircraft with a maximum gross mass per package of 2.5 kg with a metal intermediate packaging was therefore made. A number of members believed that the addition of a metal intermediate packaging provided an additional level of protection in the event of fire and therefore it would be acceptable to permit these packages on passenger aircraft.

5.4.3.8 There were some comments made that there should perhaps be some additional specificity on the metal packaging such as rigid metal packagings and the ability to withstand a specified drop test.

5.4.3.9 It was reported that the proposal for the provision of lithium metal batteries meeting the requirements of Special Provision A45 to still be transported on a cargo aircraft generated the most

discussion. It had been suggested that it was inconsistent to allow “semi-regulated” transport of metal batteries on a cargo aircraft, i.e. without a hazard label, dangerous goods transport document or advice to the Pilot-in-Command, but to require the same batteries to be fully regulated on a passenger aircraft. This was countered by identifying that under A45 these were small batteries, typically no larger than AAA or AA type batteries. The benefits of the enhanced packaging requirements flowing from the UN changes had yet to be realized and the system of allowing these batteries on cargo aircraft only had been in place in one State for almost three years and appeared to be working successfully.

5.4.3.10 One of the major concerns identified was ensuring that these unregulated batteries permitted on cargo aircraft never ended up on passenger aircraft. There had been much discussion on the use of a cargo aircraft only label, but it was suggested that this would be a misuse of the label and would send a confusing message to cargo loading and cargo terminal areas who, for example, are accustomed to seeing hazard labels in conjunction with the CAO label.

5.4.3.11 A number of members believed that a requirement for a metal intermediate packaging with a reduction in the gross mass of the package to 2.5 kg would alleviate the risk of a package inadvertently being loaded on a passenger aircraft because the batteries would at least be packed in the same method as that permitted for the fully regulated metal batteries on a passenger aircraft. It was reported that despite lengthy discussions, the working group was unable to reach a consensus.

5.4.3.12 The panel was therefore invited to adopt one of two proposals to permit:

a) 2.5 kg net mass of batteries in a metal packaging not otherwise subject to the Technical Instructions on cargo or passenger aircraft with additional marking as appropriate; or

b) 2.5 kg gross mass per package, with the batteries contained in strong outer packaging (not necessarily metal) as provided for in A45 and reflected in DGP/21-WP/7.

The proposal in b) was agreed.

5.4.3.13 The panel was then provided with a summary of the changes agreed to by the working group. It was explained that much of revised A45 had been moved into packing instructions related to the commodity involved. It was confirmed that operators would not be expected to verify information pertaining to lithium metal batteries meeting the requirements of special provision A45. It was agreed a consolidated list of amendments reflecting all decisions taken would later be presented to the panel.

5.4.4 Lithium batteries contained in equipment — weight restrictions on cargo aircraft (DGP/21-WP/43)

5.4.4.1 A proposal made in DGP/21-WP/43 to change the cargo aircraft weight limitations for lithium batteries contained in equipment from 5 kg net to 35 kg net was agreed to, following modification of the text to clarify that the lithium batteries may be contained in any piece of equipment.

5.4.5 Training (DGP/21-WP/23)

5.4.5.1 A proposal to amend Special Provision A45 specifying that the provisions of 1;4 (training) be required was discussed. It was noted that in the report of the Lithium Battery Working Group, two options for training had been added to the proposed packing instructions; the first referring to

function-specific training, the second to complete training. Although some members supported the proposal in WP/23, others suggested that it would be too onerous to require the complete training requirements. A proposal to amend the text referring to function-specific training in the proposed packing instructions to add "in accordance with 1;4" was presented.

5.4.6 **Transition for lithium ion battery marking requirement and alternative to watt-hour marking (DGP/21-WP/84)**

5.4.6.1 The panel was reminded of the new requirement introduced in the 15th Edition of the United Nations Model Regulations for certain lithium ion batteries to be marked with the watt-hour rating and the proposed introduction of the requirement in the 2009-2010 Technical Instructions. A proposal for a transition period so that the marking requirement is not applicable to batteries manufactured prior to 1 January 2009, together with an alternative watt-hour marking was made. It was suggested that this would allow for manufacturers to exhaust their supplies of lithium ion batteries in inventory which are not marked in accordance with the new watt-hour marking requirement. Although there was sympathy for the proposal, it was agreed that it was a multi-modal issue and that it should be presented by industry at the UN Sub-Committee meeting in December, 2007.

5.4.7 **Final discussion**

5.4.7.1 A consolidated list of amendments reflecting all decisions taken by the working group was presented to the panel. It was noted that a new handling label had been added together with explanatory text.

5.4.7.2 It was agreed that text pertaining to discharge found in the last paragraph of Packing Instruction 903 should replace the equivalent text in 9X1, 9X2 and 9X3.

5.4.7.3 Although one member noted that the modifications were clear and easy to understand, another expressed concern that the modifications would cause confusion to users. The importance of outreach was reiterated as was the suggestion that passenger awareness information be posted on the ICAO website.

5.4.7.4 A continuation of the discussion on proposed amendments for training ensued (see paragraph 5.4.3). A number of members objected to reference to the complete training requirements in 1;4 whilst recognizing the importance of proper instruction being given to those preparing or offering batteries for transport. A compromise proposal reflecting the necessity of acquiring instruction commensurate with experience was proposed and agreed to.

5.4.7.5 Discussion on the colour of the hatching on the handling label ensued. It was argued that since these packages will be dangerous goods, although not subject to all of the requirements of the Technical Instructions, they should be clearly recognizable. It was agreed that the label should contain red hatching on a contrasting background.

5.4.7.6 Some panel members felt that the proposed dimensions of the label were too large and that a smaller label would suffice. Others argued that the dimensions would dictate the size of the package and that since this would be the only label on the package, a smaller size could not be justified. It was agreed to maintain the dimensions as presented (120 × 110 mm), i.e. similar to that for the cargo aircraft only handling label.

5.4.7.7 The consolidated list of amendments relating to lithium batteries as modified by the discussion was agreed by an overwhelming majority.

5.4.8 **Recommendation**

5.4.8.1 In light of the foregoing discussions, the meeting developed the following recommendation:

Recommendation 5/4 — Amendment to lithium batteries provisions

That provisions related to lithium batteries in the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) be amended as indicated in Appendix D to the report on this agenda item.

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel

5.5 Review of amendment process for the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284)

5.5 REVIEW OF AMENDMENT PROCESS FOR THE TECHNICAL INSTRUCTIONS (DGP/21-WP/85)

5.5.1 It was reported that the Air Navigation Commission (ANC), when reviewing the request from the DGP for proposed amendments to the Technical Instructions regarding lithium batteries and radioactive material, commented on the issue of an out-of-cycle amendment to the Instructions. The time-consuming nature of such amendments was noted and it was suggested consideration should be given to an alternative method of processing amendments. Recognizing that the amendment process for the Technical Instructions had been specifically developed by the ANC and Council to cater for the special status of the Instructions given it by paragraph 2.2.1 of Annex 18, it was suggested an analysis of the differing types of amendments was required before a recommendation could be made to the Commission. It was suggested that the analysis should include critical safety issues requiring immediate attention; amendments required to facilitate the work of other panels (e.g AVSECP) and urgent amendments required when the Commission and/or Council are not in session. The meeting agreed that this was a complex issue and should be processed as a new task through the ANIP process.

5.6 MISCELLANEOUS

5.6.1 Air Navigation Integration Programme (ANIP)

5.6.1.1 A presentation was given by the Technical Programme Support Officer of ICAO's Air Navigation Bureau, on the new Air Navigation Integration Programme (ANIP). ANIP was developed in support of ICAO's performance framework which ensures that measurable outcomes are achieved through the most efficient use of resources. He explained that ANC panels will have two primary interfaces to the ANIP:

a) delivering outputs in the AN programme which they have been tasked to produce (e.g. draft amendments to Annexes); and

b) submitting new, unforeseen or emerging issues to the ANIP through an "ANIP Issue Form".

5.6.1.2 The panel was further informed that "ANIP Issues" would be processed in a transparent and objective manner and result in one of the following outcomes:

a) the Commission agreeing to the creation of new programmes or amendments to existing ones and cuts to other work if necessary;

b) the Secretariat creating new tasks or amending existing ones;

c) the realization that the work is covered by existing programmes/tasks and requires no further action ; or

d) rejection (with reasons).

5.6.1.3 The panel was also ensured that both the status of, and final decisions taken related to issues they raise, will be transparent.

5.6.1.4 It was uggested that given the current level of resources committed by ICAO to the dangerous goods programme and the current financial situation of the Organization, it is not expected that ANIP will result in a significant change in the resources available to the DG programme. There may, however, be a shift in focus of the work as more data on implementation is gathered and analyzed.

5.6.2 Competency framework proposal for inspectors of dangerous goods by air (DGP/21-WP/69)

5.6.2.1 The panel was briefed on the outcome of a training group which had been established since DGP/20. A number of potential performance gaps related to dangerous goods had been identified following safety oversight audits, and it was suggested that the gaps may be due to the lack of competency standards for personnel involved in the transport of dangerous goods. Although Part 1, Chapter 4 of the Technical Instructions clearly outlines the knowledge that various categories of dangerous goods personnel should have to carry out their duties, it was recognized that there was a lack of guidance in determining how well dangerous goods personnel perform their specific function.

5.6.2.2 It was reported that the initial intention of the working group was to begin the establishment of competencies for dangerous goods inspectors. However, it had quickly become evident that inspection scope and targets had to be established before competency standards could be identified. Once the inspection scope and targets were determined, the competency framework and the elements and functions that an inspection system should encompass could be developed. Once finalized, it was felt that the most likely place to house guidance material would be in the Supplement to the Technical Instructions.

5.6.2.3 It was recommended that a training working group be established with the intent of:

a) defining the scope and the areas an inspection systems should include – targets of the systems to be inspected;

b) developing a competency-framework for the most safety-critical functions;

c) applying the ICAO competency-based approach with a view to providing States with guidance on training and assessment for these functions;

d) ensuring that the scope, the competency framework and the guidance material (being developed) is both practical and applicable, whilst building in a sufficient degree of flexibility for all Contracting States; and

e) establishing a timeline for the development of guidance material.

5.6.2.4 It was suggested that some relevant material already existed in some States and that this should be provided to the panel. Subject to approval by the ANIP process, the panel agreed that a working group by correspondence should be established followed by a working group in Montreal and further discussion at the next Working Group of the Whole meeting.

5.6.3 **Layout of the Technical Instructions (DGP/21-WP/49)**

5.6.3.1 A proposal was made at the Working Group of the Whole meeting in Memphis (DGP-WG07) to amend the paragraph numbering system in the Technical Instructions to include the part number. Some member believed that this approach would be more user friendly and noted this was more closely aligned to the UN Recommendations although another member felt that the system was overly cumbersome, noting it was not just a case of renumbering the Technical Instructions but rather a much wider exercise when all national regulations and training material containing references to specific paragraphs were taken into account.

5.6.3.2 It was explained that the ICAO standard style was to have as short and simplistic a numbering system as possible. It was further explained that although the proposed renumbering was feasible, due to the reorganization of the Secretariat which would likely result in reduced staff in the language sections, no change should be made at this time.

5.6.3.3 The proposal was noted and it was agreed an update would be provided during the next biennium.

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APPENDIX A

PROPOSED AMENDMENTS RELATED TO PRINCIPLES GOVERNING THE TRANSPORT OF DANGEROUS GOODS ON CARGO ONLY AIRCRAFT

TECHNICAL INSTRUCTIONS FOR THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

. . .

Part 7

OPERATOR'S RESPONSIBILITIES

. . .

Chapter 2

STORAGE AND LOADING

. . .

2.4 LOADING AND SECURING OF DANGEROUS GOODS

2.4.1 Loading on cargo aircraft

2.4.1.1 Packages or overpacks of dangerous goods bearing the "Cargo aircraft only" label must be loaded on a cargo aircraft ~~in such a manner that a crew member or other authorized person can see, handle and, where size and mass permit, separate such packages or overpacks from other cargo in flight. Hazard warning labels and the "Cargo aircraft only" label must be visible.~~ accordance with one of the following provisions:

a) in a Class C aircraft cargo compartment; or

b) in a unit load device equipped with a fire detection/suppression system equivalent to that required by the certification requirements of a Class C aircraft cargo compartment as determined by the appropriate national authority; or

c) in such a manner that in the event of an emergency involving such packages or overpacks, a crew member or other authorized person can access those packages or overpacks, and can handle and, where size and mass permit, separate such packages or overpacks from other cargo.

2.4.1.2 When requested, packages or overpacks bearing the "Cargo aircraft only" label should be made available to the crew for inspection prior to departure.

2.4.1.3 ~~This provision~~ The requirements of 2.4.1.1 and 2.4.1.2 do~~es~~ not apply to:

a) gases of division 2.3;

b) substances of Class 3, Packing Group III, without a subsidiary risk;

~~b~~c) toxic and infectious substances (Class 6);

~~c~~d) radioactive material (Class 7);

~~d~~e) miscellaneous dangerous goods (Class 9).

Note — When transporting goods in a non-pressurized cargo hold, there will be a large pressure differential at high altitudes. Packages that are filled at a normal atmospheric pressure may not be capable of withstanding this pressure differential. Confirmation of the suitability of the packaging from the shipper may be required.

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EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS

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2.5 DANGEROUS GOODS ON CARGO AIRCRAFT

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Incidents in the main deck cargo compartment. Dangerous goods carried on the main deck of a cargo aircraft fall into two broad categories:

a) those which are permitted either for carriage on a passenger aircraft, or which are cargo aircraft only (CAO) dangerous goods or quantities not subject to additional loading requirements applicable to other CAO dangerous goods. Depending on circumstances (position on main deck, types of unit load devices (ULDs) used, etc), these may be completely inaccessible.

b) ~~those which are required to be accessible (the full requirements for accessibility are set out in the Technical Instructions, Part 7, Chapter 2) and those which are not, but which may still be cargo aircraft only (CAO) goods or quantities.~~ those which may only be carried on a cargo aircraft and are subject to additional loading requirements which are set out in Part 7;2.4.1 of the Technical Instructions. These ~~D~~dangerous goods may be required to be accessible which means they must be loaded so that ~~they~~ the crew can ~~be seen,~~ handle~~d~~ and, where size and mass permit, separate~~d~~ such packages or overpacks from other cargo. ~~However, other dangerous goods on the main deck may, depending on circumstances (position on main deck, types of unit load devices (ULDs) used, etc.), be completely inaccessible.~~ In the event of an incident ~~occurring~~ involving these dangerous goods, an assessment will have to be made of the practicality of attempting direct physical intervention. In any event, both for accessible and non-accessible dangerous goods, standard aircraft emergency procedures should always be followed.

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APPENDIX B

REFORMATTED PACKING INSTRUCTIONS

Class 3 Packing Instructions

Packing Instructions Y340 – Y344

Limited Quantities Only

Passenger and Cargo Aircraft

General Requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8 c, 1.1.8 e and 1.1.16 do not apply) including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

Limited Quantity Requirements

- Part 3 Chapter 4 requirements must be met including:
  - the capability of the package to pass a drop test of 1.2m;
  - a 24 hour stacking test;
  - inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6).

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y340	II	Glass	**0.5L**	**0.5L**	**30kg**	**NO**
		Plastic	**0.5L**			
		Metal	**0.5L**			
Y341	II	Glass	**0.5L**	**1.0L**		**NO**
		Plastic	**0.5L**			
		Metal	**0.5L**			
Y342	III	Glass	**1.0L**	**1.0L**		**NO**
		Plastic	**1.0L**			
		Metal	**1.0L**			
Y343	III	Glass	**1.0L**	**2.0L**		**NO**
		Plastic	**1.0L**			
		Metal	**1.0L**			
Y344	III	Glass	**2.5L**	**10.0L**		**NO**
		Plastic	**5.0L**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastic	Plywood	
Plywood	Other Metal	
Reconstituted wood	Steel	
Steel		

Packing Instructions 350 – 355

Passenger Aircraft

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
350	I	Glass	**0.5L**	**0.5L**	**NO**
		Plastic	**Forbidden**		
		Metal	**0.5L**		
351	I	Glass	**0.5L**	**1L**	**NO**
		Plastic	**Forbidden**		
		Metal	**1.0L**		
352	II	Glass	**1.0L**	**1L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
353	II	Glass	**1.0L**	**5L**	**NO**
		Plastic	**5.0L**		
		Metal	**5.0L**		
354	III	Glass	**2.5L**	**5L**	**5L**
		Plastic	**5.0L**		
		Metal	**5.0L**		
355	III	Glass	**2.5L**	**60L**	**60L**
		Plastic	**10.0L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings.

Packing Group III

- Packagings must meet the PG II performance standards if the substance has a class 8 subsidiary risk.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastic (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastic (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards if the substance has a class 8 subsidiary risk.

SINGLE PACKAGINGS FOR PGIII (354 or 355)			
Composites	**Cylinders**	**Drums**	**Jerricans**
ALL (3.1.18)	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instructions 360 – 366

Cargo Aircraft Only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
360	I	Glass	**1.0L**	**2.5L**	**2.5L**
		Plastic	**Forbidden**		
		Metal	**2.5L**		
361	I	Glass	**1.0L**	**30L**	**30L**
		Plastic	**Forbidden**		
		Metal	**5.0L**		
362	II	Glass	**1.0L**	**5L**	**5L**
		Plastic	**1.0L**		
		Metal	**1.0L**		
363	II	Glass	**2.5L**	**5L**	**5L**
		Plastic	**2.5L**		
		Metal	**5.0L**		
364	II	Glass	**2.5L**	**60L**	**60L**
		Plastic	**5.0L**		
		Metal	**10.0L**		
365	III	Glass	**5.0L**	**60L**	**60L**
		Plastic	**10.0L**		
		Metal	**25.0L**		
366	III	Glass	**5.0L**	**220L**	**220L**
		Plastic	**10.0L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings.

Packing Group III

- Packagings must meet the PG II performance standards if the substance has a class 8 subsidiary risk.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Other Metal (3N2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Plastics (3H2)
Plastic (4H1, 4H2)	Plywood (1D)	Steel (3A2)
Plywood (4D)	Plastic (1H2)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards if the substance has a class 8 subsidiary risk.

SINGLE PACKAGINGS PG I

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1)
		Other metal (1N1)	Steel (3A1)
		Steel (1A1)	

SINGLE PACKAGINGS PG II

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1)
		Other metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1)
		Steel (1A1)	

SINGLE PACKAGINGS (PG III only)

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instruction 370

Passenger and Cargo Aircraft For UN3269 (PGII or III) only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Polyester resin kits	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle) For LIQUID activator**	**Inner packaging quantity (per receptacle) For SOLID activator**	**Total Quantity Per Package**	
Activator (Organic peroxide)	Plastic*	**125 mL**	**500 g**	**5kg**	**NO**
	Metal*	**125 mL**	**500 g**		
Base material Class 3 PG II or III	Glass	**1.0 L**	**1.0 L**		
	Plastic	**5.0 L**	**5.0 L**		

** Including tubes*

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of leakage (See 4: 1.1.7).

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instruction Y370

Limited Quantities for UN3269 (PGII or III) only

Passenger and Cargo Aircraft

General Requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8 c, 1.1.8 e and 1.1.16 do not apply) including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

Limited Quantity Requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test;
- inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6).

COMBINATION PACKAGINGS						**SINGLE PACKAGINGS**
Polyester resin kits	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle) LIQUID**	**Inner packaging quantity (per receptacle) SOLID**	**Total Quantity Per Package**	**Total gross mass per package**	
Activator (Organic peroxide)	Plastic*	**30 mL**	**100 g**	**1kg**	**30kg**	**NO**
	Metal *	**30 mL**	**100 g**			
Base material Class 3 PG II or III	Glass	**1.0 L**	**1.0 L**			
	Plastic	**1.0 L**	**1.0 L**			
	Metal	**1.0 L**	**1.0 L**			

** Including tubes*

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of leakage **(See 4: 1.1.7).**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 371

Passenger and Cargo Aircraft For UN3473 only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	Total quantity for Passenger Aircraft	Total quantity for Cargo Aircraft Only	SINGLE PACKAGINGS
UN3473 Fuel cell Cartridges	**5.0L**	**60.0L**	**NO**

Fuel cell cartridges contained in equipment or packed with equipment must be packed in strong outer packagings.

If fuel cell cartridges are shipped as an integral component of assembled equipment, they must be securely installed and protected against contact with other articles so as to prevent short circuits, and the entire system must be protected against inadvertent operation.

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

ADDITIONAL PACKING REQUIREMENTS

Fuel cell cartridges containing flammable liquid must be packed in outer packagings conforming to Packing Group II performance standards. The fuel cells must be incapable of short-circuiting and be securely cushioned in the packagings.

Outer Packaging

Boxes	Drums	Jerricans
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Plastics (1H2)	
Plastics (4H1, 4H2)	Plywood drums (1D)	
Plywood (4D)		
Reconstituted wood (4F)		

Packing Instruction 372

Passenger and Cargo Aircraft for UN 1204 and UN3064 only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package PASSENGER**		**Total Quantity Per Package CARGO**	
UN1204 Nitroglycerin solution in alcohol with not more than 1% Nitroglycerin PGII	Glass	**1.0L**	**5L**		**60L**	**NO**
	Plastic	**1.0L**				
	Metal	**1.0L**				

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

For UN1204 and UN3064

- Inner packagings must be completely surrounded with absorbent cushioning material of sufficient quantity to absorb the entire liquid content.

For UN3064

- Wooden boxes (4C1, 4C2, 4D or 4F) must be used as the outer packaging and must be completely lined with a suitable material impervious to water, alcohol and nitroglycerin.

Packing Instruction 373

Cargo Aircraft Only For UN3165

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

UN3165 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.

Note: This Packing instruction is the same as the UN packing instruction P301

Packing Instruction 374

Passenger and Cargo Aircraft for UN 1228 PGII and III only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGINGS					SINGLE PACKAGINGS Cargo Aircraft only
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle) PASSENGER**	**Inner packaging quantity (per receptacle) CARGO**	**Total Quantity Per Package PASSENGER**	**Total Quantity Per Package CARGO**	
UN1228 Mercaptans Liquid, Flammable, toxic, n.o.s PGII	Glass	**Forbidden**	**5.0L**	**Forbidden**	**60L**	**60L**
	Plastic		**5.0L**			
	Metal		**5.0L**			
UN1228 Mercaptans liquid flammable toxic, n.o.s PGIII	Glass	**1.0L**	**5.0L**	**5L**	**220L**	**220L**
	Plastic	**1.0L**	**5.0L**			
	Metal	**1.0L**	**5.0L**			

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Glass inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

SINGLE PACKAGINGS FOR CARGO AIRCRAFT ONLY

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instruction Y374

Limited Quantities for UN1228 PGIII only

Passenger and Cargo Aircraft

General Requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8 c, 1.1.8 e and 1.1.16 do not apply) including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

Limited Quantity Requirements

- Part 3 Chapter 4 requirements must be met including:
  - the capability of the package to pass a drop test of 1.2m;
  - a 24 hour stacking test;
  - Inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6)

COMBINATION PACKAGINGS						**SINGLE PACKAGINGS**
	Packing group	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
UN1228 Mercaptans liquid flammable toxic, n.o.s PGIII	III	Glass	**0.5L**	**1L**	**30kg**	**NO**
		Plastic	**0.5L**			
		Metal	**0.5L**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Class 4.1 Packing Instructions

Packing Instructions Y440 – Y443

Limited Quantities - Solids

Passenger and cargo aircraft

General requirements

Part 4 Chapter 1requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y440	II	Glass	**0.5kg**	**1kg**	**30kg**	**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Plastic bag	**0.5kg**			
Y441	II	Glass	**0.5kg**	**5kg**		**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Plastic bag	**0.5kg**			
Y442	III	Glass	**1.0kg**	**5kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			
		Plastic bag	**1.0kg**			
Y443	III	Glass	**1.0kg**	**10kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	Drums	Jerricans
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastic
Natural wood	Plastic	Steel
Plastic	Plywood	
Plywood	Other Metal	
Reconstituted wood	Steel	
Steel		

Packing Instructions 450 - 451

Passenger - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN** *(only permitted for wetted explosives see P464)*			
450	II	Glass	**1.0kg**	**15kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Plastic bag	**1.0kg**		
451	III	Glass	**5.0kg**	**25kg**	**NO**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastic (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastic (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

Packing Instructions 453 - 454

Cargo Aircraft - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN** *(only permitted for wetted explosives see P464)*			
453	II	Glass	**2.5kg**	**50kg**	**50 kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Plastic bag	**2.5kg**		
454	III	Glass	**5.0kg**	**100kg**	**100kg**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.
- Fibre, wood and plywood single packagings must be fitted with a suitable liner

SINGLE PACKAGINGS				
Boxes	**Composites**	**Cylinders**	**Drums**	**Jerricans**
Steel (4A)	ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Aluminium (4B)			Fibre (1G)	Plastic (3H1, 3H2)
Natural wood(4C2)			Other Metal (1N1, 1N2)	Steel (3A1, 3A2)
Plywood (4D)			Plastic (1H1, 1H2)	
Reconstituted wood (4F)			Plywood (1D)	
Fibreboard (4G)			Steel (1A1, 1A2)	
Plastics (4H2)				

Packing Instruction 456

Passenger and Cargo Wetted explosives PGI Solids

General requirements

Part 4 Chapter 1requirements must be met including

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package PASSENGER**	**Total Quantity Per Package CARGO**	
UN1354, UN 1355, UN1356, UN3364, UN3365, UN3366, UN3367, UN3368, UN3369, UN3370	Glass	**0.5kg**	**0.5kg**	**0.5kg**	**NO**
	Plastic	**0.5kg**			
	Metal	**0.5kg**			
	Plastic bag	**0.5kg**			
UN1336, UN1337, UN1357,	Glass	**0.5kg**	**1kg**	**15kg**	**NO**
	Plastic	**0.5kg**			
	Metal	**0.5kg**			
	Plastic bag	**0.5kg**			
UN1310 ***See Note 1 below***	Glass	**0.5kg**	**0.5kg**	**0.5kg**	**NO**
	Plastic	**0.5kg**			
	Metal	**0.5kg**			
	Plastic bag	**0.5kg**			
UN1349 ***See Note 1 below***	Glass	**0.5kg**	**Forbidden**	**15kg**	**NO**
	Plastic	**0.5kg**			
	Metal	**0.5kg**			
	Plastic bag	**0.5kg**			
UN1320, UN1321, UN1322, UN1344, UN1348, UN1517, UN3317 ***See Note 1 below***	Glass	**0.5kg**	**1kg**	**15kg**	**NO**
	Plastic	**0.5kg**			
	Metal	**0.5kg**			
	Plastic bag	**0.5kg**			
UN 1571, UN2852	Glass	**0.25kg**	**Forbidden**	**0.5kg**	**NO**

Note 1 These substances must be in lead free packagings

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must be designed and constructed to prevent the loss of water or alcohol content or the content of the phlegmatizer.
- 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).
- The type of packaging and maximum permitted quantity per packaging are limited by the provisions of Part 2;1.5.2 and may be less than the limits shown above.
- 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 in sufficient quantity to absorb the contents in the event of leakage.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Other Metal (3N2)
Natural wood (4C1, 4C2)	Other Metal (1N2)	Plastics (3H2)
Plastics (4H1, 4H2)	Plastics (1H2)	Steel (3A2)
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

Packing Instruction 457

Passenger for UN2555, 2556 and 2557 solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS				SINGLE PACKAGINGS
	Inner Packaging (see 6;3.2)	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
UN2555 Nitrocellulose with water	Glass	**1.0kg**	**15kg**	**NO**
	Plastic	**1.0kg**		
	Metal	**1.0kg**		
	Plastic bag	**1.0kg**		
UN2556 Nitrocellulose with alcohol	Glass	**1.0kg**	**1kg**	**NO**
	Plastic	**1.0kg**		
	Metal	**1.0kg**		
	Plastic bag	**1.0kg**		
UN2557 Nitrocellulose with or without plasticizer	Glass	**1.0kg**	**1kg**	**NO**
	Plastic	**1.0kg**		
	Metal	**1.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must be designed and constructed to prevent the loss of water or alcohol content or the content of the phlegmatizer.
- 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).

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Other Metal (3N2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Plastics (3H2)
Plastics (4H1, 4H2)	Plastics (1H2)	Steel (3A2)
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instruction 458

Cargo aircraft only For UN2555, 2556, and 2557 - solids

General requirements

Part 4 Chapter 1requirements must be met including

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4

	COMBINATION PACKAGINGS			SINGLE PACKAGINGS
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
UN2555 Nitrocellulose with water	Glass	**1.0kg**	**50kg**	**50kg**
	Plastic	**1.0kg**		
	Metal	**1.0kg**		
	Plastic bag	**1.0kg**		
UN2556 Nitrocellulose with alcohol	Glass	**1.0kg**	**15kg**	**15kg**
	Plastic	**1.0kg**		
	Metal	**1.0kg**		
	Plastic bag	**1.0kg**		
UN2557 Nitrocellulose with or without plasticizer	Glass	**1.0kg**	**15kg**	**15kg**
	Plastic	**1.0kg**		
	Metal	**1.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must be designed and constructed to prevent the loss of water or alcohol content or the content of the phlegmatizer;
- 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).

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Other Metal (3N2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Plastics (3H2)
Plastics (4H1, 4H2)	Plastics (1H2)	Steel (3A2)
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)		
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

- Packagings must be designed and constructed to prevent the loss of water or alcohol content or the content of the phlegmatizer
- 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).

SINGLE PACKAGINGS

Boxes	Composites	Cylinders	Drums	Jerricans
Steel (4A)	ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Aluminium (4B)			Fibre (1G)	Plastic (3H1, 3H2)
Natural wood (4C1, 4C2)			Other Metal (1N1, 1N2)	Steel (3A1, 3A2)
Plywood (4D)			Plastic (1H1, 1H2)	
Reconstituted wood (4F)			Plywood (1D)	
Fibreboard (4G)			Steel (1A1, 1A2)	
Plastics (4H2)				

Packing Instruction 459

Passenger and Cargo for UN 1324

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING		SINGLE PACKAGINGS
	Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	
UN1324 Films, nitrocellulose base	**25kg**	**100kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

♦ Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre[1] (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

[1] **These packagings are permitted only for a maximum of 600M of film**

Packing Instruction Y459

Limited Quantities for UN1324

Passenger and cargo aircraft

General requirements

Part 4 Chapter 1requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4 must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

COMBINATION PACKAGING			
	Total Quantity Per Package	**Total gross mass per package**	**SINGLE PACKAGINGS**
UN1324 Films, nitrocellulose base	**10kg**	**30kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS

- Each reel must be placed in a tightly closed metal can or strong cardboard or fibreboard inner packaging with cover held in place by adhesive tape or paper.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 460

Passenger and Cargo for UN 1944 and 1945

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
		Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN1944 Matches Safety **UN1945 Matches, wax vesta**	**Packaging as set out in the table below may be used**	**25kg**	**100kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Matches, safety (book card or strike on box) must be of a type that will not ignite spontaneously under normal conditions of air transport and can be readily ignited by friction only by striking on the manufacturer's box, book or card.
- Matches must be tightly packed to prevent movement within the package and ignition by rubbing against an adjoining box, book or card.
- Matches must be securely wrapped in paper or foil or packed in tightly closed inner packagings.
- No more than 50 books of matches may be packed in one inner packaging.
- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instructions Y460

Limited Quantities

Passenger and Cargo for UN 1944 and 1945

General requirements

Part 4 Chapter 1requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

	COMBINATION PACKAGING			
		Total Quantity Per Package	**Total gross mass per package**	**SINGLE PACKAGINGS**
UN1944 Matches Safety **UN1945**	**Packaging as set out in the table below may be used**	**10kg**	**30kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS

- Matches, safety (book card or strike on box) must be of a type that will not ignite spontaneously under normal conditions of air transport and can be readily ignited by friction only by striking on the manufacturer's box, book or card.
- Matches must be tightly packed to prevent movement within the package and ignition by rubbing against an adjoining box, book or card.
- Matches must be securely wrapped in paper or foil or packed in tightly closed inner packagings.
- No more than 50 books of matches may be packed in one inner packaging.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 461

Passenger and Cargo for UN 2000

The general requirements of Part 4 Chapter 1 must be met

			Total Quantity Per Package PASSENGER	Total Quantity Per Package CARGO
	UN2000 Celluloid		**25kg**	**100kg**

Packing Instruction 462

Passenger and Cargo for UN 3241 Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING					
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle**	**Total Quantity Per Package PASSENGER**	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS PASSENGER**	**SINGLE PACKAGINGS CARGO**
UN3241 2-Bromo-2-Nitropropane-1, 3-diol	**Glass**	**0.5kg**	**25kg**	**50kg**	**25kg**	**50kg**
	Plastic	**1.0kg**				
	Plastic bag	**1.0kg**				

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

- Packagings must meet the PG II performance standards.

SINGLE PACKAGINGS

Composites	Drums	Jerricans
ALL	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
	Other Metal (1N1, 1N2)	Plastic (3H1, 3H2)
	Plastic (1H1, 1H2)	Steel (3A1, 3A2)
	Steel (1A1, 1A2)	

Packing Instruction Y462

Limited Quantities

Passenger and Cargo for UN3241

General requirements

Part 4 Chapter 1requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

	COMBINATION PACKAGING				
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle**	**Total Quantity Per Package**	**Total gross mass per package**	**SINGLE PACKAGINGS**
UN3241 2-Bromo-2-Nitropropane -1, 3-diol	**Glass**	**0.5kg**	**5kg**	**30kg**	**NO**
	Plastic	**0.5kg**			
	Plastic bag	**0.5kg**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 463

Passenger and Cargo for UN 3270

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
	Packaging conditions	**Total Quantity Per Package PASSENGER**	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN3270 Nitrocellulose membrane filters	**Any packaging from the table below provided that explosion is not possible by reason of increased internal pressure**	**1kg**	**15kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instruction Y463

Limited Quantities

Passenger and Cargo for UN3270

General requirements

Part 4 Chapter 1requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

	COMBINATION PACKAGING			
	Packaging conditions	**Total Quantity Per Package**	**Total gross mass per package**	**SINGLE PACKAGINGS**
UN3270 Nitrocellulose membrane filters	**Any packaging from the table below provided that explosion is not possible by reason of increased internal pressure**	**1kg**	**30kg**	**NO**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 464

Passenger and Cargo Self Reactive Substances – Solids and liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle) PASSENGER**	**Total Quantity Per Package PASSENGER**	**Inner packaging quantity (per receptacle) CARGO**	**Total Quantity Per Package CARGO**	
LIQUIDS						
UN3223	Plastic	0.5L	**5L**	1.0L	**10L**	**NO**
UN3225	Plastic	0.5L	**5L**	1.0L	**10L**	
UN3227	Plastic	1.0L	**10L**	2.5L	**25L**	
UN3229	Plastic	1.0L	**10L**	2.5L	**25L**	
SOLIDS						**NO**
UN3224	Plastic	0.5kg	**5kg**	1.0kg	**10kg**	
UN3226	Plastic	0.5kg	**5kg**	1.0kg	**10kg**	
UN3228	Plastic	1.0kg	**10kg**	2.5kg	**25kg**	

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Cushioning materials must not be readily combustible;
- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Plastics (1H2)	Steel (3A2)
Plastics (4H1, 4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Class 4.2 Packing Instructions

Packing Instructions 466 - 467

Passenger - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN**			
466	II	Glass	**1.0L**	**1L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
467	III	Glass	**2.5L**	**5L**	**5L**
		Plastic	**2.5L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

SINGLE PACKAGINGS FOR PGIII (467only)

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1,)
		Other metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1,)
		Steel (1A1)	

Packing Instructions 468 - 469

Cargo Aircraft Only - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN**			
468	II	Glass	**2.5L**	**5L**	**NO**
		Plastic	**2.5L**		
		Metal	**5.0L**		
469	III	Glass	**5.0L**	**60L**	**60L**
		Plastic	**5.0L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

SINGLE PACKAGINGS for PGIII (469 only)

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1)
		Other metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1)
		Steel (1A1)	

Packing Instructions 470 - 473

Passenger - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN**			
470	II	Glass	**1.0kg**	**15kg**	**NO**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
471	II	Glass	**1.0kg**	**15kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Plastic bag	**1.0kg**		
472	III	Glass	**2.5kg**	**25kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**5.0kg**		
473	III	Glass	**5.0kg**	**25kg**	**NO**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

Packing Instruction 474 - 475

Cargo Aircraft Only - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN**			
474	II	Glass	**2.5kg**	**50kg**	**50kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Plastic bag	**2.5kg**		
475	III	Glass	**5.0kg**	**100kg**	**100kg**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

SINGLE PACKAGINGS				
Boxes	**Composites**	**Cylinders**	**Drums**	**Jerricans**
Steel (4A)	ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Aluminium (4B)			Other metal (1N1, 1N2)	Plastic (3H1, 3H2)
Natural wood(4C2)			Plastic (1H1, 1H2)	Steel (3A1, 3A2)
Plywood (4D)			Steel (1A1, 1A2)	
Reconstituted wood (4F)				
Fibreboard (4G)				
Plastics (4H2)				

Packing Instruction 476

Passenger and Cargo for UN 1362 - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

Closures

- Closures must meet the requirements of 4: 1.1.4

	COMBINATION PACKAGING			
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle**	**Total Quantity Per Package**	**SINGLE PACKAGINGS**
UN1362 Carbon, activated	**Plastic**	**0.1kg**	**0.5kg**	**NO**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Steel (4A)	Steel (1A2)	Steel (3A2)

Packing Instruction 477

Passenger and Cargo - UN1378 and UN2881 - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGINGS					SINGLE PACKAGINGS
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle) PASSENGER**	**Total Quantity Per Package PASSENGER**	**Inner packaging quantity (per receptacle) CARGO**	**Total Quantity Per Package CARGO**	
UN1378 Metal catalyst, wetted PGII	Glass	**Forbidden**		**1.0kg**	**50kg**	**NO**
	Metal			**1.0kg**		
UN2881 Metal catalyst, dry PGI		**Forbidden**		**Forbidden**		**NO**
UN2881 Metal catalyst, dry PGII	Glass	**Forbidden**		**1.0kg**	**50kg**	**NO**
	Metal			**1.0kg**		
UN2881 Metal catalyst, dry PGIII	Glass	**1.0kg**	**25kg**	**2.5kg**	**100kg**	**100kg**
	Metal	**1.0kg**	**25kg**	**5.0kg**	**100kg**	**100kg**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

SINGLE PACKAGINGS for PGIII only

Drums	Jerricans
Steel (1A1, 1A2)	Steel (3A1, 3A2)

Class 4.3 Packing Instructions

Packing Instruction Y445 – Y448

Limited Quantities

Passenger and Cargo -Solids

General requirements

Part 4 Chapter 1requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y445	II	Glass	**0.5kg**	**1kg**	**30kg**	**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Plastic bag	**0.5kg**			
Y446	II	Glass	**0.5kg**	**5kg**		**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Plastic bag	**0.5kg**			
Y447	III	Glass	**1.0kg**	**5kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			
		Plastic bag	**1.0kg**			
Y448	III	Glass	**1.0kg**	**10kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group II and III

- For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	Drums	Jerricans
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instructions 478 - 479

Passenger - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN**			
478	II	Glass	**1.0L**	**1L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
479	III	Glass	**2.5L**	**5L**	**5L**
		Plastic	**2.5L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group II

- Inner packagings must have threaded enclosures and must be surrounded in inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents and enclosed in a leakproof liner, plastic bag or other equally effective means of intermediate leakproof containment.

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards**.**

SINGLE PACKAGINGS FOR PGIII (479 only)

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1,)
		Other metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1)
		Steel (1A1)	

Packing Instructions 480 - 482

Cargo Aircraft Only - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
480	I	Glass	**1.0L**	**1L**	**NO**
		Plastic	**FORBIDDEN**		
		Metal	**1.0L**		
481	II	Glass	**2.5L**	**5L**	**NO**
		Plastic	**2.5L**		
		Metal	**5.0L**		
482	III	Glass	**5.0L**	**60L**	**60L**
		Plastic	**5.0L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must have threaded enclosures and must be surrounded in inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents and enclosed in a leakproof liner, plastic bag or other equally effective means of intermediate leakproof containment.

Packing Group II

- Inner packagings must have threaded enclosures and must be surrounded in inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents.

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards**.**

SINGLE PACKAGINGS for PGI & II

Cylinders, provided that the general provisions of 4;27 are met. Cylinders must be made of steel and subjected to an initial test and period tests every 10 years at a pressure of not less than 0.6 Mpa (6 bar) (gauge pressure). During transport, the liquid must be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

SINGLE PACKAGINGS for PGIII (482 only))			
Composites	**Cylinders**	**Drums**	**Jerricans**
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1)
		Other metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1)
		Steel (1A1)	

Packing Instruction 483 - 486

Passenger - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN**			
483	II	Glass	**1.0kg**	**15kg**	**NO**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
484	II	Glass	**1.0kg**	**15kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Plastic bag	**1.0kg**		
485	III	Glass	**2.5kg**	**25kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**5.0kg**		
486	III	Glass	**5.0kg**	**25kg**	**NO**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.
- For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

Packing Instruction 487 - 491

Cargo Aircraft Only - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
487	I	Glass	**1.0kg**	**15kg**	**15kg**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
488	I	Glass	**1.0kg**	**15kg**	**15kg**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Plastic bag	**2.5kg**		
489	II	Glass	**2.5kg**	**50kg**	**50kg**
		Plastic	**2.5kg**		
		Metal	**5.0kg**		
490	II	Glass	**2.5kg**	**50kg**	**50kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Plastic bag	**2.5kg**		
491	III	Glass	**5.0kg**	**100kg**	**100kg**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

o Inner packagings must be hermetically sealed, e.g. by taping or by threaded closures.

Packing Group I and II

o For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

Packing Group III

- Packagings must meet the PG II performance standards.
- For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Fibre, wood and plywood single packagings must be fitted with a suitable liner

Packing Group III

- Packagings must meet the PG II performance standards.

SINGLE PACKAGINGS PG I			
Composites	**Cylinders**	**Drums**	**Jerricans**
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1)
		Other metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1)
		Steel (1A1)	

SINGLE PACKAGINGS PG II and PG III only				
Boxes	**Composites**	**Cylinders**	**Drums**	**Jerricans**
Steel (4A)	ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Aluminium (4B)			Fibre (1G)	Plastic (3H1, 3H2)
Natural wood(4C2)			Other metal (1N1, 1N2)	Steel (3A1, 3A2)
Plywood (4D)			Plastic (1H1, 1H2)	
Reconstituted wood (4F)			Plywood (1D)	
Fibreboard (4G)			Steel (1A1, 1A2)	
Plastics (4H2)				

Packing Instruction 492

Passenger and Cargo for UN 3292 Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
		Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS CARGO**
UN3292 Batteries, containing sodium	Batteries may be offered for transport and transported unpacked or in protective enclosures such as fully enclosed or wooden slatted crates that are not subject to the requirements of Part 6 of these instructions	**Forbidden**	**No quantity limit**	**No quantity limit**
UN3292 Cells containing sodium		**25kg**	**25kg**	**25kg**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PG II performance standard.
- Batteries must be protected against short circuit and must be isolated in such a manner as to prevent short circuits.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instruction 493

Passenger Aircraft for UN3399 - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS				**SINGLE PACKAGINGS**
	Inner Packaging	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
UN3399 Organometallic substance, liquid, water reactive, flammable PGI	**Forbidden**			
UN3399 Organometallic substance, liquid, water reactive, flammable PGII	Glass **(see 6: 3.2)**	**1.0L**	**1L**	**NO**
	Appropriate cylinders or other pressure vessels (see 4:2.7)	**1.0L**		**NO**
UN3399 Organometallic substance, liquid, water reactive, flammable PGIII	Glass **(see 6: 3.2)**	**5.0L**	**5L**	**NO**
	Appropriate cylinders or other pressure vessels (see 4:2.7)	**5.0L**	**5L**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Glass containers must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings
- Packagings must meet the PG II performance standard.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instruction 494

Cargo aircraft only for UN3399 - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGINGS			SINGLE PACKAGINGS
	Inner Packaging	**Inner packaging quantity (per receptacle) CARGO**	**Total Quantity Per Package CARGO**	
UN3399 Organometallic substance, liquid, water reactive, flammable PGI	Glass **(see 6: 3.2)**	**1.0 L**	**1.0 L**	**NO**
	Appropriate cylinders or other pressure vessels (see 4:2.7)	**1.0 L**		
UN3399 Organometallic substance, liquid, water reactive, flammable PGII	Glass **(see 6: 3.2)**	**2.5L**	**5L**	**NO**
	Appropriate cylinders or other pressure vessels (see 4:2.7)	**2.5L**		
UN3399 Organometallic substance, liquid, water reactive, flammable PGIII	Glass **(see 6: 3.2)**	**5.0L**	**60L**	**60 L**
	Appropriate cylinders or other pressure vessels (see 4:2.7)	**5.0L**	**60L**	**60 L**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must have threaded enclosures and must be surrounded in inert cushioning and absorbent material in a quantity sufficient to absorb the entire contents and enclosed in a leakproof liner, plastic bag or other equally effective means of intermediate leakproof containment.

Packing Group II

- Glass inner packagings must be packed with absorbent material and enclosed in a leakproof liner, plastic bag or other equally effective means of intermediate leakproof containment.

Packing Group III

- Packagings must meet the PG II performance standard.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

SINGLE PACKAGINGS for PG III only

Appropriate cylinders or pressure vessels as permitted by 4;2.7

Class 5.1 Packing Instructions

Packing Instructions Y540 – Y541

Limited Quantities - Liquids

Passenger and Cargo

General requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity consignments

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test;
- Inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6).

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y540	II	Glass	**0.1L**	**0.5L**	**30kg**	**NO**
		Plastic	**0.1L**			
		Metal	**0.1L**			
Y541	III	Glass	**0.5L**	**1.0L**		**NO**
		Plastic	**0.5L**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instructions Y543 – Y546

Limited Quantities - Solids

Passenger and Cargo

General requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity consignments

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

COMBINATION PACKAGINGS						**SINGLE PACKAGINGS**
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y543	II	Glass	**0.5kg**	**1.0kg**	**30kg**	**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Paper bag	**0.5kg**			
		Plastic bag	**0.5kg**			
		Fibre	**0.5kg**			
Y544	II	Glass	**0.5kg**	**2.5kg**		**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Paper bag	**0.5kg**			
		Plastic bag	**0.5kg**			
		Fibre	**0.5kg**			
Y545	III	Glass	**1.0kg**	**5kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			
		Paper bag	**1.0kg**			
		Plastic bag	**1.0kg**			
		Fibre	**1.0kg**			
Y546	III	Glass	**1.0kg**	**10kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			
		Paper Bag	**1.0kg**			
		Plastic bag	**1.0kg**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instructions 550 - 551

Passenger - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
	I	**FORBIDDEN**			
550	II	Glass	**1.0L**	**1L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
551	III	Glass	**2.5L**	**2.5L**	**NO**
		Plastic	**2.5L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood (4C1, 4C2)	Other Metal (1N2)
Plastics (4H1, 4H2)	Plastics (1H2)
Plywood (4D)	Steel (1A2)
Reconstituted wood (4F)	
Steel (4A)	

Packing Instructions 553 - 554

Cargo Aircraft - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
553	I	Glass	**1.0L**	**2.5L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
554	II	Glass	**2.5L**	**5L**	**NO**
		Plastic	**2.5L**		
		Metal	**2.5L**		
555	III	Glass	**5.0L**	**30L**	**30L**
		Plastic	**5.0L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- UN 1873 only glass inner packagings are permitted
- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings**.**

Packing Group III

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood(4C1, 4C2)	Other Metal (1N2)
Plastics (4H1, 4H2)	Plastics (1H2)
Plywood (4D)	Steel (1A2)
Reconstituted wood (4F)	
Steel (4A)	

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Packing Group III

- Packagings must meet the PG II performance standards.

SINGLE PACKAGINGS for PGIII (555))		
Composites	**Drums**	**Jerricans**
ALL	Aluminium (1B1)	Aluminium (3B1)
	Other metal (1N1)	Plastic (3H1)
	Plastic (1H1)	Steel (3A1)
	Steel (1A1)	

Packing Instructions 557 – 559

Passenger – Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
557	I	Glass	**1.0kg**	**1kg**	**NO**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
558	II	Glass	**1.0kg**	**5kg**	**NO**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
		Paper bag	**1.0kg**		
		Plastic bag	**1.0kg**		
		Fibre	**1.0kg**		
559	III	Glass	**2.5kg**	**25kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Paper bag	**2.5kg**		
		Plastic bag	**2.5kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I and II

- For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

Packing Group III

- Packagings must meet the PG II performance standards.
- For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS PG I ONLY

Boxes	**Drums**
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood (4C1, 4C2)	Other Metal (1N2)
Plastics (4H1, 4H2)	Plastics (1H2)
Plywood (4D)	Plywood (1D)
Reconstituted wood (4F)	Steel (1A2)
Steel (4A)	

OUTER PACKAGINGS OF COMBINATION PACKAGINGS PG II & III

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastic (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

Packing Instructions 561 – 563

Cargo Aircraft – Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
561	I	Glass	**1.0kg**	**15kg**	**15kg**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
562	II	Glass	**2.5kg**	**25kg**	**25kg**
		Plastic	**2.5kg**		
		Metal	**5.0kg**		
		Paper bag	**2.5kg**		
		Plastic bag	**2.5kg**		
		Fibre	**2.5kg**		
563	III	Glass	**5.0kg**	**100kg**	**100kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Paper bag	**5.0kg**		
		Plastic bag	**5.0kg**		
		Fibre	**5.0kg**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I and II

- For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

Packing Group III

- Packagings must meet the PG II performance standards.
- For wetted substances where the outer packaging is not leakproof, a leakproof liner or equally effective means of intermediate containment must be provided.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS PG I ONLY

Boxes	Drums
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood (4C1, 4C2)	Other Metal (1N2)
Plastics (4H1, 4H2)	Plastics (1H2)
Plywood (4D)	Plywood (1D)
Reconstituted wood (4F)	Steel (1A2)
Steel (4A)	

OUTER PACKAGINGS OF COMBINATION PACKAGINGS PG II & III

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	

	Reconstituted wood (4F)	Steel (1A2)		
	Steel (4A)			

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

Fibre, wood and plywood single packagings must be fitted with a suitable liner
Packing Group III
Packagings must meet the PG II performance standard.

SINGLE PACKAGINGS PG I ONLY

Drums

Aluminium (1B1, 1B2)

Other metal (1N1, 1N2)

Steel (1A1, 1A2)

SINGLE PACKAGINGS PG II & III

Boxes*	**Composites**	**Cylinders**	**Drums***	**Jerricans**
Steel (4A)	ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Aluminium (4B)			Other metal (1N1, 1N2)	Plastic (3H1, 3H2)
Natural wood (4C2)			Fibre (1G)	Steel (3A1, 3A2)
Plywood (4D)			Plastic (1H1, 1H2)	
Reconstituted wood (4F)			Plywood (1D)	
Fibreboard (4G)			Steel (1A1, 1A2)	
Plastics (4H2)				

Packing Instruction 565

Passenger and Cargo - for UN 3356

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGING				
		Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN3356 Oxygen Generator, chemical	**The generators must be tightly packed in the outer packagings listed below**	**Forbidden**	**25kg Gross**	**Unpackaged NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- The generator, without its packaging, must be capable of withstanding a 1.8 m drop test onto a rigid, non-resilient, flat and horizontal surface, in the position most likely to cause actuation, without loss of its contents and without actuation. For PBE, which are in a vacuum-sealed bag as part of their containment system, this test may be conducted on the PBE in the vacuum-sealed bag;
- When a generator is equipped with an actuating device, it must have at least two positive means of preventing unintentional actuation. For PBE, which are in a vacuum-sealed bag as part of their containment system, the vacuum-sealed bag may be considered the second positive means of preventing unintentional actuation;
- The generator(s) must be transported in a package which will meet the following requirements when one generator in the package is actuated:

  1) other generators in the package will not be actuated;
  2) packaging material will not ignite; and
  3) the outside surface temperature of the completed package will not exceed 100°c;

(Note. - to enable test 1), 2) and 3) to be conducted on PBE, it is acceptable to break the vacuum-sealed bag to actuate the generator fore placing it in the package.)

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Class 5-2 Packing Instructions

Packing Instruction 570

Passenger and Cargo

Liquids and solids

General requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk

2) Closures

- Closures must meet the requirements of 4: 1.1.4

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
ORGANIC PEROXIDES	**Inner packaging (see6:3.2)**	**Inner packaging quantity (per receptacle) PASSENGER**	**Inner packaging quantity (per receptacle) CARGO**	**Total quantity per package PASSENGER**	**Total quantity per package CARGO**	
LIQUIDS						
UN 3103	**Plastic**	**0.5L**	**1.0L**	**5L**	**10L**	**NO**
UN 3105	**Plastic**	**0.5L**	**1.0L**	**5L**	**10L**	**NO**
UN 3107	**Plastic**	**1.0L**	**2.5L**	**10L**	**25L**	**NO**
UN 3109	**Plastic**	**1.0L**	**2.5L**	**10L**	**25L**	**NO**
SOLIDS						
UN 3104	**Plastic and plastic bag**	**0.5kg**	**1.0kg**	**5kg**	**10kg**	**NO**
UN 3106	**Plastic and plastic bag**	**0.5kg**	**1.0kg**	**5kg**	**10kg**	**NO**
UN 3108	**Plastic and plastic bag**	**1.0kg**	**2.5kg**	**10kg**	**25kg**	**NO**
UN 3110	**Plastic and plastic bag**	**1.0kg**	**2.5kg**	**10kg**	**25kg**	**NO**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packagings must meet the PGII performance standards

Class 6-1 Packing Instructions

Packing Instructions Y640 – Y642

Limited Quantities

Passenger and Cargo - Liquids

General requirements

Part 4 Chapter 1requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test;
- Inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6).

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y640	II	Glass	**0.1L**	**0.5L**	**30kg**	**NO**
		Plastic	**0.1L**			
		Metal	**0.1L**			
Y641	II	Glass	**0.1L**	**1.0L**		**NO**
		Plastic	**0.1L**			
		Metal	**0.1L**			
Y642	III	Glass	**0.5L**	**2.0L**		**NO**
		Plastic	**0.5L**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	Drums	Jerricans
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instructions Y644 – Y645

Limited Quantities

Passenger and Cargo Solids

General requirements

Part 4 Chapter 1requirements must be me (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply t including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

COMBINATION PACKAGINGS						**SINGLE PACKAGINGS**
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y644	II	Glass	**0.5kg**	**1kg**	**30kg**	**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Paper bag	**0.5kg**			
		Plastic bag	**0.5kg**			
		Fibre	**0.5kg**			
Y645	II	Glass	**1.0kg**	**10kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			
		Paper Bag	**1.0kg**			
		Plastic bag	**1.0kg**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 651 - 655

Passenger - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
651	I	Glass	**0.5L**	**0.5L**	**NO**
		Plastic	**0.5L**		
		Metal	**0.5L**		
652	I	Glass	**0.5L**	**1L**	**NO**
		Plastic	**0.5L**		
		Metal	**1.0L**		
653	II	Glass	**1.0L**	**1L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
654	II	Glass	**1.0L**	**5L**	**NO**
		Plastic	**1.0L**		
		Metal	**2.5L**		
655	III	Glass	**2.5L**	**60L**	**60L**
		Plastic	**2.5L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

SINGLE PACKAGINGS FOR PGIII (655)

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other Metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instructions 657 - 663

Cargo aircraft Only - Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
657	I	Glass	**1.0L**	**2.5L**	**2.5L**
		Plastic	**1.0L**		
		Metal	**2.5L**		
658	I	Glass	**1.0L**	**30L**	**30L**
		Plastic	**1.0L**		
		Metal	**2.5L**		
659	I	Glass	**1.0L**	**5L**	**5L**
		Plastic	**1.0L**		
		Metal	**2.5L**		
660	II	Glass	**1.0L**	**30L**	**30L**
		Plastic	**1.0L**		
		Metal	**2.5L**		
661	II	Glass	**1.0L**	**60L**	**60L**
		Plastic	**1.0L**		
		Metal	**2.5L**		
662	II	Glass	**2.5L**	**60L**	**60L**
		Plastic	**2.5L**		
		Metal	**5.0L**		
663	III	Glass	**5.0L**	**220L**	**220L**
		Plastic	**5.0L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastic (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastic (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

SINGLE PACKAGINGS FOR PG I & II

Composites	**Cylinders**	**Drums**	**Jerricans**
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1)
		Other Metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1)
		Steel (1A1)	

SINGLE PACKAGINGS FOR PG III ONLY			
Composites	**Cylinders**	**Drums**	**Jerricans**
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other Metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instructions 665 – 670

Passenger - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
665	I	Glass	**0.5kg**	**1kg**	**NO**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
666	I	Glass	**0.5kg**	**5kg**	**NO**
		Plastic	**1.0kg**		
		Metal	**1.0kg**		
667	II	Glass	**1.0kg**	**5kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Paper bag	**1.0kg**		
		Plastic bag	**1.0kg**		
		Fibre	**1.0kg**		
668	II	Glass	**1.0kg**	**15kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Paper bag	**1.0kg**		
		Plastic bag	**1.0kg**		
		Fibre	**1.0kg**		
669	II	Glass	**1.0kg**	**25kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Paper bag	**1.0kg**		
		Plastic bag	**1.0kg**		
		Fibre	**1.0kg**		
670	III	Glass	**5.0kg**	**100kg**	**100kg**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		
		Paper Bag	**5.0kg**		
		Plastic bag	**5.0kg**		

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastic (4H1, 4H2)	Plastic (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL REQUIREMENTS FOR SINGLE PACKAGINGS

Fibre, wood and plywood single packagings must be fitted with a suitable liner

SINGLE PACKAGINGS FOR PGIII (670only)

Bags	Boxes	Composites	Cylinders	Drums	Jerricans
Paper (5M2)	Steel (4A)	All	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Plastic film (5H4)	Aluminium (4B)			Fibre (1G)	Plastic (3H1, 3H2)
Textile (5L3)	Natural wood (4C2)			Other Metal (1N1, 1N2)	Steel (3A1, 3A2)
Woven plastic (5H3)	Plywood (4D)			Plastic (1H1, 1H2)	
	Reconstituted wood (4F)			Plywood (1D)	
	Fibreboard (4G)			Steel (1A1, 1A2)	
	Plastics (4H2)				

Packing Instructions 672 -677

Cargo - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion for substances with a class 8 sub risk.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
672	I	Glass	**1.0kg**	**15kg**	**15kg**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Paper bag	**1.0kg**		
		Plastic bag	**1.0kg**		
		Fibre	**1.0kg**		
673	I	Glass	**1.0kg**	**50kg**	**50kg**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Paper bag	**1.0kg**		
		Plastic bag	**1.0kg**		
		Fibre	**1.0kg**		
674	II	Glass	**2.5kg**	**25kg**	**25kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Paper bag	**2.5kg**		
		Plastic bag	**2.5kg**		
		Fibre	**2.5kg**		
675	II	Glass	**2.5kg**	**50kg**	**50kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Paper bag	**2.5kg**		
		Plastic bag	**2.5kg**		
		Fibre	**2.5kg**		
676	II	Glass	**2.5kg**	**100kg**	**100kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Paper bag	**2.5kg**		
		Plastic bag	**2.5kg**		
		Fibre	**2.5kg**		
677	III	Glass	**5.0kg**	**200kg**	**200kg**
		Plastic	**10.0kg**		
		Metal	**10.0kg**		
		Paper Bag	**5.0kg**		
		Plastic bag	**5.0kg**		

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

ADDITIONAL REQUIREMENTS FOR SINGLE PACKAGINGS

*** Fibre, wood and plywood single packagings must be fitted with a suitable liner**

SINGLE PACKAGINGS FOR PG I

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other Metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Fibre (1G)	Steel (3A1, 3A2)
		Plastic (1H1, 1H2)	
		Plywood (1D)	
		Steel (1A1, 1A2)	

SINGLE PACKAGINGS FOR PG II AND III ONLY

Boxes	Composites	Cylinders	Drums	Jerricans
Steel (4A)	ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Aluminium (4B)			Other Metal (1N1, 1N2)	Plastic (3H1, 3H2)
Natural wood (4C2)			Fibre (1G)	Steel (3A1, 3A2)
Plywood (4D)			Plastic (1H1, 1H2)	
Reconstituted wood (4F)			Plywood (1D)	
Fibreboard (4G)			Steel (1A1, 1A2)	
Plastics (4H2)				

SINGLE PACKAGINGS FOR PGIII (677 only)

Bags	Boxes	Composites	Cylinders	Drums	Jerricans
Paper (5M2)	Steel (4A)	All	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Plastic film (5H4)	Aluminium (4B)			Fibre (1G)	Plastic (3H1, 3H2)
Textile (5L3)	Natural wood (4C2)			Other Metal (1N1, 1N2)	Steel (3A1, 3A2)
Woven plastic (5H3)	Plywood (4D)			Plastic (1H1, 1H2)	
	Reconstituted wood (4F)			Plywood (1D)	
	Fibreboard (4G)			Steel (1A1, 1A2)	
	Plastics (4H2)				

Packing Instruction 679

Cargo aircraft only for UN1700, 2016 and 2017 - Solids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS

		Maximum Net quantity per package	SINGLE PACAKGINGS
UN1700 **Tear gas candles, ammunition tear producing**	Elements must not be assembled in grenades or devices, but must be packed in a separate wooden (4C1, 4C2) box and so cushioned that they cannot come into contact with each other or with the walls of the packaging during transport. **Not more than 24 grenades and 24 functioning devices per package are permitted**	**50kg**	**NO**
UN2016 **Ammunition, toxic non-explosive** (Without ignition elements, bursting charges, detonating fuses or other explosive components)		**75kg**	**NO**
UN2017 **Ammunition, tear–producing, non-explosive** (Without ignition elements, bursting charges, detonating fuses or other explosive components)		**50kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PGII performance standards.
- The articles must be individually packaged and separated from each other using partitions, dividers, inner packagings or cushioning material to prevent inadvertent discharge during normal conditions of transport.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood (4C1, 4C2)	Other Metal (1N2)
Plastics (4H2)	Plastics (1H2)
Plywood (4D)	Plywood (1D)
Reconstituted wood (4F)	Steel (1A2)
Steel (4A)	

Packing Instruction 680

Passenger and Cargo for UN 1888 Liquids

General requirements

Part 4 Chapter 1requirements must be met including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3;

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGINGS					SINGLE PACKAGINGS Cargo Aircraft only
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle) PASSENGER**	**Inner packaging quantity (per receptacle) CARGO**	**Total Quantity Per Package PASSENGER**	**Total Quantity Per Package CARGO**	
UN1888 Chloroform	Glass	**1.0L**	**2.5L**	**60L**	**220L**	**220L**
	Plastic	**1.0L**	**2.5L**			
	Metal	**2.5L**	**5.0L**			

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings**.**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

SINGLE PACKAGINGS FOR CARGO AIRCRAFT ONLY

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other Metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instruction Y680

Limited Quantities

Passenger and Cargo for UN 1888 - Liquids

General requirements

Part 4 Chapter requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements

Part 3 Chapter 4 requirements must be met:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test;
- Inner packagings for liquids must be capable of passing a pressure differential test. (4;1.1.6)

COMBINATION PACKAGINGS						**SINGLE PACKAGINGS**
	Packing group	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
UN1888 Chloroform	III	Glass	**0.1L**	**2L**	**30kg**	**NO**
		Plastic	**0.1L**			
		Metal	**0.1L**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Class 8 Packing Instructions

Packing Instructions Y840 – Y841

Limited Quantity Liquids Only

Passenger and Cargo Aircraft

General Requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8 c, 1.1.8 e and 1.1.16 do not apply) including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion;
- Substances of class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

Limited Quantity Requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test;
- Inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6).

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y840	II	Glass	**0.1L**	**0.5L**	**30kg**	**NO**
		Plastic	**0.1L**			
		Metal	**0.1L**			
Y841	III	Glass	**0.5L**	**1L**		**NO**
		Plastic	**0.5L**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instructions Y843 – Y845

Limited Quantity Solids Only

Passenger and Cargo Aircraft

General Requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8 c, 1.1.8 e and 1.1.16 do not apply) including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion;
- Substances of class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

Limited Quantity Requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test

.COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
Y843	II	Glass	**0.5kg**	**1kg**	**30kg**	**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Plastic bag	**0.5kg**			
Y844	II	Glass	**0.5kg**	**5kg**		**NO**
		Plastic	**0.5kg**			
		Metal	**0.5kg**			
		Plastic bag	**0.5kg**			
Y845	III	Glass	**1.0kg**	**5kg**		**NO**
		Plastic	**1.0kg**			
		Metal	**1.0kg**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instructions 850 – 852

Passenger Aircraft Liquids

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion;
- Substances of class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
850	I	Glass	**0.5L**	**0.5L**	**NO**
		Plastic	**0.5L**		
		Metal	**0.5L**		
851	II	Glass	**1.0L**	**1L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
852	III	Glass	**2.5L**	**5L**	**NO**
		Plastic	**2.5L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instructions 854 - 856

Cargo Aircraft Liquids Only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion;
- Substances of class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
854	I	Glass	**1.0L**	**2.5L**	**NO**
		Plastic	**1.0L**		
		Metal	**1.0L**		
855	II	Glass	**2.5L**	**30L**	**30L**
		Plastic	**2.5L**		
		Metal	**2.5L**		
856	III	Glass	**5.0L**	**60L**	**60L**
		Plastic	**5.0L**		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

Packing Group I

- Inner packagings must be packed with absorbent material and placed in a rigid leakproof receptacle before packing in outer packagings.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

SINGLE PACKAGINGS FOR PG II

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1)	Aluminium (3B1)
		Other Metal (1N1)	Plastic (3H1)
		Plastic (1H1)	Steel (3A1)
		Steel (1A1)	

SINGLE PACKAGINGS FOR PG III ONLY

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other Metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instructions 858 - 860

Passenger Aircraft Solids

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion;
- Substances of class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
858	I	Glass	**0.5kg**	**1kg**	**NO**
		Plastic	**0.5kg**		
		Metal	**0.5kg**		
859	II	Glass	**1.0kg**	**15kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
		Plastic bag	**1.0kg**		
860	III	Glass	**2.5kg**	**25kg**	**NO**
		Plastic	**2.5kg**		
		Metal	**5.0kg**		

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

Packing Instructions 862 - 864

Cargo Aircraft Solids Only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion;
- Substances of class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	
862	I	Glass	**1.0kg**	**25kg**	**25kg**
		Plastic	**2.5kg**		
		Metal	**2.5kg**		
863	II	Glass	**2.5kg**	**50kg**	**50kg**
		Plastic	**5.0kg**		
		Metal	**5.0kg**		
		Plastic bag	**2.5kg**		
864	III	Glass	**5.0kg**	**100kg**	**100kg**
		Plastic	**5.0kg**		
		Metal	**10.0kg**		

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL REQUIREMENTS FOR SINGLE PACKAGINGS

* Fibre, wood and plywood single packagings must be fitted with a suitable liner

SINGLE PACKAGINGS FOR PG I

Composites	Cylinders	Drums	Jerricans
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Fibre (1G)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Plywood (1D)	
		Steel (1A1, 1A2)	

SINGLE PACKAGINGS FOR PG II & III ONLY

Boxes	Composites	Cylinders	Drums	Jerricans
Steel (4A)	ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Aluminium (4B)			Fibre (1G	Plastic (3H1, 3H2)
Natural wood (4C2)			Plastic (1H1, 1H2)	Steel (3A1, 3A2)
Plywood (4D)			Plywood (1D)	
Reconstituted wood (4F)			Steel (1A1, 1A2)	
Fibreboard (4G)				
Plastic (4H2)				

Packing Instruction 866

Cargo Aircraft for UN2028 Only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
		Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN2028 Bombs, smoke, non-explosive (with corrosive liquid, without initiating device)	**Bombs smoke may be carried provided they are without ignition elements, bursting charges, detonating fuses or other explosive components**	**Forbidden**	**50kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

♦ The articles must be individually packaged and separated from each other using partitions, dividers, inner packagings or cushioning material.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood(4C1, 4C2)	Other Metal (1N2)
Plastics (4H1, 4H2)	Plastics (1H2)
Plywood (4D)	Steel (1A2)
Reconstituted wood (4F)	
Steel (4A)	

Packing Instruction 867

Passenger and Cargo Aircraft for UN2803 only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING				
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle**	**Total Quantity Per Package PASSENGER**	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN2803 Gallium	**Plastic**	**3.5kg**	**20kg**	**20kg**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PG I performance standard.
- Plastic inner packagings must be enclosed in liners or bags of strong leak-proof and puncture resistant material impervious to the contents and completely surrounding the contents to prevent it from escaping from a package irrespective of its position or orientation.
- Plastic inner packagings must be packed with sufficient cushioning material to prevent breakage.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood(4C1, 4C2)	Other Metal (1N2)
Plastics (4H1, 4H2)	Plastics (1H2)
Plywood (4D)	Steel (1A2)
Reconstituted wood (4F)	
Steel (4A)	

CARRIAGE AT LOW TEMPERATURES

When it is necessary to transport Gallium at low temperatures in order to maintain it in a completely solid state, packagings may be overpacked in strong water resistant outer packagings which contains dry ice or other means of refrigeration. If a refrigerant is used, all of the above materials used in the packaging of gallium must be chemically and physically resistant at the low temperatures of the refrigerant employed. If dry ice is used the outer packaging must permit the release of carbon dioxide gas.

Packing Instruction 868

Passenger and Cargo for UN2809 Only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING				
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle**	**Total Quantity Per Package PASSENGER**	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN2809 Mercury	**Glass**	**2.5kg**	**35kg**	**35kg**	**See below**
	Plastic	**2.5kg**			

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PGI performance standard.
- Inner packagings must be enclosed in liners or bags of strong leak-proof and puncture resistant material impervious to the contents and completely surrounding the contents to prevent it from escaping from a package irrespective of its position or orientation.
- Inner packagings must be packed with sufficient cushioning material to prevent breakage.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**
Aluminium (4B)	Aluminium (1B2)
Fibreboard (4G)	Fibre (1G)
Natural wood(4C1, 4C2)	Other Metal (1N2)
Plastics (4H1, 4H2)	Plastics (1H2)
Plywood (4D)	Steel (1A2)
Reconstituted wood (4F)	
Steel (4A)	

SINGLE PACKAGINGS

Mercury may also be packed in a single packaging which may only be a welded steel bottle with an inner vaulted bottom, an opening not exceeding 20 mm and a closure which must be a bolt with a conical thread.

Packing Instructions 869

Passenger and Cargo For UN 2809 in articles only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
			Total Quantity Per Package PASSENGER or CARGO	**SINGLE PACKAGINGS**
UN2803 mercury in manufactured articles	**Manufactured articles** or apparatus of which metallic mercury is a component part, such as manometers, pumps, thermometers, switches etc.	Must have sealed inner liners or bags of strong leakproof and puncture-resistant material impervious to mercury which will prevent the escape of mercury from the package irrespective of its position. *NOTE: Mercury switches and relays are excepted from the requirement for a sealed inner liner or bag providing they are of the totally enclosed leakproof type in sealed metal or plastic units.*	**No limit**	**NO**
	Electron tubes, mercury vapour tubes (tubes with less than a total net quantity of 450g of mercury)	Tubes must be packed in strong outer packagings with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the package. *Note: Tubes with more than 450 g of mercury must be packaged according to the instructions for manufactured articles or apparatuses (above)*		

Thermometers, switches and relays, each containing a total quantity of not more than 15 g of mercury, are excepted from the requirements of these Instructions if they are installed as an integral part of a machine or apparatus and so fitted that shock or impact damage, leading to leakage of mercury, is unlikely to occur under conditions normally incident to transport
OUTER PACKAGINGS OF COMBINATION PACKAGINGS
ANY STRONG OUTER PACKAGING SUCH AS:

Drums	**Jerricans**	**Boxes**

Consignment Procedures
For electron tubes, mercury vapour tubes and similar tubes the shipper must indicate the quantity of mercury on the dangerous goods transport document

Packing Instruction 870

Passenger and Cargo For UN 2794 and 2795

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
		Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN2794 Batteries wet filled with acid and UN2795 Batteries wet, filled with alkali	Batteries must be placed in an acid/alkali-proof liner of sufficient strength and adequately sealed to positively preclude leakage in the event of spillage. The batteries must be packed so that the fill openings and vents, if any, are upward; they must be incapable of short-circuiting and be securely cushioned in the packagings.	**30kg**	**No limit**	**Unpackaged batteries NO**
UN 2794 and UN2795 Batteries installed in equipment	If batteries are shipped as an integral component of assembled equipment, they must be securely installed and fastened in an upright position and protected against contact with other articles so as to prevent short circuits. Batteries must be removed and packed according to this packing instruction if the assembled equipment is likely to be carried in other than an upright position			

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PG II performance standard.
- For batteries, electric storage, packed with battery fluid in the same outer packaging, see UN 2796 and UN 2797.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packing Instruction 871

Passenger and Cargo For UN 3028 only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
		Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN3028 Batteries dry containing potassium hydroxide	The batteries must be securely cushioned in the packagings.	**25kg G**	**230kg G**	**NO**

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the PG II performance standards.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes
Steel (4A)
Aluminium (4B)
Natural wood(4C1, 4C2)
Plywood (4D)
Reconstituted wood (4F)
Fibreboard (4G)
Plastics (4H2)

Packing Instruction 872

Passenger and Cargo For UN 2800 only

General Requirements

Part 4 Chapter 1 requirements must be met including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3;
- Metal packagings must be corrosion resistant or with protection against corrosion.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

	COMBINATION PACKAGING			
		Total Quantity Per Package PASSENGER	**Total Quantity Per Package CARGO**	**SINGLE PACKAGINGS**
UN2800 Batteries wet non spillable	Batteries must be protected against short circuits and must be securely packed in strong outer packagings	**No limit**	**No limit**	**NO**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

ANY STRONG OUTER PACKAGING SUCH AS:

Drums	**Jerricans**	**Boxes**

TESTING

Batteries can be considered as non-spillable provided that they are capable of withstanding the vibration and pressure differential tests given below, without leakage of battery fluid.

***Vibration test**:* The battery is rigidly clamped to the platform of a vibration machine and a simple harmonic motion having an amplitude of 0.8 mm (1.6 mm maximum total excursion) is applied. The frequency is varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return is traversed in 95 ± 5 minutes for each mounting position (direction of vibration) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

Pressure differential test: Following the vibration test, the battery is stored for six hours at 24°C ±4°C while subjected to a pressure differential of at least 88 kPa. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

Note.— Non-spillable type batteries which are an integral part of and necessary for the operation of mechanical or electronic equipment must be securely fastened in the battery holder on the equipment and protected in such a manner as to prevent damage and short circuits.

Class 9 Packing Instructions

Packing Instruction 950

Passenger and Cargo aircraft for UN3166

(See PI 951 for flammable gas powered vehicles and engines or PI952 for battery powered equipment and vehicles)

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   - Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

	Quantity PASSENGER	Quantity CARGO
UN 3166 Flammable liquid powered vehicles and engines	**NO LIMIT**	**NO LIMIT**

ADDITIONAL PACKING REQUIREMENTS

Flammable liquid Fuel tanks

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.

Diesel engines

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;

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; in addition

1) if spillable batteries are installed, and 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 492 or 869 as applicable
2) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

Other operational equipment

1) Dangerous goods required for the operation of the vehicle, machine or equipment, such as fire extinguishers, tire inflation canisters, safety devices, must be securely mounted in the vehicle, machine or equipment. Vehcles containing dangerous goods identified in table 3-1 as forbidden on passengers aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.
2) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational system must have such devices, equipment or system disabled;

Internal combustion engine shipped separately (not installed)

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 leakproof caps, which are positively retained

This requirement also applies to vehicles, machines or equipment containing internal combustion engines which are being shipped in a dismantled state such that fuel lines have been disconnected.

Packing Instruction 951

Cargo Aircraft Only for UN3166

(See PI 950 for flammable liquid powered vehicles and engines or PI952 for battery powered equipment or vehicles)

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

	Quantity PASSENGER	Quantity CARGO
UN 3166 Flammable gas powered vehicles and engines	**FORBIDDEN**	**NO LIMIT**

ADDITIONAL PACKING REQUIREMENTS

Flammable gas vessels

1) 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;

Or alternatively;

2) Flammable gas-powered vehicles, machines or equipment that have pressure receptacles (fuel tanks) equipped with electrically operated valves that close automatically in case the power is disconnected, or with manual shut-off valves, may be transported under the following conditions:

   i) the valves must be in the closed position and in the case of electrically operated valves, power to those valves must be disconnected;

   ii) after closing the valves, the vehicle, equipment or machinery must be operated until it stops from lack of fuel before being loaded aboard the aircraft;

   iii) in no part of the closed system must the remaining pressure of compressed gases exceed 5 per cent of the maximum allowable working pressure of the system, or more than 2 000 kPa (20 bar), whichever is the lower;

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; in addition

1) if spillable batteries are installed, and 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 492 or 869 as applicable
2) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the UN Manual of Tests and Criteria, Part III, subsection 38.3, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

Other operational equipment

1) Dangerous goods required for the operation of the vehicle, machine or equipment, such as fire extinguishers, tire inflation canisters, safety devices, must be securely mounted in the vehicle, machine or equipment. Vehcles containing dangerous goods identified in table 3-1 as forbidden on passengers aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.
2) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational system must have such devices, equipment or system disabled;

Internal combustion engine shipped separately (not installed)
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 leakproof caps, which are positively retained

This requirement also applies to vehicles, machines or equipment containing internal combustion engines which are being shipped in a dismantled state such that fuel lines have been disconnected.

Packing Instruction 952

Passenger and Cargo Aircraft for UN3171

(See PI 950 for flammable liquid powered vehicles and engines or PI951 for flammable gas powered vehicles)

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

	Quantity PASSENGER	Quantity CARGO
UN3171 Battery powered equipment or vehicles	**NO LIMIT**	**NO LIMIT**

ADDITIONAL PACKING REQUIREMENTS

This entry applies to vehicles and equipment which are powered by wet batteries, sodium batteries or lithium batteries and which are transported with these batteries installed. Examples of such vehicles and equipment are electrically-powered cars, lawn mowers, wheelchairs and other mobility aids. Vehicles that also contain an internal combustion engine must be consigned under UN3166(see PI950 or 951)

Battery powered vehicles, machines or equipment must meet the following requirements:

Batteries
All batteries must be installed and securely fastened in the battery holder of the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; in addition

1) if spillable batteries are installed, and 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 492 or 869 as applicable
2) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

Other operational equipment
1) Dangerous goods required for the operation of the vehicle, machine or equipment, such as fire extinguishers, tire inflation canisters, safety devices, must be securely mounted in the vehicle, machine or equipment. Vehcles containing dangerous goods identified in table 3-1 as forbidden on passengers aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.
2) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational system must have such devices, equipment or system disabled;

Packing Instruction 953 Superseded by 9X1

Passenger and Cargo Aircraft for UN3090

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

		Quantity PASSENGER	Quantity CARGO
UN 3090 Lithium Batteries		**5kg Gross**	**35kg* Gross**

* Irrespective of the requirements in additional requirement e) or the outer packaging limits, lithium batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings and protective enclosures not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium(4B)	Aluminium(1B2)	Steel (3A2)
Fibreboard (4G)	Fibreboard (1G)	Plastics(3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Packagings must meet the PGII performance requirements

ADDITIONAL PACKING REQUIREMENTS

1 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 UN *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);
   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;

2 Cells or batteries containing one or more cells with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride, are forbidden for transport if 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;

Packing Instruction 954 Superseded by 9X2

Passenger and Cargo Aircraft for UN3091

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

		Quantity PASSENGER	Quantity CARGO
UN3091 Lithium Batteries Packed with equipment		**5kg Gross**	**35kg Gross**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Fibreboard (4G)	Fibreboard (1G)	

Packagings must meet the PGII performance requirements

ADDITIONAL PACKING REQUIREMENTS

For the purpose of this packing instruction “equipment” means apparatus requiring the lithium batteries with which it is packed for its operation. This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries when packed with equipment.

1 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 UN *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);

2 Lithium cells and batteries must be packed in such a manner as to effectively prevent movement which could lead to short circuits.

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

Packing Instruction 955 Superseded by 9X3

Passenger and Cargo Aircraft for UN3091

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

		Quantity PASSENGER	Quantity CARGO
UN3091 Lithium Batteries contained in equipment	**Not more than a battery/cell per piece of equipment of** **No piece of equipment may contain more than 12g per cell or 500g per receptacle**	**5kg**	**5kg**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS
Strong outer packagings such as

Boxes	Drums	Jerricans

ADDITIONAL PACKING REQUIREMENTS

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

1 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 UN *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);

2 Lithium cells and batteries must be packed in such a manner as to effectively prevent movement which could lead to short circuits.

3 Cells or batteries containing one or more cells with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride, 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.

Packing Instruction 956

Passenger and Cargo Aircraft for UN2807

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

	Quantity PASSENGER	Quantity CARGO
UN2807 Magnetized material	**NO LIMIT**	**NO LIMIT**

ADDITIONAL PACKING REQUIREMENTS

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 7;2.10.

Packing Instruction 957

Passenger and Cargo Aircraft for UN1845

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   - Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

		Quantity PASSENGER	Quantity CARGO
UN1845 Carbon dioxide solid or dry ice		**200kg**	**200kg**

ADDITIONAL PACKING REQUIREMENTS

In packages:

a) must be packed in accordance with the general packing requirements of 4;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.
b) the shipper must make arrangements with the operator(s) for each shipment, to ensure that ventilation safety procedures are followed.
c) the dangerous goods transport document requirements of 5, Chapter 4 are not applicable provided alternative written documentation is supplied containing the following information:
   i) proper shipping name (**Dry ice** or **Carbon dioxide, solid**), Class 9, UN 1845,
   ii) the number of packages and the net quantity of dry ice in each package.
d) the net mass of the **Carbon dioxide, solid** (**Dry ice**) must be marked on the outside of the package.
e) the information must be included with the description of the goods.

Dry Ice used for other than dangerous goods:

a) may be shipped in a unit load device or other type of pallet prepared by a single shipper provided that the shipper has made prior arrangements with the operator.
b) the unit load device, or other type of pallet must allow the venting of the carbon dioxide gas to prevent a dangerous build-up of pressure.
c) The shipper must provide the operator with written documentation stating the total quantity of the dry ice contained in the unit load device or other type of pallet.

Packing Instruction 958

Passenger and Cargo Aircraft for UN2990 or UN 3072

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

	Quantity PASSENGER	**Quantity CARGO**
UN2990 Life-saving appliances, self-inflating **or** **UN 3072 Life saving appliances, not self inflating containing dangerous goods as equipment**	**NO LIMIT**	**NO LIMIT**

ADDITIONAL PACKING REQUIREMENTS

The description life saving appliances, self-inflating (UN2990) is intended to apply to life saving appliances that present a hazard if the self-inflating device is activated accidentally.

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

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

Packing Instruction 959

Passenger and Cargo Aircraft for UN1841 UN1931 UN2969 UN3334 UN3335

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

Applicable Substances	Combination Packagings				Single Packagings	
	Inner Packaging (see 6;3.2)	**Inner packaging quantity (per receptacle)**	**Total quantity per package Passenger**	**Total quantity per package Cargo**	**Quantity Passenger**	**Quantity Cargo**
UN1841 Acetaldehyde ammonia **UN1931 Zinc dithionite or zinc hydrosulphite**	**Glass**	**10.0 kg**	**200 kg** **100 kg**	**200 kg** **200 kg**	**200 kg** **100 kg**	**200 kg** **200 kg**
	Fibre	**50.0 kg**				
UN2315 Polychlorinated biphenyls, solid,	**Metal**	**50.0 kg**	**100 kg** **No limit**	**200 kg** **No limit**	**100 kg** **No Limit**	**200 kg** **No Limit**
UN2969 Castor beans, castor flake, castor meal castor pomace	**Paper bag**	**50.0 kg**	**400 kg**	**400 kg**	**400 kg**	**400 kg**
UN3077 Environmentally hazardous substance, solid, n.o.s.	**Plastic**	**50.0 kg**	**100 kg**	**200 kg**	**100 kg**	**200 kg**
UN3151 Polyhalogenated biphenyls or terphenyls, solid, **UN3335 Aviation regulated solid n.o.s.**	**Plastic bag**	**50.0 kg**	**100 kg**	**200 kg**	**100 kg**	**200 kg**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other Metal (1N2)	Steel (3A2)
Plastics (4H1, 4H2)	Plastics (1H2)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

SINGLE PACKAGINGS

ADDITIONAL REQUIREMENTS FOR SINGLE PACKAGINGS

Fibre, wood and plywood single packagings must be fitted with a suitable liner

Bags	Boxes	Composites	Cylinders	Drums	Jerricans
Paper (5M2)	**Steel (4A)**	**All**	**See 4; 2.7**	**Aluminium (1B1, 1B2)**	Aluminium (3B1, 3B2)
Plastic film (5H4)	**Aluminium (4B)**			**Other Metal (1N1, 1N2)**	**Plastic (3H1, 3H2)**
Textile (5L3)	**Natural wood (4C2)**			**Fibre (1G)**	**Steel (3A1, 3A2)**
Woven plastic (5H3)	**Plywood (4D)**			**Plastic (1H1, 1H2)**	
	Reconstituted wood (4F)			**Plywood (1D)**	
	Fibreboard (4G)			**Steel (1A1, 1A2)**	
	Plastic (4H2)				

Packing Instruction Y959

Limited Quantities

Passenger and Cargo for UN3077 - Solid

General requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements of

Part 3 Chapter 4 must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
Packing Instruction	**Packing group**	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
UN3077 Environmentally hazardous substances, solid, N.O.S	III	Glass	**5.0kg**	**30kg**	**30kg**	**NO**
		Plastic	**5.0kg**			
		Metal	**5.0kg**			
		Paper bag	**5.0kg**			
		Plastic bag	**5.0kg**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 960			
Passenger and Cargo Aircraft for UN 2211 UN3314			
General Requirements Part 4 Chapter 1 must be met including: **1. Compatibility** Substances must be compatible with their packagings as required by 4; 1.1.3 **2. Closures** Closures must meet the requirements of 4: 1.1.4			
	Quantity PASSENGER	**Quantity CARGO**	**SINGLE PACKAGINGS**
UN2211 Polymeric beads, expandable, evolving flammable vapour **UN3314 Plastics moulding compound in dough sheet or extruded rope from evolving flammable vapour**	**100kg**	**200kg**	**YES**
ADDITIONAL PACKING REQUIREMENTS			
• **For other than metal packagings a sealed plastic liner must be used**			
SINGLE PACKAGINGS			
Boxes	**Drums**		
Fibreboard (4G)	Aluminium (1A1, 1B2)		
Plywood (4D)	Fibre (1G)		
Reconstituted wood (4F)	Plywood (1D)		
Wooden (4C1, 4C2)	Steel (1A1, 1A2)		

Packing Instruction 961

Passenger and Cargo Aircraft for UN2071 and UN2590

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

	Quantity PASSENGER	Quantity CARGO	SINGLE PACKAGINGS
UN2071 Ammonium nitrate fertilizers **UN2590 White asbestos**	**200kg**	**200kg**	**YES**

SINGLE PACKAGINGS

Boxes	Drums	Jerricans	Bags
Fibreboard (4G)	Aluminium(1B2)	Plastic(3H2)	Plastic (5H4)
Natural wood (4C2)	Fibreboard (1G)	Steel (3A2)	Textile(5L3)
Plastic (4H1, 4H2)	Plastic (1H2)		Woven plastic (5H3)
Plywood (4D)	Plywood (1D)		
Reconstituted wood (4F)	Steel (1A2)		

ADDITIONAL PACKING REQUIREMENTS

For UN2071 and 2590

- All rigid packagings must be sift-proof

For UN 2590

- Bags must be palletized and unitized by methods such as shrink wrapping in plastic film or wrapping in fibreboard secured by strapping

Note: 5L2, 5H2 deleted as not permitted in UN P002

Packing Instruction Y961

Limited Quantities

Passenger and Cargo - Solids

General requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements of

Part 3 Chapter 4 must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

COMBINATION PACKAGINGS						SINGLE PACKAGINGS
	Packing group	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
UN2071 Ammonium nitrate fertilizers	III	Glass	**5.0kg**	**30kg G**	**30kg**	**NO**
		Plastic	**5.0kg**			
		Metal	**5.0kg**			
		Paper bag	**5.0kg**			
		Plastic bag	**5.0kg**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 962

Passenger and Cargo Aircraft for UN3245 – liquid or solid

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

	Inner Packaging (See Packing instruction 602)	Quantity PASSENGER	Quantity CARGO	SINGLE PACKAGINGS
UN3245 Genetically modified organisms	**Liquids: 100ml Solids: 100g**	**NO LIMIT**	**NO LIMIT**	**NO**

ADDITIONAL REQUIREMENTS

- The packaging must comply with all the requirements of Packing instruction P602

Packing Instruction 963

Passenger and Cargo Aircraft for UN3316 – Liquids or solids

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4

	Inner Packaging (See 6:3.2)	Maximum quantity of dangerous goods per kit	Package Quantity PASSENGER	Package Quantity CARGO	SINGLE PACKAGINGS
UN3316 Chemical or first aid kits	**Liquids: 250ml Solids: 250g**	**Liquids: 1L Solids: 1kg**	**10kg**	**10kg**	**NO**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes

Aluminium (4B)
Fibreboard (4G)
Natural wood (4C1, 4C2)
Plastic (4H1, 4H2)
Plywood (4D)
Reconstituted wood (4F)
Steel (4A)

ADDITIONAL REQUIREMENTS FOR COMBINATION PACKAGINGS

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

Packing Instruction Y963

Limited Quantity

Passenger and Cargo Aircraft for UN3316 – Liquids or solids

General requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8c), 1.1.8e) and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

Limited quantity requirements of

Part 3 Chapter 4 must be met except 3: 4.3.3 including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test.

	Inner Packaging (See 6:3.2)	**Maximum quantity of dangerous goods per kit**	**Total gross mass per package**	**SINGLE PACKAGINGS**
UN3316 Chemical or first aid kits	**Liquids: 30ml Solids: 100g**	**1kg**	**30kg**	**NO**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes

Fibreboard

Natural wood

Plastic

Plywood

Reconstituted wood

ADDITIONAL REQUIREMENTS FOR COMBINATION PACKAGINGS

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

Packing Instruction 964

Passenger and Cargo Aircraft for UN3268

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

		Quantity PASSENGER	Quantity CARGO	SINGLE PACKAGINGS
UN3268 Air bag inflators, Air bag modules, Seat-belt pretensioners		**25kg**	**100kg**	**NO**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium(1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Other metal (3N2)
Natural wood (4C2)	Other metal (4N)	Plastic(3H2)
Plastic (4H1, 4H2)	Plastic (1H2)	Steel (3A2)
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Steel (4A)		

ADDITIONAL PACKING REQUIREMENTS

- Packagings must meet the PGIII performance requirements
- The packagings must be designed and constructed to prevent movement of the articles and inadvertent operation during normal conditions of transport.
- Any pressure vessel must be in accordance with the requirements of the appropriate national authority for the substance(s) contained in the pressure vessel(s).

CARGO AIRCRAFT ONLY

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 A115;

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.

e) irrespective of the limit specified in columns 12 to Table 3-1, a handling device meeting these requirements may have a gross mass not exceeding 1000kg.

Packing Instruction 965

Passenger and Cargo Aircraft for UN 3363 – Liquids or solids

General requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8, 1.1.10, 1.1.13 and 1.1.16 do not apply) including:

1) Compatibility

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closures

- Closures must meet the requirements of 4: 1.1.4.

This entry only applies to machinery or apparatus containing dangerous goods as a residue or as an integral element of the machinery or apparatus.
It must not be used for machinery or apparatus for which a proper shipping name exists in Table 3-1. For other than fuel system components machinery or apparatus may only contain dangerous goods permitted under 3; 4.1.2. (Limited Quantity) and UN2807

	Total net quantity of dangerous goods in one package (excluding magnetic material)		
UN 3363 Dangerous goods in apparatus or equipment	**Liquids**	**0.5L**	
	Solids	**1kg**	
	Gases (Division 2.2 only)	**0.5kg**	

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

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

Boxes	**Drums**	**Jerricans**

ADDITIONAL PACKING REQUIREMENTS

- 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
- "Package orientation" labels (Figure 5-24), or pre-printed orientation labels meeting the same specification as either Figure5-24 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. Irrespective of 5;3.2.10,
- machinery or apparatus containing magnetized material meeting the requirements of Packing Instruction 954 must also bear the "Magnetized material" label (Figure 5-22).
- For Division 2.2 gases, cylinders for gases, their contents and filling ratios must conform to the requirements of PI 200.

Fuel system components

Fuel system components must be emptied of fuel as far as practicable and all openings must be sealed securely. They must be packed:

1) 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;
2) in strong outer packagings.

Packing Instruction 966

Passenger and Cargo Aircraft for ID 8000

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 4;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 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 30 kg G.

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 L 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) 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 55ûC, 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 or other type of pallet prepared by a single shipper provided they contain no other dangerous goods.
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”.)

We could add whatever closure language we add to Part 4 to the body of the PI. Or change it so it has to comply with Part 4 Chapter 1.

Packing Instruction 967

Passenger and Cargo Aircraft for UN1941, UN1990, UN2315, UN3151, UN3082, UN 3334 - Liquids

General Requirements

Part 4 Chapter 1 must be met including:

1. **Compatibility**
   Substances must be compatible with their packagings as required by 4; 1.1.3.
2. **Closures**
   Closures must meet the requirements of 4: 1.1.4.

COMBINATION PACKAGINGS					**SINGLE PACKAGINGS**	
Applicable Substances	**Inner Packaging (see 6: 3.2)**	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package Passenger**	**Total Quantity Per Package CARGO**	**Passenger**	**Cargo**
UN1941 Dibromodifluoromethane	**Glass**	**10.0 L**	**100 L**	**220 L**	**100 L**	**220 L**
UN1990 Benzaldehyde			**100 L**	**220 L**	**100 L**	**220 L**
UN2315 Polychlorinated biphenyls, liquid			**100 L**	**220 L**	**100 L**	**220 L**
UN3151 Polyhalogenated biphenyls or terphenyls, liquid	**Plastic**	**30.0 L**	**100L**	**220 L**	**100L**	**220 L**
UN3082 Environmentally hazardous substance, liquid, n.o.s.	**Metal**	**40.0 L**	**450L**	**450L**	**450L**	**450L**
UN 3334 Aviation regulated liquid, n.o.s.*			**No limit**	**No limit**	**No limit**	**No limit**

OUTER PACKAGINGS OF COMBINATION PACKAGINGS

Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Other Metal (3N2)
Natural wood(4C1, 4C2)	Other Metal (1N2)	Plastics (3H2)
Plastics (4H1, 4H2)	Plastics (1H2)	Steel (3A2)
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

SINGLE PACKAGINGS

Composites	**Cylinders**	**Drums**	**Jerricans**
ALL	See 4; 2.7	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
		Other metal (1N1, 1N2)	Plastic (3H1, 3H2)
		Plastic (1H1, 1H2)	Steel (3A1, 3A2)
		Steel (1A1, 1A2)	

Packing Instructions Y967

Limited Quantities

Passenger and Cargo Aircraft for UN1941, UN1990, UN3082

General Requirements

Part 4 Chapter 1 requirements must be met (except that 4: 1.1.2, 1.1.8 c, 1.1.8 e and 1.1.16 do not apply) including:

1) Compatibility Requirements

- Substances must be compatible with their packagings as required by 4; 1.1.3.

2) Closure Requirements

- Closures must meet the requirements of 4: 1.1.4.

Limited Quantity Requirements

Part 3 Chapter 4 requirements must be met including:

- the capability of the package to pass a drop test of 1.2m;
- a 24 hour stacking test;
- Inner packagings for liquids must be capable of passing a pressure differential test (4;1.1.6).

COMBINATION PACKAGINGS					**SINGLE PACKAGINGS**
	Inner Packaging (see 6: 3.2)	**Inner packaging quantity (per receptacle)**	**Total Quantity Per Package**	**Total gross mass per package**	
UN1941 Dibromodifluoromethane, UN1990 Benzaldehyde, UN3082 Environmentally hazardous substance, liquid, N.O.S	Glass	**5.0L**	**30kg**	**30kg**	**NO**
	Plastic	**5.0L**			
	Metal	**5.0L**			

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes	**Drums**	**Jerricans**
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Plastics	Steel
Plastics	Other Metal	
Plywood	Steel	
Reconstituted wood		
Steel		

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APPENDIX C

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS RELATED TO PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS AND CREW

Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

Chapter 1

PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

. . .

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

1.1.1 Except as otherwise provided in 1.1.2, dangerous goods, including excepted packages of radioactive material, must not be carried by passengers or crew members, either as or in carry-on baggage or checked baggage or on their person. Security type equipment such as attaché cases, cash boxes, cash bags, etc., incorporating dangerous goods, for example lithium batteries or pyrotechnic material, are totally forbidden; see entry in Table 3-1. Personal medical oxygen devices that utilize liquid oxygen are prohibited either as or in carry-on baggage or checked baggage or on the person.

. . .

1.1.2 Notwithstanding any additional restrictions which may be implemented by States in the interests of aviation security, except for the incident reporting provisions of 7;4.4, ~~T~~the provisions of these Instructions do not apply to the following when carried by passengers or crew members, or in baggage~~, transported by the operator,~~ that has been separated from its owner during transit (e.g. lost baggage or improperly routed baggage):

Medical necessities

~~e~~a) with the approval of the operator(s)~~, small~~ gaseous oxygen or air cylinders required for medical use. Each cylinder must not exceed 5 kg gross mass. Cylinders, valves and regulators, where fitted, must be protected from damage which could cause inadvertent release of the contents;

Note.— Devices containing liquid oxygen are forbidden as or in carry-on baggage, checked baggage or on the person.

~~d~~b) ~~small~~ cylinders of a gas of Division 2.2 worn for the operation of mechanical limbs, also spare cylinders of a similar size if required to ensure an adequate supply for the duration of the journey;

~~b~~c) non-radioactive medicinal~~ or toilet~~ articles (including aerosols). ~~Also aerosols in Division 2.2, with no subsidiary risk, for sporting or home use is permitted in checked baggage only.~~ The total net quantity~~ of all such articles carried by each person must not exceed 2 kg or 2 L and the net quantity~~ of each single article must not exceed 0.5 kg or 0.5 L. Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of

the contents~~. The term "medicinal or toilet articles (including aerosols)" is intended to include such items as hair sprays, perfumes, colognes and medicines containing alcohols~~;

The total net quantity of all articles mentioned in 1.1.2 c), h) and k) must not exceed 2 kg or 2 L (e.g. 4 aerosol cans of 500 mL each) for each person.

~~h~~d) radioisotopic cardiac pacemakers or other devices, including those powered by lithium batteries, implanted into a person, or radio-pharmaceuticals contained within the body of a person as the result of medical treatment;

~~i~~e) with the approval of the operator(s), wheelchairs or other battery-powered mobility aids with non-spillable batteries (see Packing Instruction 806 and Special Provision A67), as checked baggage provided the battery terminals are protected from short circuits and the battery is securely attached to the wheelchair or mobility aid;

~~j~~f) with the approval of the operator(s), wheelchairs or other battery-powered mobility aids with spillable batteries as checked baggage, provided that the wheelchair or mobility aid can be loaded, stowed, secured and unloaded always in an upright position and that the battery is disconnected, the battery terminals are protected from short circuits and the battery is securely attached to the wheelchair or mobility aid. If the wheelchair or mobility aid cannot be loaded, stowed, secured and unloaded always in an upright position, the battery must be removed and the wheelchair or mobility aid may then be carried as checked baggage without restriction. The removed battery must be carried in strong, rigid packagings as follows:

1) these packagings must be leaktight, impervious to battery fluid and be protected against upset by securing them to pallets or by securing them in cargo compartments using appropriate means of securement (other than by bracing with freight or baggage) such as by use of restraining straps, brackets or holders;

2) batteries must be protected against short circuits, secured upright in these packagings and surrounded by compatible absorbent material sufficient to absorb their total liquid contents; and

3) these packagings must be marked "Battery, wet, with wheelchair" or "Battery, wet, with mobility aid" and be labelled with a "Corrosive" label (Figure 5-21) and with a package orientation label (Figure 5-25).

The pilot-in-command must be informed of the location of a wheelchair or mobility aid with an installed battery or the location of a packed battery.

It is recommended that passengers make advance arrangements with each operator; also unless batteries are non-spillable they should be fitted, where feasible, with spill-resistant vent caps;

~~e~~g) one small medical or clinical thermometer which contains mercury, for personal use, when in its protective case;

Articles used in dressing or grooming

~~b~~h) ~~non-radioactive medicinal or~~ toilet~~ry~~ articles (including aerosols). ~~Also aerosols in Division 2.2, with no subsidiary risk, for sporting or home use is permitted in checked baggage only.~~ The total net quantity ~~of all such articles carried by each person must not exceed 2 kg or 2 L and the net quantity~~ of each single article must not exceed 0.5 kg or 0.5 L. Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents. The term ~~"medicinal or~~ "toilet~~ry~~ articles (including aerosols)" is intended to include such items as hair sprays, perfumes~~,~~ and colognes ~~and medicines containing alcohols~~;

The total net quantity of all articles mentioned in 1.1.2 c), h) and k) must not exceed 2 kg or 2 L (e.g. 4 aerosol cans of 500 mL each) for each person.

~~k~~i) hair curlers containing hydrocarbon gas, no more than one per person, provided that the safety cover is securely fitted over the heating element. Gas refills for such curlers must not be carried;

Consumer articles

~~a~~j) when in retail packagings, alcoholic beverages containing more than 24 per cent but not more than 70 per cent alcohol by volume, in receptacles not exceeding 5 L, with a total net quantity per person of 5 L for such beverages;

Note.— Alcoholic beverages containing not more than 24 per cent alcohol by volume are not subject to any restrictions.

~~b~~k) ~~non-radioactive medicinal or toilet articles (including aerosols). Also a~~Aerosols in Division 2.2, with no subsidiary risk, for sporting or home use is permitted in checked baggage only. The total net quantity ~~of all such articles carried by each person must not exceed 2 kg or 2 L and the net quantity~~ of each single article must not exceed 0.5 kg or 0.5 L. Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents~~. The term "medicinal or toilet articles (including aerosols)" is intended to include such items as hair sprays, perfumes, colognes and medicines containing alcohols~~;

The total net quantity of all articles mentioned in 1.1.2 c), h) and k) must not exceed 2 kg or 2 L (e.g. 4 aerosol cans of 500 mL each) for each person.

~~c~~l) with the approval of the operator(s), as checked baggage only, securely packaged cartridges (UN 0012 or UN 0014 only), in Division 1.4S, in quantities not exceeding 5 kg gross mass per person for that person's own use, excluding ammunition with explosive or incendiary projectiles. Allowances for more than one person must not be combined into one or more packages;

≠ ~~g~~m) one small packet of safety matches or a cigarette lighter that does not contain unabsorbed liquid fuel (other than liquefied gas), intended for use by an individual when carried on the person. Matches and lighters are not permitted in checked or carry-on baggage. Lighter fuel and lighter refills are not permitted on one's person, in carry-on or checked baggage;

Note.— "Strike anywhere" matches are forbidden for air transport.

n) with the approval of the operator(s), ~~heat producing articles (i.e. battery-operated~~ equipment ~~such as underwater torches and soldering equipment which, if accidentally activated, will generate extreme heat and can cause fire) may be carried in carry-on baggage only. The heat producing component, or the energy source, must be removed so as to prevent unintentional functioning during transport~~ battery-powered equipment capable of generating extreme heat, which could cause a fire if activated (e.g. underwater high intensity lamps) providing that the heat producing component or the battery is packed separately so as to prevent activation during transport. Any battery which has been removed must be protected against short circuit;

≠ ~~p~~o) with the approval of the operator(s), one avalanche rescue backpack per person equipped with a pyrotechnic trigger mechanism containing not more than 200 mg net of Division 1.4S and a cylinder of compressed gas of Division 2.2 not exceeding 250 mL. The backpack must be packed in such a manner that it cannot be accidentally activated. The airbags within the backpack must be fitted with pressure relief valves;

~~m~~p) with the approval of the operator(s), no more than two small cylinders of carbon dioxide or another suitable gas in Division 2.2, per person, fitted into a self-inflating life-jacket for inflation purposes, plus no more than two spare cartridges;

Editorial Note.— Proposed amendments to sub-paragraph q) are shown in Appendix D to the report on this agenda item. Proposed amendments to sub-paragraph r) are shown in the appendix to the report on Agenda Item 2.

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Other

≠ ~~f~~s) with the approval of the operator, dry ice in quantities not exceeding 2.5 kg per person, when used to pack perishables that are not subject to these Instructions, provided the package permits the release of carbon dioxide gas. ~~The dry ice may be either:~~

~~— in carry-on baggage; or~~

~~— with the approval of the operator(s), in checked baggage.~~

When carried in checked baggage, each package must be marked:

— "DRY ICE" or "CARBON DIOXIDE, SOLID"; and

— with the net weight of dry ice or an indication that the net weight is 2.5 kg or less;

~~t~~t) with the approval of the operator(s), as carry-on baggage only, a mercurial barometer or mercurial thermometer carried by a representative of a government weather bureau or similar official agency. The barometer or

thermometer must be packed in a strong outer packaging, having a sealed inner liner or a bag of strong leakproof and puncture-resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position. The pilot- in-command must be informed of the barometer or thermometer;

~~s~~u) with the approval of the operator(s), as carry-on or checked baggage, instruments containing radioactive material not exceeding the activity limits specified in Table 2-12 (i.e. chemical agent monitor (CAM) and/or rapid alarm and identification device monitor (RAID-M)), securely packed and without lithium batteries, when carried by staff members of the Organization for the Prohibition of Chemical Weapons (OPCW) on official travel.

1.1.3 Any organization or enterprise other than an operator (such as a travel agent), involved in the air transport of passengers, should provide passengers with information about the types of dangerous goods which they are forbidden to transport aboard an aircraft. This information should consist of, as a minimum, notices at those locations where there is an interface with the passengers.

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APPENDIX D

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS RELATED TO LITHIUM BATTERIES

PART 3

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Table 3-1. Dangerous Goods List

								Passenger aircraft		Cargo aircraft	
Name	*UN No.*	*Class or division*	*Subsidiary risk*	*Labels*	*State variations*	*Special provisions*	*UN packing group*	*Packing instruction*	*Max. net quantity per package*	*Packing instruction*	*Max. net quantity per package*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Lithium metal batteries (including lithium alloy batteries)†	3090	9		Miscellaneous		A88 ~~A45~~ A99 A154 A164	II	~~903~~9X1	~~5~~ 2.5 kg G	~~903~~9X1	35 kg G
Lithium metal batteries contained in equipment (including litfhium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	~~A45~~ A48 A154 A164		see ~~912~~9X3		see ~~912~~9X3	
Lithium metal batteries packed with equipment (including lithium alloy batteries)†	3091	9		Miscellaneous	US 2 US 3	~~A45~~ A154 A164		see ~~918~~9X2		see ~~918~~9X2	
Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous		A88 A99 A154 A164	II	9X4	5 kg G	9X4	35 kg G
Lithium ion batteries contained in equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous		A48 A154 A164	II	see 9X6		see 9X6	
Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous		A88 A154 A164	II	see 9X5		see 9X5	

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Table 3-2. Special provisions

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A45 Not used.~~Lithium cells and batteries offered for transport are not subject to other provisions of these Instructions if they meet the following:~~

~~a) For a lithium metal or lithium alloy cell, the lithium content is not more than 1 g, and for a lithium ion cell, the lithium-equivalent content is not more than 1.5 g;~~

~~b) For a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g, and for a lithium ion battery, the aggregate lithium-equivalent content is not more than 8 g;~~

~~c) Each cell or battery is of the type proved to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3;~~

~~d) Cells and batteries are separated so as to prevent short circuits and are packed in strong packagings, except when installed in equipment; and~~

~~e) Except when installed in equipment, each package containing more than 24 lithium cells or 12 lithium batteries must in addition meet the following requirements:~~

~~i) Each package must be marked indicating that it contains lithium batteries and that special procedures should be followed in the event that the package is damaged;~~

~~ii) Each shipment must be accompanied with a document indicating that packages contain lithium batteries and that special procedures should be followed in the event a package is damaged;~~

~~iii) Each package is capable of withstanding a 1.2 m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents; and~~

~~iv) Except in the case of lithium batteries packed with equipment, packages may not exceed 30 kg gross mass.~~

~~As used above and elsewhere in the Instructions, "lithium content" means the mass of lithium in the anode of a lithium metal or lithium alloy cell, except in the case of a lithium ion cell the "lithium equivalent content" in grams is calculated to be 0.3 times the rated capacity in ampere-hours~~.

Part 4

PACKING INSTRUCTIONS

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

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Delete current packing instructions 903, 912 and 918 and *insert* the following:

PACKING INSTRUCTION 9X1		
Passenger and Cargo Aircraft for UN 3090		
Lithium Metal Cells and Batteries		
This entry applies to lithium metal or lithium alloy batteries in Class 9 (Section I) and lithium metal or lithium alloy batteries subject to specific requirements of the Technical Instructions (Section II).		
Section I		
Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9. • Each cell or battery must; i. Be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3. ii. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits. • 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). • Cells, and batteries containing one or more cells, with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride 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; are forbidden from transport.		
General Requirements: Part 4;1 requirements must be met.		
Outer Packagings		
Boxes	**Drums**	**Jerricans**
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
For all lithium metal cells and batteries prepared for transport as Class 9: • They must be protected against short circuits; • Packagings must meet Packing Group II performance requirements;		

- Lithium batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings and protective enclosures not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of origin. A copy of the document of approval must accompany the consignment.

For lithium metal cells and batteries prepared for transport on Passenger Aircraft as Class 9:

- Cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging.
- Cell and batteries must be surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging.

Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Lithium Metal Cells and Batteries	**2.5 kg G**	**35 kg G**

Section II

Lithium metal or lithium alloy cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.

Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet the following:

1. A lithium metal cell, the lithium content is not more than 1 g;
2. A lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g.
3. Each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.

General Requirements:

Batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1)

STRONG OUTER PACKAGINGS

Boxes	Drums	Jerricans

Additional Requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each consignment must be accompanied with a document such as an air waybill with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- Each package must be labelled with a lithium battery handling label (Figure 5-30);
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

Section II	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Lithium Metal Cells and Batteries	**2.5 kg G**	**2.5 kg G**

PACKING INSTRUCTION 9X2

Passenger and Cargo Aircraft for UN 3091

Lithium Metal Cells and Batteries packed with equipment

This entry applies to lithium metal or lithium alloy batteries in Class 9 (Section I) and lithium metal or lithium alloy batteries subject to specific requirements of the Technical Instructions (Section II).

Section I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

- Each cell or battery must;
  - i. Be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.
  - ii. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.
- 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).
- Cells, and batteries containing one or more cells, with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride 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;
  are forbidden from transport.

General Requirements:

Part 4;1 requirements must be met.

Outer Packagings

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Additional Requirements

For all lithium metal cells and batteries prepared for transport as Class 9:

- They must be protected against short circuits;
- The completed package for the cells or batteries must meet the Packing Group II packaging requirements.
- Each completed package containing lithium cells or batteries must be marked and labelled in accordance with the applicable requirements of Part 5, Chapters 1, 2 and 3;
- The equipment and the packages of lithium cells or batteries must be placed in an overpack. The overpack must bear applicable marks and labels as set out in Part 5;1 and 5;2.4.9;
- For the purpose of this packing instruction, “equipment” means apparatus requiring the lithium batteries with which it is packed for its operation.

Lithium metal cells and batteries prepared for transport on Passenger Aircraft as Class 9 must in addition meet the following requirements:

- Cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging.
- Surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging.

Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Packaged Quantity of Lithium Metal Cells and Batteries per overpack (Excluding Equipment)	**5 kg**	**35 kg**

Section II

Lithium metal cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.

Lithium metal cells and batteries may be offered for transport if they meet the following:

1. A lithium metal cell, the lithium content is not more than 1 g;
2. A lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g.
3. Each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.

General Requirements:

Batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1)

STRONG OUTER PACKAGINGS

Boxes	Drums	Jerricans

Additional Requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery;
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit;
- The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares;
- Each package of batteries must be capable of withstanding a 1.2 m drop test in any orientation without
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each consignment must be accompanied with a document such as an air waybill with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- Each package must be labelled with a lithium battery handling label (Figure 5-30);
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

PACKING INSTRUCTION 9X3

Passenger and Cargo Aircraft for UN 3091

Lithium Metal Cells and Batteries contained in equipment

This entry applies to lithium metal or lithium alloy batteries in Class 9 (Section I) and lithium metal or lithium alloy batteries subject to specific requirements of the Technical Instructions (Section II).

Section I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

- Each cell or battery must;
  - i. Be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.
  - ii. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.
- 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).
- Cells, and batteries containing one or more cells, with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride 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;
  are forbidden from transport.

General Requirements:

Part 4;1 requirements must be met.

Outer Packagings

Boxes	Drums	Jerricans

Additional Requirements

For all lithium metal cells and batteries prepared for transport as Class 9:

- 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.

Section I	Passenger Aircraft	Cargo Aircraft
Net Quantity of Lithium Metal Batteries per Piece of Equipment	**5 kg**	**35 kg**

Section II

Lithium metal cells and batteries contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.

Lithium metal cells and batteries may be offered for transport if they meet the following:

1. A lithium metal cell, the lithium content is not more than 1 g;
2. A lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g.
3. Each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.

General Requirements:

- Equipment containing batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1)

STRONG OUTER PACKAGINGS

Boxes	Drums	Jerricans

Additional Requirements
• The equipment must be equipped with an effective means of preventing accidental activation. • Cells and batteries must be protected so as to prevent short circuits. • The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained. • Each consignment with packages bearing the lithium battery handling label must be accompanied with a document such as an air waybill with an indication that: o the package contains lithium metal cells or batteries; o the package must be handled with care and that a flammability hazard exists if the package is damaged; o special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and o a telephone number for additional information. • Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-30); • Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

PACKING INSTRUCTION 9X4

Passenger and Cargo Aircraft for UN 3480

Lithium Ion Cells and Batteries (including lithium polymer)

This entry applies to lithium ion or lithium polymer batteries in Class 9 (Section I) and lithium ion or lithium polymer batteries subject to specific requirements of the Technical Instructions (Section II).

Section I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

- Each cell or battery must;
  - i. Be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.
  - ii. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.
- 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).

General Requirements:

Part 4;1 requirements must be met.

Outer Packagings

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Additional Requirements

For all lithium ion cells and batteries prepared for transport as Class 9:

- They must be protected against short circuits;
- Packagings must meet Packing Group II performance requirements;
- Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings and protective enclosures not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of origin. A copy of the document of approval must accompany the consignment

Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Lithium Ion Cells and Batteries	**5 kg G**	**35 kg G**

Section II

Lithium ion cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.

Lithium ion cells and batteries may be offered for transport if they meet the following:

1. Lithium ion cells, the Watt-hour rating is not more than 20 Wh;
2. Lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   - The Watt-hour rating must be marked on the outside of the battery case.
3. Each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.

General Requirements:

Batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1)

STRONG OUTER PACKAGINGS

Boxes	**Drums**	**Jerricans**

Additional Requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each consignment must be accompanied with a document such as an air waybill with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- Each package must be labelled with a lithium battery handling label (Figure 5-30);
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

Section II	**Package Quantity for Passenger Aircraft**	**Package Quantity for Cargo Aircraft**
Lithium Ion Cells and Batteries	**10 kg G**	**10 kg G**

PACKING INSTRUCTION 9X5

Passenger and Cargo Aircraft for UN 3481

Lithium Ion Cells and Batteries (including lithium polymer) packed with equipment

This entry applies to lithium ion or lithium polymer batteries packed with equipment in Class 9 (Section I) and lithium ion or lithium polymer batteries packed with equipment subject to specific requirements of the Technical Instructions (Section II).

Section I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

- Each cell or battery must:
  - i. Be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.
  - ii. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.
- 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).

General Requirements:

Part 4;1 requirements must be met.

Outer Packagings

Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

Additional Requirements

For all lithium ion cells and batteries prepared for transport as Class 9:

- They must be protected against short circuits.
- The completed package for the cells or batteries must meet the Packing Group II packaging requirements.
- The equipment and the packages of lithium cells or batteries must be placed in an overpack. The overpack must bear applicable marks and labels as set out in Part 5;1 and 5;2.4.9.
- For the purpose of this packing instruction, "equipment" means apparatus requiring the lithium ion batteries with which it is packed for its operation.

Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Packaged Quantity of Lithium Ion Cells and Batteries per overpack (excluding equipment)	**5 kg**	**35 kg**

Section II

Lithium ion cells and batteries (including lithium polymer) offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.

Lithium ion cells and batteries may be offered for transport if they meet the following:

1. Lithium ion cells, the Watt-hour rating is not more than 20 Wh;
2. Lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   - The Watt-hour rating must be marked on the outside of the battery case.
3. Each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.

General Requirements:

Batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1).

STRONG OUTER PACKAGINGS

Boxes	Drums	Jerricans

Additional Requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares;
- Each package of batteries must be capable of withstanding a 1.2 m drop test in any orientation without
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each consignment must be accompanied with a document such as an air waybill with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- Each package must be labelled with a lithium battery handling label (Figure 5-30);
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

PACKING INSTRUCTION 9X6

Passenger and Cargo Aircraft for UN 3481

Lithium Ions Cells and Batteries (including lithium polymer) contained in equipment

This entry applies to lithium ion or lithium polymer batteries contained in equipment in Class 9 (Section I) and lithium ion or lithium polymer batteries contained in equipment subject to specific requirements of the Technical Instructions (Section II).

Section I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

- Each cell or battery must;
  i. Be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.
  ii. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.
- 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).

General Requirements:

Part 4;1 requirements must be met.

Outer Packagings

Boxes	Drums	Jerricans

Additional Requirements

- 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.

Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Net Quantity of Lithium Ion Batteries Per Piece of Equipment	**5 kg**	**35 kg**

Section II

Lithium ion cells and batteries (including lithium polymer) contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.

Lithium ion cells and batteries may be offered for transport if they meet the following:

1. Lithium ion cells, the Watt-hour rating is not more than 20 Wh;
2. Lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   - The Watt-hour rating must be marked on the outside of the battery case.
3. Each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.

General Requirements:

Equipment must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1).

STRONG OUTER PACKAGINGS

Boxes	Drums	Jerricans

Additional Requirements
• The equipment must be equipped with an effective means of preventing accidental activation. • Cells and batteries must be protected so as to prevent short circuits. • The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained. • Each consignment with packages bearing the lithium battery handling label must be accompanied with a document such as an air waybill with an indication that: o the package contains lithium ion cells or batteries; o the package must be handled with care and that a flammability hazard exists if the package is damaged; o special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and o a telephone number for additional information. • Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-30); • Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

Editorial Note.— Delete Packing instructions 903, 912 and 918.

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Part 5

SHIPPER'S RESPONSIBILITIES

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Add new heading 3.5.2.1 and new paragraph 3.5.2.2:

3.5.2 Handling label ~~specifications~~

3.5.2.1 *Handling label specifications*

An illustration of each of the handling labels showing the approved design and colour is given in Figures 5-23 to 5-25 and Figures 5-27 to 5-29. The minimum label dimensions are shown in the figures; however, labels having dimensions not smaller than half of those indicated may be used on packages containing infectious substances when the packages are of dimensions such that they can only bear smaller labels.

3.5.2.2 *Lithium battery handling label*

Packages containing lithium batteries packed according to packing instructions 9X1 to 9X6 that are not subject to other additional requirements of these Instructions must bear a "Lithium battery" handling label (Figure 5-30). The label must show "Lithium metal batteries" or "Lithium ion batteries", as applicable.

. . .

Insert new Figure 5-30 as follows:



Colour: red on a contrasting background
Dimensions: 120 × 110 mm

* Place for “Lithium ion battery” or “Lithium metal battery”

Figure 5-30. Lithium battery handling label

Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

Chapter 1

PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

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1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

q) consumer electronic devices (watches, calculating machines, cameras, cellular phones, laptop computers, camcorders, etc.) containing lithium or lithium ion cells or batteries when carried by passengers or crew for personal use, which should be carried as carry-on baggage. Spare batteries must be individually protected so as to prevent short circuits (by placement in original retail packaging or by otherwise insulating terminals, e.g. by taping over exposed terminals or placing each battery in a separate plastic bag or protective pouch) and carried in carry-on baggage only. In addition, each installed or spare battery must not exceed the following ~~quantities~~:

— for lithium metal or lithium alloy batteries, a lithium content of not more than 2 grams; or

— for lithium ion batteries, ~~an aggregate equivalent lithium content of not more than 8 grams~~ a watt-hour rating of not more than 100 Wh.

With the approval of the operator, ~~L~~lithium ion batteries exceeding ~~with an aggregate equivalent lithium content of more than 8 grams but not more than 25 grams~~ a watt-hour rating of 100 Wh but not exceeding 160 Wh may be carried as spare batteries in carry-on baggage ~~if they are individually protected so as to prevent short circuits and are limited to two spare batteries per person~~ or in equipment in either checked or carry-on baggage. No more than two individually protected spare batteries per person may be carried.

— END —