



DANGEROUS GOODS PANEL (DGP)

TWENTY-FIRST MEETING

Montréal, 5 to 16 November 2007

**WG/07 — REPORT OF THE MEETING OF THE
WORKING GROUP OF THE WHOLE**

(Presented by the Secretary)

SUMMARY

This paper presents the report of the DGP Working Group of the Whole (WG/07) Meeting held in Memphis, Tennessee from 30 April to 4 May 2007. It also includes a consolidation of proposed amendments arising from the WG/07 meeting as follows:

Appendix A — Amendments to Doc 9284, *Technical Instructions for the Safe Transport of Dangerous Goods by Air*

Appendix B — Amendments to Amendments to Doc 9284Supp, *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air*

Appendix C — Amendments to Doc 9481, *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods*

The DGP-WG is invited to note the contents of this working paper.

1.1 The meeting of the Dangerous Goods Panel Working Group of the Whole was opened by Mr. Jack Muhs, Vice President, International Planning and Engineering, Federal Express Corporation on 30 April 2007. Mr. G. Leach was elected Chairperson of the meeting and Mr. Richard was elected Vice Chairperson. Mr. Leach, on behalf of the working group, thanked Messrs Muhs and Richard for the excellent hospitality provided by the Fedex Corporation and the U.S. Department of Transportation.

2. ATTENDANCE

2.1 The meeting was attended by the following panel members and advisers:

| Member | Adviser | State/International Organization |
|-----------------------|-------------------------|---|
| R.E. Timmins | L. Willoughby | Australia |
| K. Vermeersch | | Belgium |
| P.C.C. Guerreiro Lima | L. Horacio Jawerbaum | Brazil |
| G. Branscombe | T.C. Vieira | |
| | D. Evans | Canada |
| | L. Hume Sastre | |
| | R. Lessard | |
| Jiang Rui | D. Sylvestre | |
| | J. Abouchaar | China |
| | Xiao Ruping | |
| | Frank Yan | |
| | Li Yuhong | |
| | Qiu Zhenhua | |
| | Aldous Chung | Hong Kong, China |
| | Sze Wang Mok | |
| J. Le Tonqueze | | France |
| H. Brockhaus | P. Bluemel | Germany |
| | M. Philippi | |
| | T. Seemann | |
| M. Gelsomino | C. Carboni | Italy |
| | Hikomichi Kinoshita | Japan |
| | Kaoru Ohta | |
| | Yasuhiro Ohno | |
| | Shuichiro Saito | |
| | Yukihiro Watanabe | |
| D.E. Raadgers | W. Hoogerhout | Netherlands |
| | T. Muller | |
| | S. Oosterhoff | |
| M.W. Evans | | New Zealand |
| | D. Kurdchenko | Russian Federation |
| | L. Calleja Bárcena | Spain |
| | D. Cantalejo de la Mata | |
| G. Leach | M. Castle | United Kingdom |
| | J. Hart | |
| | R. McLachlan | |
| | R. Wells | |
| R.A. Richard | J. McLaughlin | United States |
| | D. Pfund | |
| D. Brennan | P. Jala | IATA |
| | R. Jessop | |
| | P. Oppenheimer | |
| M. Rogers | J. Haynes | IFALPA |
| | M. Wangler | IAEA |
| | E. Sigrist | CEFIC |
| | R. Bauer | |

| Member | Adviser | State/International Organization |
|--------|--|--|
| | E.A. Altemos S. Burkhart S. Lineham N. McCulloch J.T. Mulreed A. Stukas F. Wybenga V. Krampe R. Wichert Kerchner, G. Monahan, C. | DGAC FEA Fuel Cell Council PRBA |

3. REVIEW OF REPORT

3.1 Report of the Meeting of the Working Group of the Whole (WG/06) Including Consolidated Proposed Amendments Agreed to at the Meeting (DGP-WG/07-WP/1)

3.1.1 The report of the WG06 meeting was agreed to, subject to A154 being added against Lithium batteries packed with equipment and the deletion of an editorial note after 5;1.1 h).

4. DEVELOPMENT OF PROPOSALS, IF NECESSARY, FOR AMENDMENTS TO ANNEX 18 — *THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR*

4.1 Refer to SMS discussion (paragraph 8).

5. 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

Amendments to Part 1 — General

5.1 Draft amendments to the Technical Instructions to align to the UN Recommendations — Part 1 (DGP-WG/07-WP/2)

5.1.1 Draft amendments to Part 1 Chapters 1, 2, 3, 5 and a new Chapter 6 were proposed to reflect the decisions taken by the UN. These were agreed to subject to the:

- a) deletion of “international” in 1;2.3 as appropriate;
- b) insertion of “For the transport of class 7 material” into definitions transferred from 2;7 (as appropriate);
- c) addition of “desensitized explosives” against Class 3 in Table 1-5;

- d) addition of 5;1.4 as a reference in 6.1.5.1 a); and
- e) retention of the original text from 1.4 in new 6.6 (the Secretary will advise the IAEA).

5.2 **Excepted quantities (DGP-WG/07-WP/8)**

5.2.1 The incorporation in the UN Model Regulations of a new chapter on excepted quantities and a new column for limited quantities in the List of Dangerous Goods was discussed. The requirements in the new chapter largely reflect those in 1;2.4 of the 2007-2008 Edition of the Technical Instructions with the exception of a new excepted quantities mark and a new format in which a code is assigned to each entry in the List of Dangerous Goods with the corresponding quantity limits presented in a table the new chapter.

5.3 It was recalled that WG06 had agreed to adopt the UN provisions but it was queried whether the adoption of the new format should be deferred until after a decision was taken regarding the formatting of the packing instructions. Some members wished to align the provisions to the greatest extent practicable with those of the UN recommendations; others suggested it should be done in conjunction with the reformatting exercise.

5.4 It was agreed the UN text (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.

5.5 **Dangerous goods to provide medical aid in flight (DGP-WG/07-WP/36)**

5.5.1 A proposal to clarify the conditions under which dangerous goods may be carried to provide medical aid to a patient was discussed. The proposal was modified to refer to aircraft rather than aeroplane and to remove reference to medical evacuation.

5.5.2 It was agreed that the wording of Part 1;1.1.3.1 a) is intended to apply to dedicated air ambulance flights and also instances where, for example, an operator may remove seats from a conventional scheduled flight to carry a patient. One member suggested that the sub-paragraph should be further subdivided to clarify this. It was explained, however, that the wording has been interpreted by some as meaning one circumstance or the other, not both.

5.5.3 The paper was withdrawn; a revised proposal will be submitted for DGP/21.

5.6 **Definition of the term “specially designed for their transport” (DGP-WG/07-WP/39)**

5.6.1 Clarification was sought on the meaning of the term “specially designed for their transport” in Part 1;2.2.2. It was noted by one member that in practice, the provisions of Part 1;2.2.2 tend to be used for items such as aircraft batteries where the operator does not possess the manufacturer’s original packaging nor any other suitable UN specification packagings. However, questions from the engineering departments of several operators led the member to believe that the meaning of this definition is not clear. Some operators manufacture their own wooden or plywood boxes as and when the need arises, but it is not clear whether this is what was intended when the provision was introduced.

5.6.2 It was agreed the term was vague and that clarifying text should be developed. One member suggested that reference to the relevant UN test requirements in Part 6 could be made, even if the

packagings are not themselves UN specification packagings. It was noted that this phrase applied to packagings for many aircraft spare parts, not just those containing dangerous goods e.g. packagings designed to protect sensitive aircraft equipment. After discussion by the working group, the proposer withdrew the paper and said a revised proposal would be submitted for DGP/21.

5.7 Training for security personnel (DGP-WG/07-WP/61)

5.7.1 Following the outcome of discussions at the Eighteenth Meeting of the Aviation Security Panel (AVSECP/18), it was suggested that the focus of dangerous goods is not only a safety issue but also one of security. The working group was requested to consider the need to instruct security personnel to a greater depth and to review the current training requirements. It was proposed that in addition to operational security staff such as screeners, supervisory staff and staff implementing security procedures will need to be trained on certain aspects of dangerous goods, allowing them to recognize and anticipate conflicts between security and dangerous goods regulations at an earlier stage.

5.7.2 There was general support for the proposal with a number of members noting the benefits to safety which would result. It was noted that basic classification was sometimes covered under general philosophy but since this was not always the case, it was believed it was necessary to clarify it by the addition of a note.

5.7.3 The proposal was agreed.

5.8 Training requirements for airlines not holding an approval to carry dangerous goods (DGP-WG/07-WP/68)

5.8.1 Concern was raised at DGP-WG/06 of operators who, when not possessing a licence to carry dangerous goods, believed they did not have to train their staff. Two proposals to refine the training requirements for operators not carrying dangerous goods as cargo were made at that meeting, and at that time the working group favoured the proposal for the development of an additional table in the Technical Instructions. Based on the discussion at DGP-WG/06, a proposal to add a new paragraph to 1;4.2 specifying that staff of operators not holding an approval to carry dangerous goods must be trained commensurate with their responsibilities and a new Table 1-5 indicating the subject matter with which the various categories of staff should be familiar with was made.

5.8.2 Following comments on the absence of the term “approval” in the Technical Instructions in relation to operators, it was proposed to replace this with “operators not carrying dangerous goods as cargo”. It was queried whether ground handling staff should be identified separately but it was pointed out that persons employed contractually by an operator to act on their behalf would be subject to the requirements.

5.8.3 The proposal, as amended, was agreed.

Amendments to Part 2 — Classification

5.9 Draft amendments to the Technical Instructions to align to the UN Recommendations — Part 2 (DGP-WG/07-WP/3)

5.9.1 Draft amendments to Part 2 Chapters 2, 4, 5, 6, 7 and 8 were proposed to reflect the decisions taken by the UN. These were agreed to subject to the replacement of:

- a) “280 kPa” with “200 kPa” in 2;2.2.2; and

- b) “must require” with “require” in 2;7.2.2.2.

Amendments to Part 3 — Dangerous Goods List and Limited Quantities Exceptions

5.10 Draft amendments to the Technical Instructions to align to the UN Recommendations — Part 3 (DGP-WG/07-WP/4)

5.10.1 Draft amendments to Part 3 Chapters 2 and 3 were proposed to reflect the decisions taken by the UN. These were agreed to subject to the assignment of:

- a) A99 and A154 against UN 3480;
- b) A48 and A154 against UN 3481 (1st entry); and
- c) A88 and A154 against UN 3481 (2nd entry).

5.11 Special provisions (DGP-WG/07-WP/9)

5.11.1 At DGP-WG/06, the topic of intermodal harmonization was discussed (DGP-WG/06-WP/56), paragraph 7.6 refers). It was agreed that Table 3-2 would be analyzed so that those special provisions which were developed for air transport would be identified.

5.11.2 A distinction between those special provisions which were either developed for air transport or which have been significantly modified from their UN equivalent, those which are identical or have only a minor modification from their UN equivalent, and those which are “not used” in the current edition of the Technical Instructions was made.

5.11.3 Although support was expressed for the two methods proposed, it was agreed to have two tables of special provisions, one containing special provisions unique to air transport and the other containing special provisions identical to those in the UN Model Regulations, as this most closely aligned with the UN Recommendations. It was also agreed numbers assigned to the UN special provisions would be used in the latter table.

5.12 Special Provision A45 (DGP-WG/07-WP/11)

5.12.1 A proposal was made to delete “other provisions of” in the phrase “not subject to other provisions of these Instructions” in Special Provision A45 in order to align it with other special provisions. It was explained that the two phrases were causing confusion in translation since in some languages, one phrase conveyed both expressions.

5.12.2 The proposal was agreed. On the basis similar difficulties must exist in other regulations, it was agreed the UN should be informed of the decision.

5.13 New Entries for Fuel Cell Cartridges Adopted by the UNCOE (DGP-WG/07-WP/22)

5.13.1 Proposals to add fuel cell cartridges containing fuels of divisions 2.1 and 4.3, and class 8, as adopted by the UNCOE in December 2006, were discussed and agreed, subject to modifications resulting from the discussion. It was noted the quantity limit for UN 3473 in column 10 should be corrected to read 5 kg. It was noted the intent was to treat the fuel cell cartridges, when in finished

articles, as solids. It was also confirmed that the net quantity in columns 10 and 12 was the net mass of the finished article excluding packagings.

5.13.2 With regard to the entries in Table 3-1, it was agreed for UN 3477 (containing corrosive fuels) the quantity limit for passenger aircraft should be lowered to 5 kg and placed in square brackets on the basis the quantity should reflect how similar hazards were treated. Concern was expressed that borohydride substances, normally forbidden for transport on passenger aircraft, were being proposed for transport with a 15 kg quantity limit. It was agreed such water reactive substances should be permitted but at a reduced quantity limit of 5 kg, placed in square brackets. This would allow movement on passenger aircraft as many States had few, if any cargo only operators. A number of members queried the quantity of the division 4.3 chemical in the cartridge; industry was asked to provide the relevant data. Industry would also be able to comment on whether these proposed quantity limits were practicable.

5.13.3 With regard to the proposed entries in Table 3-2, the issue of which performance tests the fuel cells, transported as cargo, should be subjected to, was raised. It was noted additional tests were specified only for those fuel cells which were intended to be carried by passengers. It was also noted some large fuel cells, particularly those developed for military use, would be too heavy to be permitted for transport on passenger aircraft. It was also noted fire testing applied to UN 3479 and not to UN 3476. It was explained the UN had not considered it necessary to include a fire test for UN 3476. It was noted the requirements for cartridges containing flammable gas were based on those for receptacles small, flammable – these were not subject to a fire test.

5.13.4 With regard to A334 (applicable to both fuel cells containing corrosive or water reactive materials), the issue of the physical state of the activator was queried. It was explained the activator could be water plus a small amount of another chemical but that the design of the cartridge required two independent means of preventing unintentional mixing with the fuel during transport.

5.13.5 With regard to A338, it was queried whether cartridges, when installed in equipment, had design features to prevent the cartridge from leaking. It was noted the drop test applied to the cartridge alone which could result in less specific protection for the cartridge when contained in (or packed with) equipment. However, it was explained the requirement for the cartridge to be leakproof, including when contained in equipment, had been added to A146. In addition, it was agreed to delete the phrase “for each unit placed in transport”.

5.13.6 It was also noted that the final sentence in A146 and A339 duplicated earlier text. It was agreed to delete the sentence and to advise the UN.

5.13.7 With regard to the proposed packing instructions, it was agreed standard terminology referring to packing group II performance standards would be used. It was noted that although the equivalent UN packing instructions included requirements for large robust equipment, this was inappropriate for inclusion in the Technical Instructions and should be deleted. This was agreed.

5.13.8 A number of members requested a quantity limit per article should be included in PI 4XX (for UN 3476) and PI 8XX (for UN 3477); a 1 kg limit was agreed.

5.13.9 One member advised the working group of tests on all fuel cartridges which were to be done in his State before DGP/21. The issue of fire propagation on board aircraft needed to be assessed.

5.14 **Lithium batteries (DGP-WG/07-WP/33)**

5.14.1 This paper was withdrawn on the basis of the adoption by the UN Sub-Committee of provisions for excepted quantities which excluded UN3090 .

**5.15 Additional Amendment to A45 (DGP-WG/07-WP/19)
Comments on Proposed Amendment to Special
Provision A45 (DGP-WG/07-WP/72)**

5.15.1 In DGP-WG/07-WP/19, it was suggested that recent amendments to special provision A45 have resulted in the transport of lithium cells and batteries being given quasi-regulatory treatment. A member noted how the requirements included a specific marking to, a telephone number for emergency response, a drop test, packaging requirements, and a quantity limitation. However, unlike dangerous goods not shipped under this special provision, he noted all of the markings are in English and differ from the internationally recognized diamond labels associated with dangerous goods. There is also no notification to the pilot-in-command. He noted these batteries were originally classed as division 4.3 then as class 9 and now were subject to the special provision.

5.15.2 In light of the number of incidents involving lithium metal and lithium ion batteries occurring outside the regulatory scheme, the member proposed that the exemptions gained under A45 for these batteries is not justified. He proposed that the batteries should be shipped fully in accordance with the provisions of the Technical Instructions. The only exception should be for batteries shipped in or with equipment, where some level of protection to the batteries is afforded.

5.15.3 Comments from industry in DGP-WG/07-WP/72 focused on the excellent safety record involving the transport of such lithium cells and batteries. It was also noted the significant restrictive amendments made by the UNCOE to the relevant provisions in the UN Recommendations and suggested this would adequately deal with the issue.

5.15.4 Whilst recognising the economic consequences of the proposed changes, it was argued safety justification had to be the over-riding concern. It was also suggested that although transporting these cells and batteries was a multi-modal issue, the consequences were higher in air transport.

5.15.5 On the basis the relevant regulations had changed frequently, a number of members stated their belief that a comprehensive analysis and strategy to deal with these cells and batteries was now needed, whilst recognizing the need to reflect the UN provisions for multi-modal harmony. It was agreed an informal working group should meet to discuss any amendment to the Technical Instructions and any non-regulatory actions which might be necessary to ensure lithium battery transport safety across the entire scope of the passenger and transport communities. A member offered to host an ad hoc working group in Montreal from 4 to 5 October 2007 to discuss the issues raised. To facilitate the meeting, he asked for those interested in attending to contact him by e-mail (brennand@iata.org).

**5.16 Prohibition of transport of certain types of lithium metal
batteries aboard passenger and cargo aircraft
(DGP-WG/07-WP/18)
Prohibition of Lithium Metal Batteries on Passenger Aircraft
(DGP-WG/07-WP/56)**

5.16.1 A proposal was made (in DGP-WG/07-WP/18) to adopt a new special provision prohibiting the transport of lithium metal batteries as cargo on passenger and cargo aircraft with an exception allowing for small lithium metal batteries shipped in or with equipment. The proposed special provision would not affect provisions for carriage in the cabin of a passenger aircraft by passengers and crew. The proposal was made following agreement to the prohibition in principle at DGP-WG/06. The prohibition is based on the flammability characteristics of lithium metal batteries and the inability of onboard equipment to suppress a fire involving these batteries.

5.17 Taking into account the decisions taken by the UN at its 30th Session, in particular amendments to Special Provision 188 of the UN Model Regulations and the revision of the lithium battery proper shipping names to differentiate between lithium metal and lithium ion batteries, a new proposal was submitted in DGP-WG/07-WP/56. A new special provision was also proposed for inclusion in Table 3-1 which would prohibit the transport of lithium metal batteries on passenger aircraft except when packed with or installed in equipment under specified conditions. Batteries not meeting the conditions of this Special Provision were proposed to be marked to indicate that they are forbidden for transport aboard passenger aircraft.

5.18 One member stated he could not support the proposal to prohibit these batteries for transport on passenger aircraft without the participation of industry to advise on the economic consequences. Keeping in mind the failure of halon to suppress fires involving lithium metal, another member supported the prohibition on the basis passengers had the right to expect the highest level of safety whereas there was an element of informed consent on the part of flight crew on cargo aircraft.

5.19 The proposed marking indicating the prohibition of lithium metal batteries as cargo on passenger aircraft was discussed. Some believed a pictogram would be preferable than a manufacturers mark; others suggested a CAO label might be used.

5.20 It was agreed all issues pertaining to the transport of lithium cells and batteries should be discussed at the proposed ad hoc working group. It was noted this meeting could be expected to be just the first in a series of discussions on the issue.

5.21 **Special Provision A66 (DGP-WG/07-WP/25)**

5.21.1 This paper was withdrawn on the basis it had already been dealt with in WP/4.

5.22 **Special Provision A144 (DGP-WG/07-WP/27)** **Special Provisions A144 and A1 (DGP-WG/07-WP/49)**

5.22.1 Difficulties encountered when using Special Provision A144 were discussed. One member described how a consignment on a passenger aircraft was rejected on the basis that even though both the package and the dangerous goods transport document were annotated with a statement “Aircrew Protective Breathing Equipment (Smoke Hood) in accordance with Special Provision A144”, the dangerous goods transport document, the dangerous goods information to the pilot in command, and the air waybill were marked as “Cargo Aircraft Only”. The consignment also complied with the last paragraph of A144 in that the “cargo aircraft only” label was not displayed. In addition, clarification was sought on whether A144 nullified the requirements of A1 or whether A1 took precedence.

5.22.2 It was explained that the intent underlying A144 was to facilitate the transport of aircrew smoke hoods and that all references to cargo aircraft only should be removed. Some members suggested it would be preferable to amend the wording of A144 so as to clarify the intent rather than to assign a new ID number, as had been suggested.

5.22.3 The papers were withdrawn; a revised proposal will be submitted to DGP/21.

5.23 **Special Provision A67 (DGP-WG/07-WP/28)**

5.23.1 The working group discussed the placing of a further restriction in Special Provision A67 so as to prevent **Batteries, wet, non-spillable** finding their way into passengers checked baggage. The discussion was based on the fact that when **Batteries, wet, non-spillable**, meet the requirements of

Special Provision A67 and Packing Instruction 806, there is no restriction on the battery being carried in passengers checked baggage.

5.23.2 It was recalled that A67 had been developed specifically to allow passengers to carry such batteries. A general discussion on the meaning of the phrase “not subject to these Instructions”, contained in several special provisions, then ensued. It was queried whether the issue was one of an item being regulated and then excepted (providing certain qualifying conditions were met) or whether it was one of an item being considered fully non-regulated.

5.23.3 The paper was withdrawn. A revised proposal will be submitted to DGP/21.

5.24 **UN 3166 Engines, Internal Combustion, Flammable Liquid Powered (DGP-WG/07-WP/38)**

5.24.1 A proposal was made to amend Special Provision A70 in order to clarify that if a fuel that powers an engine does not meet the classification criteria as a flammable liquid, the engine can be considered as not subject to the Technical Instructions.

5.24.2 A number of members, whilst supporting the general intent, expressed difficulty with the incorporation of the phrases “when tested” and “defining criteria”. Others thought the proposal was unnecessary and were unable to see the benefit of the proposal. The proposer explained the criteria were those for classification; on modifying the proposal to reflect this and on deletion of the phrase “when tested”, it was agreed.

5.25 **Special Provision A123 (DGP-WG/07-WP/45)** **Incident Involving Wheelchair Battery (DGP-WG/07-IP/6)**

5.25.1 Special Provision A123 specifies the measures which must be taken with regard to the protection against short circuit of electric storage batteries (included when fitted in equipment) which have the potential of a dangerous evolution of heat. However, a number of incidents have occurred not because of short circuit but rather because of unintentional activation, particularly in the case of power tools.

5.25.2 A proposal was made at DGP-WG/06 to amend Special Provision A123 to reflect this. Although several members supported the objective, they queried whether the proposal would rectify the problem of inadvertent activation for such batteries. The placing of A123 only against **Batteries, electric storage** was noted as both regulated as well as non-regulated batteries in equipment needed to be considered.

5.25.3 A new proposal was formulated for WG07 after identifying all battery entries in Table 3-1. Identifying the batteries revealed that simply applying an amended A123 to each of these entries would not work because other aspects had to be taken into account, e.g. batteries not subject to the requirements of the Technical Instructions and duplications which arise due to existing requirements for protection against short circuit contained in Packing Instructions. Consequently, the batteries were treated as follows:

- a) for “Batteries, electric storage”, an amendment to A123 was proposed;
- b) for **Batteries, wet, filled with acid** electric storage (UN 2794), **Batteries, wet, filled with alkali**, electric storage (UN 2795), **Batteries, wet, non-spillable**, electric storage (UN 2800), **Battery-powered equipment** (UN 3171), **Battery-powered vehicle** (UN 3171), **Lithium batteries** (UN 3090), **Lithium batteries contained in**

equipment (UN 3091) and **Lithium batteries packed with equipment** (UN 3091) it was proposed to add a new special provision to Table 3-2;

- c) for **Batteries, wet, non-spillable**, electric storage (UN 2800), the need to address batteries which are not subject to the requirements of the Technical Instructions in accordance with Special Provision A67 was discussed and consequentially an amendment to A67 was proposed;
- d) For **Lithium batteries** (UN 3090), **Lithium batteries contained in equipment** (UN 3091) and **Lithium batteries packed with equipment** (UN 3091), there was also the need to address batteries which are not subject to the requirements of the Technical Instructions in accordance with Special Provision A45 and consequently, an amendment to A45 was proposed.

5.25.4 Members warmly supported the general objectives of preventing short circuits and unintentional activation in batteries, noting the issue of battery safety was the subject of large outreach programmes in a number of States.

5.25.5 Reference to removal of circuit breakers was queried. It was agreed that this example could be deleted as users might believe this was the only method to prevent short circuits in equipment. It was noted that the phrase “packed for transport” was inappropriate, bearing in mind the addition of battery-powered vehicles to the provision; it was agreed to replace it with the standard phrase “prepared for transport”.

5.25.6 The proposal was agreed as modified.

5.26 Xenon Lamps (DGP-WG/07-WP/50)

5.26.1 At DGP-WG/06, clarification was sought as to which UN number and packing instruction number should be assigned to lamps containing xenon with a pressure greater than 280 kPa. One member indicated that information from industry suggested that different gases could be present in similar lamps and that a more general entry would be preferable to that proposed in the paper. Another suggested these lamps should be considered for classification as **Receptacles, small, containing gas** if an amendment to the 50 ml exception was made. The proposer at the time withdrew the paper and said he would work with other members to produce a revised proposal for WG07.

5.26.2 The proposer explained that since WG06, a 1.8m drop test for PG I, a 3m stacking test for 24 hours and a compulsory destruction test were performed on six types of fibreboard box containing xenon lamps, and the test results were all satisfactory. Based on these results and the fact that there have been no irregularities or incidents in transporting the lamps, a new proposal to amend Special Provision A98 was made.

5.26.3 Some members queried whether this problem was a multi-modal one and should be addressed first by the UN Sub-Committee. A number of members suggested that these lamps should be considered as non-regulated articles and that a note clarifying this could be developed for incorporation in the Technical Instructions.

5.26.4 It was agreed an information paper would be submitted to the July meeting of the UNSCOE. Depending on the outcome of the discussion, a revised proposal might be submitted to the DGP/21 meeting.

5.27 **Balls Used for Playing Sports (DGP-WG/07-WP/51)**

5.27.1 The issue of whether table tennis balls should be classified as dangerous goods was discussed. It was suggested the allocation of UN 2000 — **Celluloid** to such items was incorrect and that the proposed special provision was unnecessary.

5.27.2 With regard to the broader issue related to sporting balls when inflated or when containing compressed gases, it was suggested Note 1 in 2;2 could be amended to clarify they were not subject to the Technical Instructions. The proposal, as modified, was agreed.

5.28 **Assignment Of Special Provision A69 To Substances Treated as Inert Gas (DGP-WG/07-WP/52)**

5.28.1 A proposal to assign Special Provision A69 to all inert gases was agreed.

5.28.2 A second proposal to amend the proper shipping name of UN 2036 to read **Xenon, compressed** in order to align the name with the other inert gas substances was not agreed. It was noted the expert from Japan would raise the issue at the UN SCOE meeting.

5.29 **Prescribed Conditions for Substances and Articles to be Considered Non-Restricted (DGP-WG/07-WP/57)**

5.29.1 At WG06, the working group considered a proposal to require consignors to indicate on the air waybill when a substance or article was excepted from the requirements of the Technical Instructions by the prescribed conditions of a special provision. A list of special provisions was provided as an appendix and included the substances to which the provisions were assigned.

5.29.2 Taking into account comments from WG06, a new list of eight articles to which the provisions should be assigned was provided. The list included only those 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 and is safe for transport.

5.29.3 A number of members supported the intent of the proposal but queried how the requirement could be legally enforced in instances when no documentation accompanied the dangerous goods. It was also queried who would complete the air waybill as this was not routinely done by the shipper. Others noted this requirement could only apply to cargo but not to excepted dangerous goods carried by passengers. It was suggested that a safety enhancement would be achieved when shippers understood the benefits they would gain in having their shipment accepted as being non-dangerous only after specific action had been taken.

5.29.4 The proposer withdrew the paper and said a revised proposal would be submitted to DGP/21, in which it would be clarified it applied to cargo only.

5.30 **Special Provision A136 (DGP-WG/07-WP/64)**

5.30.1 The working group discussed the requirements of Special Provision A136 and, by extension, of Special Provision A20, particularly the lack of a statement on the dangerous goods transport document and application of the “keep away from heat” label for substances subject to A136.

5.30.2 It was explained that UN 2208 and UN 2880 presented different hazards than those presented by organic peroxides and that A136 might not be relevant for air transport. Incidents had occurred when they had been placed on top of fuel oil, resulting in casualties. With regards to organic

peroxides, it was suggested incidents had occurred in the maritime mode when large quantities of peroxides, contained in freight containers with an adequate circulation of air, had been subjected to heat.

5.30.3 The paper was withdrawn; a revised proposal will be submitted to DGP/21.

Amendments to Part 4 — Packing Instructions

5.31 Draft Amendments to the Technical Instructions to Align to the UN Recommendations — Part 4 (DGP-WG/07-WP/5)

5.31.1 Draft amendments to Part 4, Chapters 1, 4, 6, 8, 9, 10 and 11 were proposed to reflect the decisions taken by the UN. These were agreed to subject to the deletion of:

- a) proposed new text in Packing Instruction 200, 3 b); and
- b) paragraph 9.1.12.

5.32 Chemical Kits (DGP-WG/07-WP/13)

5.32.1 Packing instruction 915 requires that kits must not be packed with other dangerous goods; however, in some cases, dry ice must be added for cooling purposes. A proposal was made to amend the packing instruction to permit dry ice.

5.32.2 Although it was noted overpacks containing one or more packages of chemical or first aid kits could contain dry ice, it was explained a better cooling effect was achieved when dry ice was placed within the package. It was suggested detailed reference in the proposed new paragraphs to both dry and wet ice was confusing, and unnecessary, if reference to other applicable requirements were included. Following a modification to the original proposal to ensure all other applicable requirements in Packing Instruction 904 must be met, it was agreed to amend the fourth paragraph.

5.33 Dangerous Goods in Non-Pressurized Cargo Holds (DGP-WG/07-WP/16)

5.33.1 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 was proposed at WG06. Although there was some sympathy for the issue at that time, it was suggested the proposal was not practical on the basis that shippers would have no knowledge of the aircraft type and its compartment holds which would be used. A revised amendment was presented to WG07.

5.33.2 It was 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-pressurised cargo holds. The paper was withdrawn; a revised proposal will be submitted to DGP/21.

5.34 New Entries for Fuel Cell Cartridges Adopted by the UNCOE (DGP-WG/07-WP/22)

5.34.1 See section 5.13 for discussion of this item.

5.35 UN 1037 – Ethyl Chloride (DGP-WG/07-WP/24)

5.35.1 A proposal was discussed to delete the provision in Packing Instruction 200 which permits the transport of UN 1037 in glass ampoules. It was suggested this item was not presented for transport in such a packaging and it would also align the instruction with the UN Model Regulations.

5.35.2 Some members disagreed with this view on the basis that similar provisions (but with different quantities) were included in some regional and national regulations and were therefore reluctant to delete the provision for the air mode.

5.35.3 The paper was withdrawn; the proposer said he would take up the issue with the UN Sub-Committee.

5.36 Packing Instruction 650 (DGP-WG/07-WP/32)

5.36.1 An amendment to paragraph 11 b) of packing instruction 650 to remove a contradiction regarding the application of the proper shipping name and UN number was proposed and agreed to.

5.37 Packing Instructions 905 and 200 (DGP-WG/07-WP/44)

5.37.1 An editorial amendment to delete reference to packing instruction 200 contained in packing instruction 905 was agreed.

5.37.2 A proposal to permit cylinders, intended for life jackets and life rafts that are not fitted with pressure relief devices was discussed. Some members suggested this was unnecessarily over-complicated and that such small cylinders would normally be transported as gas cartridges, which themselves did not have pressure release devices.

5.37.3 The second proposal was withdrawn; a revised proposal will be submitted to DGP/21.

5.38 Shipper Loaded Units (DGP-WG/07-WP/65)

5.39 A proposal to identify the shipper's responsibility when presenting a unit load device or other type of pallet containing consumer commodities or magnetized materials was agreed.

5.39.1 A proposal to identify in 7;4.1.1 that for shipper loaded unit load devices the operator may show the average gross mass per package for consumer commodities on the written information to the pilot-in-command was also agreed.

5.40 Packing Instruction 916 (DGP-WG/07-WP/66)

5.40.1 A proposal to address inconsistencies in the provisions of Packing Instruction 916 was made. It was suggested the majority of cylinders contained in equipment would not generally meet UN specifications; allowing cylinders containing flammable gases in equipment should be considered carefully.

5.40.2 The Secretary was asked to reissue the paper for DGP/21.

5.41 Proposed Amendment to Packing Instruction 202 to Allow for the Use of Glass Receptacles for the Transport of Certain Cryogenic Liquids (DGP-WG/07-WP/67)

5.42 A proposal was made at WG06 to allow a new concept of a container for the transport of liquid nitrogen (DGP-WG/06-WP/47). Although there was general consensus for the principle, comments were made that the requirements should be as short and prescriptive as possible. A new proposal taking into account the comments made by WG06 was made.

5.43 It was noted a paper would be presented to the July UNSCOE meeting on the issue of cryogenic liquid receptacles, based on the requirements in the Instructions and the ADR regulations.

5.44 The working group agreed to a modified proposal, which clarified that packagings must meet packing group II performance test requirements.

5.45 Packing Instruction 918 (DGP-WG/07-WP/69)

5.46 A proposal to amend Packing Instruction 918 in order to clearly identify applicable marking and labelling requirements was agreed.

Amendments to Part 5 — Shipper's Responsibilities

5.47 Draft Amendments to the Technical Instructions to Align to the UN Recommendations — Part 5 (DGP-WG/07-WP/6)

5.47.1 Draft amendments to Part 5, Chapters 1, 2 and 3 were proposed to reflect the decisions taken by the UN. These were agreed to subject to the replacement of “shall” with “must” in 5;1.6.3.

5.48 Label Marking (DGP-WG/07-WP/30)

5.48.1 The working group was invited to discuss the establishment of a standard hazard label font size for the label text, given that text on hazard labels are appearing with a font size of 3 millimetres.

5.48.2 Some members noted the issue had been raised earlier at the UN Sub-Committee where it had been explained the font size could vary significantly, depending on the size of the packaging. It was queried to which label text was being referred in the working paper since the only mandatory requirements for text to appear on a label was that for class 7.

5.48.3 The paper was withdrawn.

5.49 "Cargo Aircraft Only" Label (DGP-WG/07-WP/34)

5.49.1 A proposal was made at WG06 to amend the design of the Cargo Aircraft Only label in order to address what was seen as some shortcomings with the existing label design. Although there was some support for the proposal, there was also support for a complete redesign of the label to remove all words and to have a pictogram that conveyed the required meaning.

5.49.2 The working group was informed that attempts had been made since WG06 to design a new label using only pictograms which would clearly convey the required message. However, difficulties were encountered in that there was no clear outline or image which could unambiguously be identified as being a “Cargo Aircraft”. The working group was therefore requested to consider the original re-design which was presented at WG06 as the new Cargo Aircraft Only label.

5.49.3 Some members thought the change was not significant enough to warrant the introduction and associated costs of a new label. Others believed it to be an improvement but noted training remained the key to understanding whichever label was used.

5.49.4 The proposal was agreed on condition a long transitional period was adopted, thus minimizing the cost to industry.

5.50 Marking For Limited Quantities (DGP-WG/07-WP/42)

5.50.1 A proposal to add a reference in 5;3.5.2 to ISO Standard 780-1985 in relation to orientation labels was agreed. The proposal was made on the basis that although 5;3.2.11 b), 5;3.3.2 and Packing Instruction 916 allow for labels that meet the specifications of ISO Standard 780-1985 to be used as an alternative to the package orientation labels shown in the TIs, 5;3.5.2 does not currently provide reference to the ISO Standard.

5.50.2 One member pointed out, however, that a contradiction existed in so far as the ISO Standard did not specify a minimum standard size and thus permitted smaller labels than those prescribed in the Technical Instructions; a paper proposing deletion of this reference will be submitted to DGP/21.

5.50.3 The proposal was agreed.

5.51 Packing Marking Requirements (DGP-WG/07-WP/43)

5.51.1 Minor proposed amendments to the headings of 5;2.4.1 and 5;2.4.10 in order to clarify the package marking requirements were agreed to.

5.52 Declared Quantity on Dangerous Goods Transport Document (DGP-WG/07-WP/63)

5.52.1 The working group discussed a proposed amendment to 5;4.1.5.1 e). The proposal referred to an amendment made at DGP/20 which provided a list of articles where the quantity shown on the dangerous goods transport document should be the gross mass of the article when Table 3-1 shows “No limit” in column 10 or 12, and all other substances should be the net mass or volume. It was suggested that the original list of numbers was incomplete.

5.52.2 It was agreed to specify that the quantity must, rather than should, be the net mass or volume for substances and the gross mass followed by the letter “G” for articles and to include relevant UN numbers as examples for each.

5.52.3 The proposal, as amended, was agreed.

5.53 Recent Incidents Involving Radioactive Materials (DGP-WG/07-WP/71)

5.53.1 Two recent incidents involving radioactive materials were reported to the working group. The first involved a consignment of radioactive material which was generating heat flux and was transferred from one air operator to another. The consignment was then placed in a soft overpack, which resulted in an accumulation of heat and resulted in a call to emergency services. The second involved cargo acceptance staff refusing a consignment of Krypton 85 due to an incomplete description on the shipping document.

5.53.2 With regard to the first incident, the IAEA representative suggested this was potentially a training problem in so far as handlers appeared to be inadequately trained to deal with packages generating heat flux. With regard to the second incident, he suggested a note could be developed for incorporation in the technical Instructions with specific wording regarding the physical form requirement.

5.53.3 Some members advised similar incidents had occurred in their State and said they would communicate with the proposer so that a new paper could be presented to DGP/21.

Amendments to Part 6 — Packaging Nomenclature, Marking, Requirements and Tests

5.54 Draft Amendments to the Technical Instructions to Align to the UN Recommendations — Part 6 (DGP-WG/07-WP/7)

5.54.1 Draft amendments to Part 6, Chapters 1, 2, 4, 5, 6 and 7 were proposed to reflect the decisions taken by the UN. These were agreed to subject to the:

- a) replacement of “Chapter 1 through 3” with “Chapters 1 to 6” in 6;5.2.7.1; and
- b) amendment of Chapter 6 title to “Packagings for infectious substances of category A”.

5.54.2 The Secretary was asked to bring to the attention of the UN the amendment to the Chapter 6 title.

5.55 Puncture Test for Infectious Substances Packagings (DGP-WG/07-WP/14 (Revised))

5.55.1 Clarification was requested on the intent and the requirements of the puncture test for infectious substances described in 6;6.3 of the Technical Instructions and similarly in the UN Model Regulations. It was explained differing interpretations had been provided regarding the required test equipment as well as some of the requirements.

5.55.2 It was agreed that the UN should be advised of the problem.

Amendments to Part 7 — Operator’s Responsibilities

5.56 Detection and Fire Suppression in Cargo Holds (DGP-WG/07-WP/10)

5.56.1 The group was informed of a fire which occurred in a cargo hold before departure and the investigation that followed which revealed that the fire was caused by the shipment of a lithium battery; in this incident, the fire detection system of the cargo hold issued a warning when the aircraft was still on the taxiway. The working group was asked to consider 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.

5.56.2 The importance of fire suppression systems in cargo holds containing certain dangerous goods was noted. However, it was also noted that some fleets do not have Class C compartments and to retrofit existing compartments would place a huge burden on the airline industry. It was agreed that industry should be asked to comment on the potential financial impact.

5.56.3 The Secretary was asked to coordinate discussion of the issue with the Airworthiness Panel (AIRP) Working Group of the Whole Meeting (8 to 17 May 2007).

5.57 Retention of Rejected Transport Documents (DGP-WG/07-WP/15)

5.57.1 This paper was withdrawn before the meeting.

5.58 Passenger's Exposure Dose Limits (DGP-WG/07-WP/17)

5.58.1 A potential problem of passengers using portable dosimeters on board aircraft which has radioactive material in the cargo hold was raised. It was suggested that such passengers, on seeing a reading greater than background on the meter, might panic. It was proposed to add text relating to the maximum acceptable dose rate in 7;2.9.1.

5.58.2 The representative of the IAEA explained that the tables of separation distances contained as requirements in the Technical Instructions were presented as guidance by the Agency, as one means of complying with the dose value requirements. He further noted that the table is based on a radiation dose-rate criterion of 0.02mSv/h to a passenger. Some members observed that that the dose values were sufficiently restricted and were, in fact, very conservative. Others believed the proposed text was confusing in so far as it raised additional questions e.g. how high a value was acceptable and what measures should be taken. The representative of the IAEA suggested that a note could be drafted that explains that the separation distances are based on the aforementioned criterion. This value could be used as a check to ensure that the proper separation distances in the hold of the aircraft are maintained.

5.58.3 The proposal was not agreed, but the use of the note was accepted.

5.59 Transport Index Limit Under Exclusive Use (DGP-WG/07-WP/46)

5.59.1 It was suggested that the provision in Par 7;2.9.3.3 b) could be misinterpreted to mean that limits on transport indexes as a result of the separation requirements do not apply. A proposal was made to clarify that there may be a limit on the sum of transport indexes as a result of separation distances.

5.59.2 The proposal was agreed to with amendments to clarify the minimum segregation distances apply.

5.60 Acceptance (DGP-WG/07-WP/47)

5.60.1 At WG06 discussed were held on whether the requirements of Part 7;1.1.2 was clear in respect of what an operator is expected to verify during an acceptance check. There was general support of the idea of clarifying the existing text, without being too prescriptive. Discussions continued at WG07 based on a new a proposal to for amendment to 7;1,.1.1 and 7;1.3.

5.60.2 The working group was asked to consider what the purpose of the acceptance check is. It was suggested that the purpose for the operator is to establish, as far as is reasonable, that the external condition of, and quantity declared as being contained in the package complies with the Technical Instructions and also that the documentation meets the requirements. It was also suggested that the lack of clarity in the Technical Instructions has given rise to overly burdensome and complicated checklists, so as to cater for most possible interpretations of the requirements by States, and thus avoid possible

enforcement action. The proposal was to list those items an operator could reasonably be expected to check for safety reasons.

5.60.3 Many members expressed strong support for the proposal, welcoming the additional clarity and specificity contained within it. Recognizing the detailed checklists had evolved over time in the absence of more specific requirements, it was suggested this amendment would benefit both operators and regulators. Some reservations were expressed relating to the proposed 1.2 d) and suggested more general text might be preferable.

5.60.4 One member suggested the sequence of paragraphs might be rearranged so that general requirements were at the start, followed by more detailed requirements.

5.60.5 Following the placing of 1.2 d) in square brackets, the proposal was agreed. The proposer agreed to review the paragraph order before DGP/21.

5.61 Reporting of Incidents Involving Batteries (DGP-WG/07-WP/55)

5.61.1 At WG06, it was proposed that incidents involving batteries of any type should be required to be reported in accordance with Part 7;4.4. A list of incidents was provided for information and it was noted that in a number of cases, the batteries were of a type that are excepted from the Technical Instructions when certain prescribed conditions are met and as such it is not clear whether the reporting requirements of Part 7 apply.

5.61.2 It was agreed that the incidents demonstrated a need to gather appropriate information in order to determine whether any improvements could be made to the requirements of the Technical Instructions to prevent such incidents from occurring. However, it was questioned whether the ICAO Technical Instructions could require reporting of incidents involving batteries that in some cases are in and of themselves not subject to the Technical Instructions. Several views were expressed and it was agreed that the Secretary would coordinate a legal review with the ICAO Legal Bureau.

5.61.3 After further review, it was noted that electric storage batteries are only considered not subject to the Technical Instructions on the basis of compliance with the provisions in Special Provision A123 which includes prohibitions against batteries which have the potential of dangerous evolution of heat or are inadequately protected against short-circuit. It was also noted that 1;2.1 also contains a general prohibition against articles that can dangerously react or produce a flame or dangerous evolution of heat.

5.61.4 The proposer therefore concluded that a battery which may otherwise be non-restricted but has caused an incident due to generation of a flame or heat is subject to the ICAO Technical Instructions and is in fact *prohibited* from carriage. As such, incidents involving flame or excessive heat generation should be reported. It was therefore proposed that specific language in 7;4.4 be added to clarify that all incidents involving batteries should be reported.

5.61.5 The proposal was agreed, subject to a modification to clarify the text and the amendment being placed in square brackets.

Amendments to Part 8 — Provisions Concerning Passengers and Crew**5.62 Carriage of Fuel Cells by Passengers and Crew
(DGP-WG/07-WP/23)**

5.62.1 At DGP/20, a decision in principle was taken that no fuel could be accepted as a passenger exception if the substance was not already acceptable for transport as cargo on a passenger aircraft. One member asked to reopen the decision, suggesting that packaged goods present a different hazard to those in the passenger cabin; he asked that the issue be reconsidered on a case-by-case basis. A number of members supported this proposal and agreed that the original principle should be taken as a consideration, not as an over riding principle. A proposal to extend the provisions for fuel cells permitted for carriage by passengers and crew was then discussed. It was noted this would reflect what had been approved for transport as cargo (see 5.13).

5.62.2 It was noted the issue of quantity limits was not just one of safety but also security in so far as 100 ml quantity limits were prescribed for security reasons. Members were awaiting the outcome of discussion with security colleagues who were deciding whether this limit was inappropriate for articles.

5.62.3 Some members wished to await the results of tests which were to be carried out before taking a decision. Others suggested they had five years experience transporting such fuel cells as cargo and suggested the proposed text be placed in square brackets; this would act as an incentive to those interested in facilitating their use. This was agreed.

**5.63 Small Oxygen Cylinders Carried by Passengers
(DGP-WG/07-WP/26)**

5.63.1 During the Working Group on Passenger Provisions that met prior to WG06 there was a discussion on the current provision in Part 8;1.1.2 c) that permits passengers or crew to carry “with the approval of the operator(s), small gaseous oxygen or air cylinders required for medical use;” The Working Group had agreed that how many “cylinders” an operator could approve a passenger to carry should be specified and also that defining “small” as the maximum size for the cylinder is a very subjective term. It was also agreed that there should be some text added to the provision to require that the cylinder, valve and regulator be protected from damage.

5.63.2 The working group was informed of research done with two major medical oxygen supply companies to determine if there was an international standard size that equated to a portable cylinder suitable for carriage in the passenger cabin or in checked baggage. It was identified that there is no single standard size but rather a range of cylinder sizes. Within the ranges, however, 5 kg seemed to be the upper limit for a filled oxygen cylinder that would be suitable for carriage by passengers.

5.63.3 It was suggested that limiting the number of cylinders was unnecessary since the operator had to give approval, based on the journey duration and health of the passenger concerned. Specifying the dimensions was also considered unnecessary on the basis a quantity limit was proposed.

5.63.4 The proposal, modified to remove reference to number and dimensions of cylinders, was agreed.

**5.64 Packaging Standard for Liquids and Gels
(DGP-WG/07-WP/29)**

5.64.1 A proposal to add a standard packaging requirement to the provisions for dangerous goods carried by passengers or crew was made. It was suggested that security-enforced limitations for

liquids, aerosols and gels now in place may result in many passenger carry-on dangerous goods being driven out of manufacturers' packaging and into lesser standard packaging.

5.64.2 There was some support for the concept but it was suggested it should not be as regulatory text. Other members suggested it should be the subject of outreach programmes in States.

5.64.3 The paper was withdrawn; a revised proposal will be submitted for DGP/21.

5.65 Clarifications Concerning Carriage of Fuel Cells by Passengers and Crew (DGP-WG/07-WP/31)

5.65.1 Proposals to amend the provisions for the carriage of fuel cells by passengers were made. It was suggested that the current wording of r) took focus away from the fuel cell and the fuel cell cartridges and a re-worded paragraph was provided to clarify this. The working group agreed with the proposal.

5.65.2 It was suggested that the current wording of 8;1.1.2 r) 5) and 6) is inconsistent and repetitious. It was proposed to reword the two sentences and combine them into one. The working group agreed with the proposal. It was also suggested that the text in paragraph 8;1.1.2 r) 2) is redundant as it is covered in 8;1.1.2 r) 5). It was agreed to delete the paragraph.

5.65.3 A proposal to amend Packing Instruction 313 was withdrawn because it was superseded by amendments to align the packing instruction with the UN Model Regulations.

5.66 The Transport of Baggage Separated From its Owner (DGP-WG/07-WP/35)

5.66.1 An amendment to 8;1.1.2 to permit operators other than the originating operator to carry separated passenger baggage was proposed. Some members agreed with the principle but suggested the use of the word "the" could be interpreted as applying to more than one operator. Others pointed out the text "transported by the operator" was unnecessary since it would always be an operator who would transport misplaced baggage in any case.

5.66.2 The proposal was amended to remove the phrase "transported by the operator"; this was agreed.

5.67 Secretariat Study Group on the Carriage and Screening of Liquids, Gels and Aerosols (DGP-WG/07-WP/41)

5.67.1 The meeting was informed of the outcome of the discussion which had taken place at the first meeting of the ICAO Secretariat Study Group on the Carriage and Screening of Liquids, Gels and Aerosols (26 to 27 February 2007). Working papers detailing instances of disharmony between the new security provisions and the Technical Instructions had been submitted but had received minimal discussion.

5.67.2 Members agreed better coordination with security personnel, both in ICAO and in national administrations, was important. The Secretary agreed to provide the list of members of the Aviations Security (AVSEC) Panel to the DGP members in order to facilitate discussion.

5.67.3 It was suggested the DGP should remain focused on safety justifications when deciding quantity limits rather than basing them on security considerations. It was queried whether the 100 ml quantity limit, imposed by security requirements, would remain.

5.67.4 The working group agreed the paper should be reissued for DGP/21.

**5.68 Batteries Carried by Passengers or Crew
(DGP-WG/07-WP/54)**

5.68.1 The working group was asked to consider enhancing protection against short-circuit of batteries carried by passengers and crew by adding text to 8;1.1.2 q) explaining how the batteries can be protected.

5.68.2 An amended proposal was agreed.

**5.69 Comments on Carry-on Provisions for Lithium Ion Batteries
Carried by Passengers or Crew (DGP-WG/07-WP/73)**

5.69.1 At WG06, the working group decided to remove the provision from Part 8 for lithium ion batteries with an aggregate lithium content of more than 8 grams (100 watt-hours) but not more than 25 grams (310 watt-hours). It was suggested that many batteries of up to 16 grams (160 watt-hours) are needed (by, amongst others, the professional audio/video industry and by some users of the portable oxygen concentrators) and that these are currently being sold. It was proposed to reinstate the provision but to amend the upper quantity to a watt-hour rating of not more than 100 watt-hours.

5.69.2 Following a short discussion on the safety aspects of carrying one larger rather than two smaller ones, it was agreed the ad hoc working group on lithium batteries should include this issue in its discussion.

**6. 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**

**6.1 Identification of Toxic by Inhalation Liquids in the
Supplement (DGP-WG/07-WP/53)**

6.1.1 WG06 considered a proposal to identify materials in the Supplement which are toxic by inhalation. It was suggested that this would assist States in prescribing appropriate requirements when such substances are transported under approval by the appropriate national authority. There was general support for the proposal, however it was agreed that a revised proposal should be submitted on the basis of comments received.

6.1.2 A revised listing of toxic by inhalation liquids with supporting data was provided; the proposal to add a special provision was agreed. The working group further agreed that the table should be placed in the Supplement along with introductory text to be developed.

7. **AMENDMENTS TO THE *EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS* (DOC 9481)**

7.1 **Guidance for Portable Electronic Device Fires in Aircraft Cabins (DGP-WG/07-WP/21)**

7.1.1 A proposal was made to amend the Emergency Response Guidance document checklist for Dangerous Goods Incidents in the Passenger Cabin to include guidance for fires involving passenger electronic devices. It was suggested that because of the unique characteristics of battery fires, guidance specific to addressing a fire involving portable electronic devices in the cabin was needed.

7.1.2 The proposal was agreed.

8. **RESOLUTION, WHERE POSSIBLE, OF THE NON-RECURRENT WORK ITEMS IDENTIFIED BY THE AIR NAVIGATION COMMISSION OR THE PANEL**

Principles governing the transport of dangerous goods on cargo only aircraft

8.1 **Loading of "CAO" Dangerous Goods (DGP-WG/07-WP/20)
Accessibility Requirements For Cargo Aircraft Only
Dangerous Goods (DGP-WG/07-WP/37)**

8.1.1 A working group met to discuss the issues raised in the above papers. There was general agreement for the proposal in both papers to permit loading of Cargo Aircraft Only dangerous goods in Class C compartments as an alternative to having them accessible to flight crew. Differing opinions were expressed with regard to the requirements for handling.

8.1.2 The proposers agreed to coordinate their discussions so that a revised, joint proposal might be submitted to DGP/21.

Reformatting of the packing instructions

8.2 **Comments on Proposed Reformatted Packing Instructions
(DGP-WG/07-WP/48, DGP-WG/07-WP/62,
DGP-WG/07-IP/4)
Report of the Packing Instruction Working Group
(DGP-WG/07-Flimsy 3)**

8.2.1 A working group on the reformatting of the packing instructions (PIWG) had met prior to WG07 to review comments which had been received, in the form of working papers or via the website survey. Comments on the proposed reformatted packing instructions from a meeting held with various interested parties from industry in the United Kingdom and comments from the DGAC were presented.

8.2.2 With regard to WP/48, consultation had taken place with a large cross-section of industry and the following comments were offered:

- a) there was general support for separation of the packing instructions between passenger and cargo aircraft;

- b) it was thought the proposed numbering system was overly complex;
- c) suggestions were made for a different layout and structure;
- d) concerns had been expressed over the expansion of the absorbent material requirements; and
- e) transitional arrangements required discussion.

8.2.3 With regard to WP/62, the view was expressed by a representative from industry that whilst inconsistencies existed in the present packing instructions, there was no need to change the system. In particular, the cost to industry associated with renumbering and training was not justified since no measurable increase in safety had been shown. The issue of transition was also raised, with the suggestion it could not be implemented overnight.

8.2.4 Finally, with regard to IP/4, further comments received from industry, supporting those in WP/62, were also presented. It was suggested should the reformatted packing instructions be adopted, ample time should be given for implementation.

8.2.5 Following the introduction of these papers, the report of the PIWG was presented. After reviewing all comments and deciding sufficient support had been expressed, the following areas were identified for discussion:

- a) Inner packaging types. It was clarified a misunderstanding had led some commentators to believe some of the existing inner packagings would no longer be authorized. It was explained that an earlier decision of the panel to rationalise inner packagings had been made on condition it would only be implemented when reformatting of the packing instructions took place. This decision was consistent with the approach taken in the UN Model Regulations. The working group further suggested all references to “IP” codes could be deleted from the Technical Instructions.
- b) Outer packagings. It was noted an error had been made in the preparation of the draft packing instructions; a correction had been placed on the website.
- c) Additional packaging materials. Taking into account the concerns raised by industry whilst ensuring safety in air transport, the PIWG discussed the proposal to require a liner, and in some cases absorbent material for liquids. The group agreed that absorbent material requirement should apply to all combination packagings containing liquids of Packing Group I on the basis the hazard posed by such a liquid warrants retaining the additional safety measure. Recognizing a significant incidence of leaking inner receptacles, the PIWG determined the capability of the closure system to be the key and proposed the addition of a second means of securing closures as a solution.
- d) Structure and format. A suggestion to simplify the presentation of the packing instruction was agreed.
- e) Number scheme. Recognizing the increased costs which would result from the adoption of an alpha-numeric system, the maintenance of a three digit number was supported.

- f) Cost to transition. The PIWG believed the overall benefits of the new system would outweigh the cost of transition. It was noted major outreach programmes would have to be developed to support the change.

8.2.6 Support for continuing the work of the PIWG was expressed by several members; those who had contributed to the work were thanked in recognition of the task they had accomplished. It was suggested a decision in principle was now needed, noting that many of the problems had now been resolved or accommodated. It was also noted the advantages of the new system should be stressed, in particular the number of additional packagings which would now be authorised. It was said there was widespread support from the airlines; it was recognised the much simpler packing instructions would make it easier to comply with all the requirements.

8.2.7 Following requests from industry, it was agreed the comments received to the survey would be made available. In addition, the incident data which had been reviewed by the PIWG would also be made available.

8.2.8 Regarding the issue of cost which had been identified by industry as being of serious concern, the working group requested that industry research the matter and provide data for the panel to review and consider.

8.2.9 The working group agreed that sufficient time should be given for formal working papers to be developed for DGP/21. The Secretary noted the PIWG would develop a final draft based on the format suggested in DGP-WG/07-WP/48 which would be placed on the website in August; an extended deadline of 21 September 2007 for working papers commenting on the reformatting exercise was proposed. All other working papers would be subject to a deadline of 7 September 2007.

Review of provisions for dangerous goods carried by passengers and crew

8.3 No papers submitted.

Intermodal harmonization

8.4 No papers submitted.

Safety management systems

8.5 Safety Management Systems (DGP-WG/07-WP/58)

8.5.1 At DGP-WG/06, the need to establish a safety management system (SMS) for the transport of dangerous goods by air was discussed. WG07 was provided with material for further discussion on the need to establish an SMS. The material also clarified the distinction between ICAO's definitions for safety programmes and safety management systems.

8.5.2 Strong support for developing provisions related to SMS was expressed. Some members suggested, however, such provisions should be recommendatory in nature on the basis implementation of a mandatory programme would be difficult to achieve. Others stressed the importance of a systems based approach, especially in relation to the transport chain, noting that shippers are one of the most important components in transport safety.

8.5.3 The working group agreed that material should be sent to the Secretary for development of a proposal for DGP/21.

Competency based training

8.6 No papers submitted.

9. DISCUSSION OF MISCELLANEOUS DANGEROUS GOODS ISSUES**9.1 Layout of the ICAO Technical Instructions (DGP-WG/07-WP/12)**

9.1.1 A proposal to amend the numbering system in the Technical Instructions to include the part number was discussed. Some members believed that this approach would be more user friendly and noted this was more closely aligned to the UN Recommendations. One member thought the ISO system used in the UN recommendations was overly cumbersome. It was pointed out 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. It was suggested a cost benefit analysis should be carried out before a decision was made.

9.1.2 The Secretary agreed to discuss the feasibility of the proposal with the English Editorial Unit and to provide sample text for DGP/21.

9.2 ISO Standards Referred to in the Technical Instructions (DGP-WG/07-WP/40)

9.2.1 The difficulties encountered by enforcement agencies when attempting to obtain out of date ISO standards, referenced both in the Technical Instructions and the UN Recommendations, was explained. It was noted it was not simply a case of amending the references to the revised ISO standard but a more complex issue of checking each individual standard to see if all requirements still applied.

9.2.2 It was agreed this was a multimodal issue; the proposer offered to notify the UN of the problem.

9.3 Miscellaneous Issues Arising From DGP-WG06 (DGP-WG/07-WP/59)

9.3.1 The working group noted the information provided in the paper.

9.4 Dangerous Goods Issues Raised With Other ANC Panels (DGP-WG/07-WP/60)

9.4.1 The working group noted the information provided in the paper, with regard to the decision of the AP not to consider the matter for consideration in Annex 14 but rather as a facilitation matter. The Secretary informed the working group of the potential involvement of Airports Council International (ACI). One member suggested all civil aviation authorities should work collectively to do more to educate passengers regarding what they can or cannot carry.

9.5 Electronic Dangerous Goods Transport Data (DGP-WG/07-WP/70)

9.5.1 The working group was reminded of discussions at WG06 on the development of provisions to permit the electronic transmission of information required in the dangerous goods transport

document and the potential removal of the requirement to have a copy of the dangerous goods transport document accompanying every consignment. The working group was asked to continue discussions on what steps needed to be taken to be able to remove the mandatory requirement for a physical dangerous goods transport document and instead permit the use of electronic data interchange (EDI) as an alternative to a document. It was suggested that in order to be able to move toward EDI as an alternative to a document there would need to be amendments made to certain provisions in the TIs to recognize EDI as meeting the current provisions.

9.5.2 Members welcomed the initiative and considered this to be an important item. It was noted an information paper would be presented at the July UNSCOE meeting, recognizing this was a multimodal issue. General discussion on how technology could be used to expedite shipments then ensued; it was noted advance information systems and electronic data exchanges could be used for safety, facilitation and security reasons.

9.5.3 It was agreed that the working group by correspondence continue work on this subject.

9.6 UN Working Papers for July 2007 Meeting (DGP-WG/07-WP/74)

9.6.1 Comments were sought from the working group on proposed amendments to the UN Model Regulations contained in working papers for the thirty-first session of the UNSCOE.

9.6.2 Members were invited to submit comments to the originator of the paper for onward submission to the UN.

9.7 Report to ICAO on the IAEA's safety of transport of radioactive material programme (DGP-WG/07-IP/5)

9.7.1 A report by the IAEA representative was noted; particular stress was placed on the harmonization work being done by the UN and the IAEA and on the establishment of the Steering Committee on denial of shipments of radioactive material.

9.8 Enhanced requirements for transport of oxygen, oxygen generators, and oxidizing gases (DGP-WG/07-IP/7)

9.8.1 Information was provided by one member on proposed enhancements for packaging and cylinder requirements for oxygen and oxidizing gases in his State. It was noted similar proposals would be submitted to DGP/21.

APPENDIX A
AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Reference for amendments to Part 1: DGP-WG/07-WP/2, unless otherwise indicated.

Part 1

GENERAL

Chapter 1

SCOPE AND APPLICABILITY

...

**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.~~

4.5.1.4 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.

4.6.1.5 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

2.1 DANGEROUS GOODS FORBIDDEN FOR TRANSPORT BY AIR UNDER ANY CIRCUMSTANCE

Editorial Note.— The following amendments are included in a proposed addendum to the 2007-2008 edition (DGP-WG/07-WP/1 refers).

Any article or substance which, as presented for transport, is liable to explode, dangerously react, produce a flame or dangerous evolution of heat or dangerous emission of toxic, corrosive or flammable gases or vapours under conditions normally encountered in transport must not be carried on aircraft under any circumstance.

Note 1.— *Certain dangerous goods known to meet the description above have been included in the Dangerous Goods List (Table 3-1) with the word "Forbidden" shown in columns 2 and 3. It must be noted, however, that it would be impossible to list all dangerous goods which are forbidden for transport by air under any circumstance. Therefore, it is essential that appropriate care be exercised to ensure that no goods meeting the above description are offered for transport.*

Note 2.— 2.1 is intended to include articles being returned to the manufacturer for safety reasons.

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

DGP-WG/07-WP/2 and DP/1:

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 ~~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 2-42~~15~~.

Note.— The Acts of the Universal Postal Union do not apply to the domestic transport of dangerous goods by mail. Domestic transport of dangerous goods in the mail are subject to the provisions of the appropriate national authorities.

2.4 DANGEROUS GOODS IN EXCEPTED QUANTITIES

Editorial Note.— See DGP-WG/07-WP/8 for proposed reformatting of excepted quantities.

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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;7-27.1.3.

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.* 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.

DGP-WG/07-WP/2 and DP/2:

Containment system. *For the transport of Class 7 material.* 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):

DGP-WG/07-WP/2 and DP/2:

Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material. *For the transport of Class 7 material.* 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 definition (Design) (moved from current 2;7.2):

DGP-WG/07-WP/2 and DP/2:

Design. *For the transport of Class 7 material.* 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 definition (Exclusive use) (moved from current 2;7.2):

Exclusive use. For the transport of Class 7 material. ~~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.

End of inserted text.

...

Freight container. See unit load device.

Note.— *For the definition of freight container for radioactive material, see 2;7-27.1.3.*

...

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. ~~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~~ their containment and other safety functions.

[Note.— *For radioactive material, see 2;7-27.1.3.]*

...

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. ~~The~~ corresponding dose rate expressed in millisieverts per hour.

Radioactive contents. For the transport of Class 7 material. ~~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.

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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, Aa 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-1211 Geneva 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).

...

Chapter 4

TRAINING

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DGP-WG/07-WP/1:

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.

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DGP-WG/07-WP/61 and DP/3:

Table 1-4. Content of training courses

| 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 |
| 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

...

12 — Security staff ~~who deal~~ who 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

Note 1. — Depending on the responsibilities of the person, the aspects of training to be covered may vary from those shown in the table. E.g. in this respect staff involved in implementing security procedures, screeners and their supervisors do not need to be trained fully in the aspect of Classification. They only need to be trained in the general properties of Dangerous Goods.

4.2 TRAINING CURRICULA

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DGP-WG/07-WP/68:

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

| Contents | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | <u>11</u> |
|--|----------|----------|----------|-----------|-----------|
| <u>General Philosophy</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> |
| <u>Limitations</u> | <u>X</u> | | <u>X</u> | <u>X</u> | <u>X</u> |
| <u>Labelling and marking</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> |
| <u>Dangerous goods transport document and other relevant documentation</u> | <u>X</u> | | | | |

| | | | | | |
|--|----------|----------|----------|----------|----------|
| <u>Recognition of undeclared dangerous goods</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> |
| <u>Provisions for passengers and crew</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> |
| <u>Emergency procedures</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> | <u>X</u> |

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 responsible for the handling, storage and loading of cargo (other than dangerous goods), mail or stores and baggage
- 9 — Passenger handling staff
- 10 — Flight crewmembers and load planners
- 11 — Crew members (other than flight crew members)

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Chapter 5**DANGEROUS GOODS SECURITY**

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Table 1-56. 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 |
| <u>Class 1 Division 1.4 UN Nos. 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456 and 0500</u> |
| <u>Class 1 Division 1.5 explosives</u> |
| Division 2.3 toxic gases (excluding aerosols) |
| <hr/> |
| <u>DGP-WG/07-WP/2 and DP/2:</u> |
| <hr/> |
| <u>Class 3 desensitized explosives</u> |
| <u>Division 4.1 desensitized explosives</u> |
| 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 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.

~~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;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;7.1~~.

6.1.5 Specific provisions for the transport of excepted packages

~~7.9.4.6.1.5.1~~ Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles 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:

DGP-WG/07-WP/2 and DP/2:

- a) the applicable requirements specified in 1;4, 2; Introductory Chapter, 4.2, 2;7.9.2, and, 2;7.2.4.1.2.2 to 7.2.4.1.2.6 (as applicable), 2;7.9.3 to 2;7.9.6, 4;9.1.2, 5;1.4, 5;2.4.2, 5;2.2.2, 5;2.4.1.1, 5;2.4.5 a) and e); 5;3.2.11 e), 5;4.1.4.1 a), 5;4.4, 7;3.2.2 and 7;4.4;
- 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;7.10.22~~ 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 The following provisions do not apply to excepted packages and the controls for transport of excepted packages: 1;5, [2.7.4.1], 2;7.2.3.3.2, 4;9.1.3, 4;9.1.4, 4;9.1.6, 4;9.1.7, 5;1.6.3, 5;3.2.6, 5;4.1.5.7.1, 5;4.1.5.7.2, 5;4.1.6.1, 6;7.5.1, [7.1.7.5.1], [7.1.7.5.3 to 7.1.7.5.5], [7.1.8.1.1], [7.1.8.1.3], [7.1.8.3.1] and [7.1.8.6.1].

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

4.4.2.6.2 Radiation protection programme

~~4.4.2.4.6.2.1~~ 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.

- ≠ ~~4.4.2.3.6.2.2~~ 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.

~~4.4.2.2.6.2.3~~ 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 on 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 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.

DGP-WG/07-WP/2 and DP/2:

4.4.56.6 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;
 - 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.
-

Reference for amendments to Part 2: DGP-WG/07-WP/3, unless otherwise indicated.

Part 2

CLASSIFICATION OF DANGEROUS GOODS

Chapter 2

CLASS 2 — GASES

...

2.1 DEFINITIONS AND GENERAL PROVISIONS

...

DGP-WG/07-WP/51 and Flimsy 9:

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

...

DGP-WG/07-WP/3 and DP/3:

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 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](#).

...

Chapter 5

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

...

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) | Emergenc y tempera- ture (°C) | UN generic entry | Notes |
|------------------|-----------------------------|------------------------------------|--|---------------------------------|------------------------|-------------------------------------|---|------------------------|-------|
| | | | | | | | | | |

...

| 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 temperature (°C) | Emergency temperature (°C) | UN generic entry | Notes |
|---|--------------------------|---------------------------|------------------------------------|------------------------|------------------|--------------------------|----------------------------|------------------|-----------|
| <u>Methyl isopropyl ketone peroxide(s)</u> | <u>see remark 31)</u> | <u>≥70</u> | | | | | | <u>3109</u> | <u>31</u> |
| ... | | | | | | | | | |
| <u>3,3,5,7,7-pentamethyl-1,2,4-trioxepane</u> | <u>≤100</u> | | | | | | | <u>3107</u> | |
| ... | | | | | | | | | |

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

...

6.3.2.3 Exceptions

...

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.

...

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 DEFINITIONS 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/cm² for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm² 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.~~

7.27.1.3 Definitions of specific terms

A₁ and A₂:

A₁. The activity value of special form radioactive material, which is listed in Table 2-43~~12~~ or derived in 2;7.7.2~~7.2.2~~ and is used to determine the activity limits for the requirements of these Instructions.

A₂. The activity value of radioactive material, other than special form radioactive material, which is listed in Table 2-43~~12~~ or derived in 2;7.7.2~~7.2.2~~ 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/cm² for beta and gamma emitters and low toxicity alpha emitters, or 0.04 Bq/cm² 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 m³. 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 of uranium 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

| <u>UN Number</u> | <u>Name</u> |
|------------------------------------|---|
| <u>Excepted packages (1:6.1.5)</u> | |
| <u>UN 2908</u> | <u>Radioactive material, excepted package — empty packaging</u> |
| <u>UN 2909</u> | <u>Radioactive material, excepted package — articles manufactured from natural uranium or depleted uranium or natural thorium</u> |
| <u>UN 2910</u> | <u>Radioactive material, excepted package — limited quantity of material</u> |
| <u>UN 2911</u> | <u>Radioactive material, excepted package — instruments or articles</u> |

| <u>UN Number</u> | <u>Name</u> |
|---|--|
| <u>Low specific activity radioactive material (7.2.3.1)</u> | |
| <u>UN 2912</u> | <u>Radioactive material, low specific activity (LSA-I), non-fissile or fissile excepted</u> |
| <u>UN 3321</u> | <u>Radioactive material, low specific activity (LSA-II), non-fissile or fissile excepted</u> |
| <u>UN 3322</u> | <u>Radioactive material, low specific activity (LSA-III), non-fissile or fissile excepted</u> |
| <u>UN 3324</u> | <u>Radioactive material, low specific activity (LSA-II) fissile</u> |
| <u>UN 3325</u> | <u>Radioactive material, low specific activity (LSA-III) fissile</u> |
| <u>Surface contaminated objects (7.2.3.2)</u> | |
| <u>UN 2913</u> | <u>Radioactive material, surface contaminated objects (SCO-I or SCO-II), non-fissile or fissile excepted</u> |
| <u>UN 3326</u> | <u>Radioactive material, surface contaminated objects (SCO-I or SCO-II), fissile</u> |
| <u>Type A packages (7.2.4.4)</u> | |
| <u>UN 2915</u> | <u>Radioactive material, Type A package, non-special form, non-fissile or fissile excepted</u> |
| <u>UN 3327</u> | <u>Radioactive material, Type A package, fissile, non-special form</u> |
| <u>UN 3332</u> | <u>Radioactive material, Type A package, special form, non-fissile or fissile excepted</u> |
| <u>UN 3333</u> | <u>Radioactive material, Type A package, special form, fissile</u> |
| <u>Type B(U) package (7.2.4.6)</u> | |
| <u>UN 2916</u> | <u>Radioactive material, Type B(U) package, non-fissile or fissile excepted</u> |
| <u>UN 3328</u> | <u>Radioactive material, Type B(U) package, fissile</u> |
| <u>Type B(M) package (7.2.4.6)</u> | |
| <u>UN 2917</u> | <u>Radioactive material, Type B(M) package, non-fissile or fissile excepted</u> |
| <u>UN 3329</u> | <u>Radioactive material, Type B(M) package, fissile</u> |
| <u>Type C package (7.2.4.6)</u> | |
| <u>UN 3323</u> | <u>Radioactive material, Type C package, non-fissile or fissile excepted</u> |
| <u>UN 3330</u> | <u>Radioactive material, Type C package, fissile</u> |
| <u>Special arrangement (7.2.5)</u> | |
| <u>UN 2919</u> | <u>Radioactive material, transported under special arrangement, non-fissile or fissile excepted</u> |
| <u>UN 3331</u> | <u>Radioactive material, transported under special arrangement, fissile</u> |
| <u>Uranium hexafluoride (7.2.4.5)</u> | |
| <u>UN 2977</u> | <u>Radioactive material, uranium hexafluoride, fissile</u> |
| <u>UN 2978</u> | <u>Radioactive material, uranium hexafluoride, non-fissile or fissile excepted</u> |

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 $2 \times 10^{-3} A_2/g$.~~

~~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 $(50 \pm 5)^\circ\text{C}$ 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 $(50 \pm 5)^\circ\text{C}$ 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 $4 \times 10^4\text{ Bq/cm}^2$ for beta and gamma emitters and low toxicity alpha emitters, or $4 \times 10^3\text{ Bq/cm}^2$ 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 $4 \times 10^4\text{ Bq/cm}^2$ for beta and gamma emitters and low toxicity alpha emitters, or $4 \times 10^3\text{ Bq/cm}^2$ 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 $8 \times 10^5\text{ Bq/cm}^2$ for beta and gamma emitters and low toxicity alpha emitters, or $8 \times 10^4\text{ Bq/cm}^2$ 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 $8 \times 10^6\text{ Bq/cm}^2$ for beta and gamma emitters and low toxicity alpha emitters, or $8 \times 10^4\text{ Bq/cm}^2$ 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

| <i>Size of load*</i> | <i>Multiplication factor</i> |
|--|------------------------------|
| size of load $\leq 1 \text{ m}^2$ | 4 |
| $1 \text{ m}^2 < \text{size of load} \leq 5 \text{ m}^2$ | 2 |
| $5 \text{ m}^2 < \text{size of load} \leq 20 \text{ m}^2$ | 3 |
| $20 \text{ m}^2 < \text{size of load}$ | 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

| <i>Physical state of contents</i> | <i>Instruments or article</i> | | <i>Materials</i> |
|-----------------------------------|-------------------------------|------------------------|------------------------|
| | <i>Item limits*</i> | <i>Package limits*</i> | <i>Package limits*</i> |
| 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.~~

7.7.2.2.2 Determination of A₂ activity levels

~~7.7.2.4~~**7.2.2.1** The following basic values for individual radionuclides are given in Table 2-43**12**:

- a) A₁ and A₂ 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 2-43**12**, determination of the basic radionuclide values referred to in ~~7.7.2.4~~**7.2.2.1** requires multilateral approval. It is permissible to use the A₂ 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 2-44**13** may be used without obtaining competent authority approval.

~~7.7.2.3~~**7.2.2.3** In the calculations of A₁ and A₂ for a radionuclide not in Table 2-43**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 A₁ or A₂ 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 ~~7.7.2.4~~**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 A₁ or A₂ 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 A₁ or A₂ 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 ~~7.7.4.4.2~~**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 2-44**13** must be used.

Table 2-43~~12~~. Basic radionuclides values for individual radionuclides

| <i>Radionuclide (atomic number)</i> | <i>A₁ (TBq)</i> | <i>A₂ (TBq)</i> | <i>Activity concentration for exempt material (Bq/g)</i> | <i>Activity limit for an exempt consignment (Bq)</i> |
|---|--------------------------------|--------------------------------|--|--|
| 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

| <i>Radioactive contents</i> | <i>A₁ (Tbq)</i> | <i>A₂ (Tbq)</i> | <i>Activity concentration for exempt material (Bq/g)</i> | <i>Activity limit for an exempt consignment (Bq)</i> |
|---|--------------------------------|--------------------------------|--|--|
| 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 A₂ 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} A₂/g for solids and gases, and 10^{-5} A₂/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 A₂; and
 - iii) the estimated average specific activity of the solid, excluding any shielding material, does not exceed 2×10^{-3} A₂/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 A₂.

~~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 cm² (or the area of the surface if less than 300 cm²) does not exceed 4 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 0.4 Bq/cm² for all other alpha emitters; and
 - ii) the fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4×10^4 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm² for all other alpha emitters; and
 - iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4×10^4 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 4×10^3 Bq/cm² 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 cm² (or the area of the surface if less than 300 cm²) does not exceed 400 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 40 Bq/cm² for all other alpha emitters; and

- ii) the fixed contamination on the accessible surface, averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 8×10^5 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm² for all other alpha emitters; and
- iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 8×10^5 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters, or 8×10^4 Bq/cm² 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 7.3.1:

~~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 2919:1990~~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 2919:1990~~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 2919:1990~~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 $(50 \pm 5)^\circ\text{C}$ 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 $(50 \pm 5)^\circ\text{C}$ 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 $(50 \pm 5)^\circ\text{C}$ 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 low dispersible radioactive material*

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

~~7.10.4~~ 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 A₂. 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 A₂. 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 ~~7.10.4~~ 7.2.3.4.1 have been met.

~~7.10.3~~ 7.2.3.4.3 Demonstration of compliance with the performance standards in ~~7.10.4~~ 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 the following conditions are met:

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 hydrogenous 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 6-52-14. Consignment mass limits for exceptions from the requirements for packages containing fissile material

| <i>Fissile material</i> | <i>Fissile material mass (g) mixed with substances having an average hydrogen density less than or equal to water</i> | <i>Fissile material mass (g) mixed with substances having an average hydrogen density greater than water</i> |
|----------------------------|---|--|
| Uranium 235 (X) | 400 | 290 |
| Other fissile material (Y) | 250 | 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 ~~Ex~~cepted 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** The 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 2-4312 (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 2-4215, may be transported in an exempt 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 exempt 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 exempt 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 cm², does not exceed:

(i) 400 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters; and

(ii) 40 Bq/cm² 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.

~~7.7.1.2.27.2.4.1.6~~ ~~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 exempt 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 A₂.

Table 2-42 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 | $2 \times 10^{-2} A_2$ | $2 \times 10^{-1} A_2$ | $2 \times 10^{-2} A_2$ |
| 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 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

7.7.1.4.4.7.2.4.4.1 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 .

7.7.1.4.4.27.2.4.4.1.2 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~~
- ~~e) 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 A₁ or 100 000 A₂, whichever is the lower; or~~
- ~~c) for all other radioactive material — 3000 A₂.~~

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) packages 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 A₁ or 100 000 A₂, whichever is the lower; or~~
- ~~c) for all other radioactive material — 3000 A₂.~~

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 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 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;9.1.12:

~~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

| <i>Conditions</i> | | |
|--|---|-----------------|
| <i>Transport index</i> | <i>Maximum radiation level at any point on external surface</i> | <i>Category</i> |
| 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 μ Sv/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 μ m 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;7.10.3 and the impact test specified in 6;7.10.4. 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

...

8.2 ASSIGNMENT OF PACKING GROUPS

...

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 after 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.

...

Reference for amendments to Part 3: DGP-WG/07-WP/4, unless otherwise indicated.

Part 3

DANGEROUS GOODS LIST AND LIMITED QUANTITIES EXCEPTIONS

...

Chapter 2

ARRANGEMENT OF THE DANGEROUS GOODS LIST (TABLE 3-1)

...

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 columns as follows:

DGP-WG/07-WP/1:

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.

...

Add new entries and *modify* existing entries as follows (entries are listed in UN No. order)

| Name 1 | UN No. 2 | Class or division 3 | Subsidiary risk 4 | Labels 5 | State variations 6 | Special provisions 7 | UN packing group 8 | Passenger aircraft | | Cargo aircraft | |
|---|-------------|------------------------|----------------------|---------------|-----------------------|-------------------------|-----------------------|--------------------------|-------------------------------------|---------------------------|-------------------------------------|
| | | | | | | | | Packing instruction 9 | Max. net quantity per package 10 | Packing instruction 11 | Max. net quantity per package 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 | |

| 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 |

DGP-WG/07-WP/52 (for 1006):

| | | | | | | | | | | | |
|-------------------|------|-----|----------|-------------------|--|----|--|-----------|-------|-----------|--------|
| Argon, compressed | 1006 | 2.2 | | Gas non-flammable | A69 | | | 200 | 75 kg | 200 | 150 kg |
| Chlorine | 1017 | 2.3 | 5.1 8 | | AU 1 CA 7 GB 3 IR 3 NL 1 US 3 | A2 | | FORBIDDEN | | FORBIDDEN | |

DGP-WG/07-WP/52 (for UN 1046, 1065 and 1066):

| | | | | | | | | | | | |
|--|------|-----|---|------------------------------|--|-------------------|-----------|----------------------------|----------------------------|------------|---------------|
| Helium, compressed | 1046 | 2.2 | | Gas non-flammable | A69 | | | 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 | A69 | | | 200 | 75 kg | 200 | 150 kg |
| 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 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 | 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 A148 | II III | 305 Y305 309 Y309 | 5 L 1 L 60 L 10 L | 307 310 | 60 L 220 L |
| Methyltrichlorosilane | 1250 | 3 | 8 | Liquid flammable & Corrosive | AU 1 CA 7 GB 3 IR 3 NL 1 US 3 | A4 | III | FORBIDDEN 306 | 1 L | 304 | 2.5 L |
| Vinyltrichlorosilane | 1305 | 3 | 8 | Liquid flammable & Corrosive | AU 1 CA 7 GB 3 IR 3 NL 1 US 3 | A4 | III | FORBIDDEN 306 | 1 L | 304 | 2.5 L |
| <u>Picric acid, wetted with not less than 30% water, by mass</u> | 1344 | 4.1 | | Solid flammable | BE 3 | A40 | I | 416 | 1 kg | 412 | 15 kg |
| <u>TNT, wetted with not less than 30% water, by mass</u> | 1356 | 4.1 | | Solid Flammable | BE 3 | 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 |
| 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 |
| 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 |
| <u>Nitric acid, other than red fuming, with less than 65% nitric acid</u> | <u>2031</u> | <u>8</u> | | <u>Corrosive</u> | | | <u>II</u> | <u>807</u> <u>Y807</u> | <u>1 L</u> <u>0.5 L</u> | <u>813</u> | <u>30 L</u> |
| Nitric acid, other than red fuming, with <u>at least 65%</u> <u>but</u> not more than 70% nitric acid | 2031 | 8 | <u>5.1</u> | Corrosive & Oxidizer | AU 1 CA 7 GB 3 IR 3 NL 1 US 3 | A1 | II | FORBIDDEN | | 813 | 30 L |

DGP-WG/07-WP/52 (UN 2036):

| | | | | | | | | | | | |
|--|------|-----|--|-------------------|-----|------|--|------------------|-------|-----|--------|
| Xenon | 2036 | 2.2 | | Gas non-flammable | A69 | | | 200 | 75 kg | 200 | 150 kg |
| Radioactive material, excepted package — empty packaging | 2908 | 7 | | None | | A130 | | See Part 2.7.1.6 | | | |
| Radioactive material, excepted package — articles manufactured from natural uranium or depleted uranium or natural thorium | 2909 | 7 | | None | | A130 | | See Part 2.7.1.6 | | | |

DGP-WG/07-WP/45 (for UN 2794, 2795, 2800):

| | | | | | | | | | | | |
|---|------|---|--|-----------|--|--------------------|--|------------------|----------|-----|----------|
| 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 A164 | | 800 | 30 kg G | 800 | No limit |
| Batteries, wet, non-spillable, electric storage | 2800 | 8 | | Corrosive | | A48 A67 A164 | | 806 | No limit | 806 | No limit |
| Radioactive material, excepted package — limited quantity of material | 2910 | 7 | | None | | A130 | | See Part 2.7.1.6 | | | |
| Radioactive material, excepted package — instruments or articles | 2911 | 7 | | None | | A130 | | See Part 2.7.1.6 | | | |

| 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 |
| 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 2-7.1.6 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 2-7.1.6 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 2-7.1.6 and Part 4.9 | | | |
| 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 A158 | III | 914 Y914 | 450 L 30 kg G | 914 | 450 L |

DGP-WG/07-WP/s1, 4, 45 and DP/2:

| | | | | | | | | | | | |
|--|------|---|--|---------------|--------------|-----------------------------------|----|---------|--------|---------|---------|
| Lithium metal batteries (including lithium alloy batteries)† | 3090 | 9 | | Miscellaneous | US 2 US 3 | A45 A88 A99 A154 A164 | II | 903 | 5 kg G | 903 | 35 kg G |
| Lithium metal batteries contained in equipment† | 3091 | 9 | | Miscellaneous | US 2 US 3 | A45 A48 A154 A164 | | see 912 | | see 912 | |
| Lithium metal batteries packed with equipment† | 3091 | 9 | | Miscellaneous | US 2 US 3 | A45 A88 A154 A164 | II | see 918 | | see 918 | |

DGP-WG/07-WP/45 (UN 3171):

| | | | | | | | | | | | |
|---|------|---|--|---------------|------|----------------------------------|--|-------------------------------|---------------|-----|----------|
| Battery-powered equipment | 3171 | 9 | | Miscellaneous | | A21 A67 A87 A94 A164 | | 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 A163 | | 915 Y915 | 10 kg 1 kg | 915 | 10 kg |
| Radioactive material, surface contaminated objects (SCO-I or SCO-II), non-fissile or fissile excepted | 3321 | 7 | | Radioactive | CA 1 | A23 A78 A139 A159 | | See Part 2-7.1.6 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 |
| Radioactive material, low specific activity (LSA-III), non-fissile or fissile excepted | 3322 | 7 | | Radioactive | CA 1 | A23 A78 A159 | | See Part 2.7.1.6 and Part 4.9 | | | |
| Radioactive material, low specific activity (LSA-II) fissile | 3324 | 7 | | Radioactive | CA 1 | A76 A78 A159 | | See Part 2.7.1.6 and Part 4.9 | | | |
| Radioactive material, low specific activity (LSA-III) fissile | 3325 | 7 | | Radioactive | CA 1 | A76 A78 A159 | | See Part 2.7.1.6 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 2.7.1.6 and Part 4.9 | | | |
| Radioactive material, Type B(U) package, fissile | 3328 | 7 | | Radioactive | CA 1 | A78 A160 | | See Part 2.7.1.6 and Part 4.9 | | | |
| Radioactive material, Type B(M) package, fissile | 3329 | 7 | | Radioactive | CA 1 | A78 A160 | | See Part 2.7.1.6 and Part 4.9 | | | |
| <u>Pentaerythritol tetranitrate mixture desensitized, solid, n.o.s.* with more than 10% but not more than 20% PETN, by mass</u> | 3344 | 4.1 | | | | BE 3 | | FORBIDDEN | | FORBIDDEN | |
| <u>PETN mixture desensitized, solid, n.o.s.* with more than 10% but not more than 20% PETN, by mass</u> | 3344 | 4.1 | | | | BE 3 | | FORBIDDEN | | FORBIDDEN | |
| <u>Hydrogen in a metal hydride storage system contained in equipment</u> | 3468 | 2.1 | | Gas flammable | | A1 A143 | | FORBIDDEN | | 214 | 100 kg G |
| <u>Hydrogen in a metal hydride storage system packed with equipment</u> | 3468 | 2.1 | | Gas flammable | | A1 A143 | | FORBIDDEN | | 214 | 100 kg G |

DGP-WG/07-WP/22 (UN 3473) :

| | | | | | | | | | | | |
|--|------|-----|--|------------------|--|------|----|-------------|------------|-----|--------|
| <u>Fuel cell cartridges containing flammable liquids</u> | 3473 | 3 | | Liquid flammable | | A146 | | 313 | 5 kg | 313 | 50 kg |
| <u>Fuel cell cartridges contained in equipment containing flammable liquids</u> | 3473 | 3 | | Liquid flammable | | A146 | | 313 | 5 kg | 313 | 50 kg |
| <u>Fuel cell cartridges packed with equipment containing flammable liquids</u> | 3473 | 3 | | Liquid flammable | | A146 | | 313 | 5 kg | 313 | 50 kg |
| <u>1-Hydroxybenzotriazole, anhydrous, wetted with not less than 20% water, by mass</u> | 3474 | 4.1 | | Solid flammable | | A40 | I | 416 | 0.5 kg | 416 | 0.5 kg |
| <u>Ethanol and gasoline mixture with more than 10% ethanol</u> | 3475 | 3 | | Liquid flammable | | A156 | II | 305 Y305 | 5 L 1 L | 307 | 60 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 |
| <u>Ethanol and motor spirit mixture, with more than 10% ethanol</u> | <u>3475</u> | <u>3</u> | | <u>Liquid flammable</u> | | <u>A156</u> | <u>II</u> | <u>305</u> <u>Y305</u> | <u>5 L</u> <u>1 L</u> | <u>307</u> | <u>60 L</u> |
| <u>Ethanol and petrol mixture, with more than 10% ethanol</u> | <u>3475</u> | <u>3</u> | | <u>Liquid flammable</u> | | <u>A156</u> | <u>II</u> | <u>305</u> <u>Y305</u> | <u>5 L</u> <u>1 L</u> | <u>307</u> | <u>60 L</u> |

DGP-WG/07-WP/22 (UN 3476, 3477, 3478, 3479) :

| | | | | | | | | | | | |
|--|-------------|------------|--|----------------------|--|----------------------------|--|-------------|---------------|------------|--------------|
| <u>Fuel cell cartridges, containing water-reactive substances</u> | <u>3476</u> | <u>4.3</u> | | <u>Danger if wet</u> | | <u>A146</u> <u>A157</u> | | <u>436</u> | <u>[5 kg]</u> | <u>436</u> | <u>50 kg</u> |
| <u>Fuel cell cartridges contained in equipment, containing water-reactive substances</u> | <u>3476</u> | <u>4.3</u> | | <u>Danger if wet</u> | | <u>A146</u> <u>A157</u> | | <u>436</u> | <u>[5 kg]</u> | <u>436</u> | <u>50 kg</u> |
| <u>Fuel cell cartridges packed with equipment, containing water-reactive substances</u> | <u>3476</u> | <u>4.3</u> | | <u>Danger if wet</u> | | <u>A146</u> <u>A157</u> | | <u>436</u> | <u>[5 kg]</u> | <u>436</u> | <u>50 kg</u> |
| <u>Fuel cell cartridges, containing corrosive substances</u> | <u>3477</u> | <u>8</u> | | <u>Corrosive</u> | | <u>A146</u> <u>A157</u> | | <u>827</u> | <u>[5 kg]</u> | <u>827</u> | <u>50 kg</u> |
| <u>Fuel cell cartridges contained in equipment, containing corrosive substances</u> | <u>3477</u> | <u>8</u> | | <u>Corrosive</u> | | <u>A146</u> <u>A157</u> | | <u>827</u> | <u>[5 kg]</u> | <u>827</u> | <u>50 kg</u> |
| <u>Fuel cell cartridges packed with equipment, containing corrosive substances</u> | <u>3477</u> | <u>8</u> | | <u>Corrosive</u> | | <u>A146</u> <u>A157</u> | | <u>827</u> | <u>[5 kg]</u> | <u>827</u> | <u>50 kg</u> |
| <u>Fuel cell cartridges, containing liquefied flammable gas</u> | <u>3478</u> | <u>2.1</u> | | <u>Gas flammable</u> | | <u>A146</u> <u>A161</u> | | <u>[???</u> | <u>1 kg</u> | <u>215</u> | <u>15 kg</u> |
| <u>Fuel cell cartridges contained in equipment, containing liquefied flammable gas</u> | <u>3478</u> | <u>2.1</u> | | <u>Gas flammable</u> | | <u>A146</u> <u>A161</u> | | <u>[???</u> | <u>1 kg</u> | <u>215</u> | <u>15 kg</u> |
| <u>Fuel cell cartridges packed with equipment, containing liquefied flammable gas</u> | <u>3478</u> | <u>2.1</u> | | <u>Gas flammable</u> | | <u>A146</u> <u>A161</u> | | <u>[???</u> | <u>1 kg</u> | <u>215</u> | <u>15 kg</u> |
| <u>Fuel cell cartridges, containing hydrogen in metal hydride</u> | <u>3479</u> | <u>2.1</u> | | <u>Gas flammable</u> | | <u>A146</u> <u>A162</u> | | <u>215</u> | <u>1 kg</u> | <u>215</u> | <u>15 kg</u> |
| <u>Fuel cell cartridges contained in equipment, containing hydrogen in metal hydride</u> | <u>3479</u> | <u>2.1</u> | | <u>Gas flammable</u> | | <u>A146</u> <u>A162</u> | | <u>215</u> | <u>1 kg</u> | <u>215</u> | <u>15 kg</u> |
| <u>Fuel cell cartridges packed with equipment, containing hydrogen in metal hydride</u> | <u>3479</u> | <u>2.1</u> | | <u>Gas flammable</u> | | <u>A146</u> <u>A162</u> | | <u>215</u> | <u>1 kg</u> | <u>215</u> | <u>15 kg</u> |

| 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 |
| <u>Lithium ion batteries (including lithium ion polymer batteries)</u> | <u>3480</u> | <u>9</u> | | <u>Miscellaneous</u> | | <u>A45 A88 A99 A154</u> | <u>II</u> | <u>903</u> | <u>5 kg G</u> | <u>903</u> | <u>35 kg G</u> |
| <u>Lithium ion batteries contained in equipment</u> | <u>3481</u> | <u>9</u> | | <u>Miscellaneous</u> | | <u>A45 A48 A154</u> | <u>II</u> | <u>903</u> | <u>5 kg G</u> | <u>903</u> | <u>35 kg G</u> |
| <u>Lithium ion batteries packed with equipment</u> | <u>3481</u> | <u>9</u> | | <u>Miscellaneous</u> | | <u>A45 A88 A154</u> | <u>II</u> | <u>903</u> | <u>5 kg G</u> | <u>903</u> | <u>35 kg G</u> |

Editorial Note.— Decision regarding authorization of passenger or cargo limits and quantity limits for new fuel cell entries assigned UN Nos. 3476, 3477, 3478 and 3479 to be determined.

Chapter 3

SPECIAL PROVISIONS

...

DGP-WG/07-WP/9:

Editorial Note.— It was agreed to separate the special provisions into two tables. Table 3-2 will contain special provisions which have equivalent special provisions in the UN Model Regulations. Table 3-3 will contain special provisions which apply to air transport. Only provisions which contain proposed amendments are shown here. Tables 3-2 and 3-3 will be shown in their entirety at DGP/21.

Table 3-2. Special provisions — Multimodal

...

DGP-WG/07-WP/4 and WP/11:

- A45 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~~ Watt-hour rating is not more than 20 Wh;
 - 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~~ Watt-hour rating is not more than 100 Wh. Lithium ion batteries subject to this provision must be marked with the Watt-hour rating on the outside case;
 - 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.~~
 - d) Cells and batteries, except when installed in equipment, 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 inner packagings must be packed in strong outer packagings which conform to the provisions of 4;1.1.1, 4;1.1.3.1, and 4;1.1.9.

- e) Cells and batteries when installed in equipment must be protected from damage and short circuit, and the equipment must be equipped with an effective means of preventing accidental activation. When lithium batteries are installed in equipment, 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.
- f) Except for packages containing no more than four cells installed in equipment or no more than two batteries installed in equipment, each package must be marked with the following:
- i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
 - ii) an indication that the package must be handled with care and that a flammability hazard exists if the package is damaged;
 - iii) an indication that special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - iv) a telephone number for additional information.
- g) Each consignment of one or more packages marked in accordance with paragraph (f) must be accompanied with a document including the following:
- i) an indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
 - ii) an indication that the package must be handled with care and that a flammability hazard exists if the package is damaged;
 - iii) an indication that special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - iv) a telephone number for additional information.
- h) Except when lithium batteries are installed in equipment, each package must be 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
- (i) Except when lithium batteries are installed in or packed with equipment, packages must 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.~~

DGP-WG/07-WP/45 and DP/2:

Any lithium battery or lithium 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.

Separate entries exist for lithium metal batteries and lithium ion batteries to facilitate the transport of these batteries for specific modes of transport and to enable the application of different emergency response actions.

...

A79 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.

...

A91 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 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.

...

DGP-WG/07-WP/22 and DP/4:

A146 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.~~ Fuel cell cartridges, including when contained in equipment, must be designed and constructed to prevent the fuel from leaking during under normal conditions of transport.

~~This entry applies to 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 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 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 ~~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.~~

+ A155 Magnesium nitrate hexahydrate is not subject to these Instructions.

+ A156 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 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 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 A single package of non-combustible solid LSA-II or LSA-III material must not contain an activity greater than 3000 A₂.

+ A160 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 A₁ or 100 000 A₂, whichever is the lower; or

c) For all other radioactive material: 3000 A₂.

DGP-WG/07-WP/22 and DP/4:

- + A161 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 Part 6, Chapter 5, Paragraph 5.4.2.1.
- A162 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".
- 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 38 mm steel apex, 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% 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% rated hydrogen capacity to not less than 95% rated hydrogen capacity and back to not more than 5% 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% rated capacity and pressurized to 75% 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
- c) The date of expiry based on the maximum service life (year in four digits; month in two digits).

DGP-WG/07-WP/4:

- + A163 Chemical kits and first aid kits containing dangerous goods in inner packagings which do not exceed the quantity limits for excepted quantities applicable to individual substances as specified in [1:2.4.3] may be transported in accordance with 3:5. Division 5.2 substances, although not individually authorized as excepted quantities in the Dangerous Goods List, are authorized in such kits and are [assigned Code E2 (see 3:5.2)].

Table 3-3. Special provisions — transport by air

...

- ≠ A32 Air bags inflators, air bag modules or seat-belts 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.

...

- ≠ 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 to the base material. The quantity limit [and the excepted quantity code] shown in [1:2.4.3] apply to the base material.

DGP-WG/07-WP/45 and DP/2:

- 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.

...

DGP-WG/07-WP/38 and DP/1:

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.

...

DGP-WG/07-WP/45 and DP/2:

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.~~

Editorial Note.— A154 below is included in the proposed Addendum No. 1 to the 2007-2008 edition (DGP-WG/07-WP/1 refers).

+ A154 Lithium batteries that have the potential of producing a dangerous evolution of heat, fire or short circuit as a result of being damaged or defective are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

...

DGP-WG/07-WP/45 and DP/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.

...

DGP-WG/07-WP/8:

Insert new chapter 5 as follows:

Editorial Note.— Amend quantity limits for outer packagings for Division 5.2 substances in 1;2.4.3 to read 500 g or 500 ml if new Chapter 5 is not adopted.

Chapter 5

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

5.1 Excepted quantities

5.1 Excepted quantities of dangerous goods of certain classes, other than articles, meeting the provisions of this section 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, Classification of Dangerous Goods;
- 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 in Part 4.

Note.— In the case of radioactive material, the requirements for radioactive material in excepted packages in 1;6.1.5 apply.

5.2 Dangerous goods which may be carried as excepted quantities in accordance with these provisions are shown in column 14 of the dangerous goods list by means of an alphanumeric code as follows:

Table 3-3. Excepted quantity codes for Table 3-1

| <i>Code</i> | <i>Maximum quantity per inner packaging</i> | <i>Maximum quantity per outer packaging</i> |
|-------------|---|---|
| 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 |

5.2.1 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.

5.2.2 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.

5.2.3 Excepted quantities of dangerous goods must be transported in accordance with the provisions of sections 5.2.4 to 5.2.6.

5.2.4 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 minimum 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 5.2.5;
- 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.

5.2.5 Tests for packages

5.2.5.1 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:
 - (i) Where the sample is in the shape of a box, it must be dropped in each of the following attitudes:
 - flat on the base;
 - flat on the top;
 - flat on the longest side;
 - flat on the shortest side;
 - on a corner;
 - (ii) Where the sample is in the shape of a drum, it must be dropped in each of the following attitudes:
 - 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).

5.2.5.2 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 should be similar to those of the substance to be transported.

5.2.6 Marking of packages

5.2.6.1 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 or consignee is not shown elsewhere on the package this information must be included within the mark.

5.2.6.2 For packages the dimensions of the mark must be a minimum of 100 mm × 100 mm.

5.2.6.3 An overpack containing dangerous goods in excepted quantities must display the markings required by 5.2.6.1, unless such markings on packages within the overpack are clearly visible.

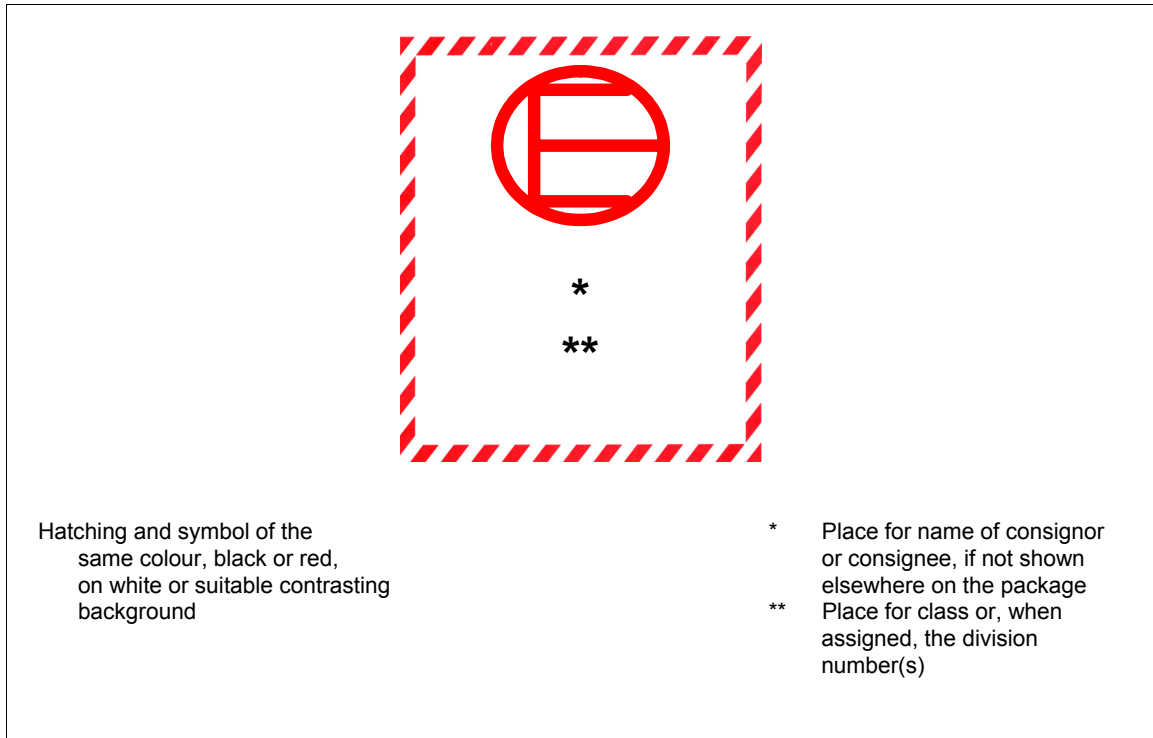


Figure 3-1. Excepted quantities mark

5.2.6 Documentation

If a document (such as a bill of lading or air waybill) accompanies dangerous goods in excepted quantities, it must include the statement "Dangerous Goods in Excepted Quantities" and indicate the number of packages.

Reference for amendments to Part 4: DGP-WG/07-WP/5, unless otherwise indicated.

Part 4

PACKING INSTRUCTIONS

...

Chapter 1

GENERAL PACKING REQUIREMENTS

...

1.1 GENERAL REQUIREMENTS APPLICABLE TO ALL CLASSES EXCEPT CLASS 7

...

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.

...

Chapter 4

CLASS 2 — GASES

...

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;5.1.5.1.6 have been performed.

...

≠ 4.1.1.10 Refillable cylinders, other than closed cryogenic receptacles, must be periodically inspected according to the provisions of 6;5.1.5.1.6 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.

...

4.2 PACKING INSTRUCTIONS

| 200 | PACKING INSTRUCTION 200 | 200 |
|-----|---|-----|
| | <p>For cylinders, the general packing requirements of 4.1.1 must be met.</p> <p>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:</p> <p>...</p> <p>≠ 3) In no case must cylinders be filled in excess of the limit permitted in the following requirements:</p> <p>a) For compressed gases, the working pressure must be not more than two-thirds of the test pressure of the cylinders. Restrictions to this upper limit on working pressure are imposed by special packing provision "o". In no case must the internal pressure at 65°C exceed the test pressure.</p> <p>b) For high pressure liquefied gases, the filling ratio must be such that the settled pressure at 65°C does not</p> | |

exceed the test pressure of the cylinders.

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

...

≠ 4) Keys for the column "Special packing provisions":

...

Gas specific provisions:

...

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.~~

...

Periodic inspection:

...

≠ 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 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.

...

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 |

≠
>

| 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 |
|--------|---|-------------------|-----------------|------------------------------------|-----------|--------------------|--------------------------|--|----------------------------|
| 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 | 0.54 0.52 | v |
| ≠ 1012 | Butylene (butylenes mixture) | 2.1 | | | X | 10 | 10 | 0.50 | z |
| | Butylene (1-butylene) | 2.1 | | | X | 10 | 10 | 0.53 | |
| | Butylene (cis-2-butylene) | 2.1 | | | X | 10 | 10 | 0.55 | |
| | 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 | 42 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 | 48 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 | 48 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 0.30 0.40 | |
| 1036 | Ethylamine | 2.1 | | | X | 10 | 10 | 0.61 | b |
| ≠ 1037 | Ethyl chloride | 2.1 | | | X | 10 | 10 | 0.80 | a, FW |
| > 1039 | Ethyl methyl ether | 2.1 | | | X | 10 | 10 | 0.64 | |

| 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 |
|--------|---|-------------------|-----------------|------------------------------------|-----------|--------------------|--|--|----------------------------|
| 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 | |
| 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 |

| 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 |
|--------|---|---|-----------------|------------------------------------|-----------|--------------------|-------------------------|--|----------------------------|
| 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 | |
| 1962 | Ethylene | 2.1 | | | X | 10 | 225 300 | 0.34 0.37 <u>0.38</u> | |
| ≠ | 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 <u>1.01</u> | |
| | 1974 | Chlorodifluorobromomethane (refrigerant gas R 12b1) | 2.2 | | X | 10 | 10 | 1.61 | |
| | 1976 | Octafluorocyclobutane (refrigerant gas R C318) | 2.2 | | X | 10 | 11 | 1.34 <u>1.32</u> | |
| ≠ | 1978 | Propane | 2.1 | | X | 10 | 25 <u>23</u> | 0.42 <u>0.43</u> | v |
| | 1982 | Tetrafluoromethane (refrigerant gas R 14) | 2.2 | | X | 10 | 200 300 | 0.62 <u>0.71</u> 0.94 <u>0.90</u> | |
| | 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 <u>0.88</u> 0.95 <u>0.96</u> | |
| | 2035 | 1,1,1-trifluoroethane (refrigerant gas R 143a) | 2.1 | | X | 10 | 35 | 0.75 <u>0.73</u> | |
| | 2036 | Xenon | 2.2 | | X | 10 | 130 | 1.24 <u>1.28</u> | |
| | 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 |

| 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 |
|--------|--|-------------------|-----------------|------------------------------------|-----------|--------------------|------------------------|--|----------------------------|
| 2193 | Hexafluoroethane (refrigerant gas R 116) | 2.2 | | | X | 10 | 200 | 1.40 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 | |
| 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 | 0.44 0.12 0.20 0.17 0.66 0.64 | |
| 2601 | Cyclobutane | 2.1 | | | X | 10 | 10 | 0.63 | |
| 2602 | Dichlorodifluoromethane and difluoroethane azeotropic mixture with approximately 74% dichlorodifluoromethane (refrigerant gas R 500) | 2.2 | | | X | 10 | 22 | 1.01 | |
| 3070 | Ethylene oxide and dichlorodifluoromethane 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 | |

| 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 |
|--------|--|-------------------|-----------------|------------------------------------|-----------|--------------------|--------------------|----------------------|----------------------------|
| 3252 | Difluoromethane (refrigerant gas R 32) | 2.1 | | | X | 10 | 48 | 0.78 | |
| 3296 | Heptafluoropropane (refrigerant gas R 227) | 2.2 | | | X | 10 | 45 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 | |
| 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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DGP-WG/07-WP/67 and DP/3:

| 202 | PACKING INSTRUCTION 202 | 202 |
|---|-------------------------|-----|
| <p>This instruction applies to Class 2 refrigerated liquefied gases in open and closed cryogenic receptacles.</p> <ol style="list-style-type: none"> 1. Open cryogenic receptacles must be metal <u>or glass</u> vacuum insulated vessels or flasks vented to the atmosphere to prevent any increase in pressure within the package <u>and must be designed and constructed to permit the release of the gas.</u> 2. The use of safety relief valves, check valves, frangible discs or similar devices in the vent lines is not permitted. 3. <u>Receptacles must be equipped with devices which prevent the release of liquid.</u> 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 <u>for metal receptacles</u> is 50 litres- <u>and for glass receptacles is 5 litres.</u> 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. <u>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.</u> 7.8. Open cryogenic receptacles are permitted for nitrogen, argon, krypton and xenon refrigerated liquids. | | |
| <p>...</p> | | |

DGP-WG/07-WP/22 and DP/4:

215**PACKING INSTRUCTION 215****215**

This instruction applies to UN 3478 and UN 3479 on passenger and cargo aircraft.

The requirements of 4;1.1.1, 4;1.1.2, 4;1.1.3.1, 4;1.1.7 and 4;2 must be met, as appropriate. The following packagings are authorized:

The following packagings are authorized:

- 1) For fuel cell cartridges, wooden (4C1, 4C2), plywood (4D), fibreboard (4G), or reconstituted wood (4F) boxes, plywood drums (1D), fibre drums (1G), plastic drums (1H2), plastic jerricans (3H2) or solid plastic boxes (4H2). Packagings must meet Packing Group II performance standards; and
- 2) For fuel cell cartridges contained in equipment or packed with equipment, strong outer packagings. When fuel cell cartridges are packed with equipment, they must be packed in inner packagings or placed in the outer packaging with cushioning material or divider(s) so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the contents within the outer packaging. Fuel cell cartridges which are installed in equipment must be protected against short circuit and the entire system must be protected against inadvertent operation.

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Chapter 5**CLASS 3 — FLAMMABLE LIQUIDS**

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DGP-WG/07-WP/22 and DP/4:

313**PACKING INSTRUCTION 313****313**

This instruction applies to UN 3473 on passenger and cargo aircraft.

The requirements of 4;1.1.1, 4;1.1.2, 4;1.1.3.1, 4;1.1.7 and 4;2 must be met, as appropriate. The following packagings are authorized:

~~1) For fuel cell cartridges, containing flammable liquid must be packed in accordance with the general packing requirements of 4;1 and be in wooden (4C1, 4C2), plywood (4D), fibreboard (4G) or reconstituted wood (4F) boxes, plywood drums (1D), fibre drums (1G), plastic drums (1H2), plastic jerricans (3H2) or solid plastic boxes (4H2) of. Packagings must meet Packing Group II performance standards. The fuel cells must be incapable of short circuiting and be securely cushioned in the packagings; and~~

~~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.~~

2) For fuel cell cartridges contained in equipment or packed with equipment, strong outer packagings. When fuel cell cartridges are packed with equipment, they must be packed in inner packagings or placed in the outer packaging with cushioning material or divider(s) 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 contents within the outer packaging. Fuel cell cartridges which are installed in equipment must be protected against short circuit and the entire system must be protected against inadvertent operation.

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Chapter 6

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

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DGP-WG/07-WP/22 and DP/4:

| 436 | PACKING INSTRUCTION 436 | 436 |
|--|--------------------------------|------------|
| <p><u>This instruction applies to UN 3476 on passenger and cargo aircraft.</u></p> <p><u>The requirements of 4;1.1.1, 4;1.1.2, 4;1.1.3.1, 4;1.1.7 and 4;2 must be met, as appropriate. The following packagings are authorized:</u></p> <p><u>The mass of each cartridge must not exceed 1 kg.</u></p> <p><u>The following packagings are authorized:</u></p> <ol style="list-style-type: none"><u>1) For fuel cell cartridges, wooden (4C1, 4C2), plywood (4D), fibreboard (4G), or reconstituted wood (4F) boxes, plywood drums (1D), fibre drums (1G), plastic drums (1H2), plastic jerricans (3H2) or solid plastic boxes (4H2). Packagings must meet Packing Group II performance standards; and</u><u>2) For fuel cell cartridges contained in equipment or packed with equipment, strong outer packagings. When fuel cell cartridges are packed with equipment, they must be packed in inner packagings or placed in the outer packaging with cushioning material or divider(s) so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the contents within the outer packaging. Fuel cell cartridges which are installed in equipment must be protected against short circuit and the entire system must be protected against inadvertent operation.</u> | | |

...

Chapter 8

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

...

DGP-WG/07-WP/5:

| 602 | PACKING INSTRUCTION 602 | 602 |
|---|--------------------------------|------------|
| <p>This packing instruction applies to UN 2814 and UN 2900.</p> <p>The following packagings are authorized provided the special packing provisions are met.</p> <p>Packagings meeting the requirements of 6;6 and approved accordingly consisting of:</p> <ol style="list-style-type: none">a) inner packagings comprising:<ol style="list-style-type: none">1) watertight <u>leakproof</u> primary receptacle(s); | | |

| | |
|---|-------------------|
| <p>2) a watertight leakproof secondary packaging;</p> <p>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;</p> <p>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.</p> <p>...</p> <p>d) Other than for exceptional consignments, e.g. whole organs, which require special packaging, the following additional requirements must apply:</p> <p>...</p> <p>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 6.2.2.26.3. 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;</p> <p>...</p> <p>f) <u>Alternative packagings for the transport of animal material may be authorized by the competent authority in accordance with the provisions of 4.2.8.</u></p> <p>Special packing provisions</p> <p>...</p> <p>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.</p> <p>d) <u>Before an empty packaging is returned to the consignor, 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.</u></p> <p>...</p> | <p>≠</p> <p>≠</p> |
|---|-------------------|

| | | |
|---|--------------------------------|------------|
| 650 | PACKING INSTRUCTION 650 | 650 |
| <p>This packing instruction applies to UN 3373.</p> <p>...</p> <p>6) The completed package must be capable of successfully passing the drop test in 6.6.2.6.5.3 as specified in 6.6.4.5.6.5.2 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.</p> <p>...</p> | | |

≠

DGP-WG/07-WP/32:

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;

...

≠

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. 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.

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. ~~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

...

9.1.5 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 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**

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DGP-WG/07-WP/22 and DP/4:

| <u>827</u> | <u>PACKING INSTRUCTION 827</u> | <u>827</u> |
|--|--------------------------------|------------|
| <p><u>This instruction applies to UN 3477 on passenger and cargo aircraft.</u></p> <p><u>The requirements of 4:1.1.1, 4:1.1.2, 4:1.1.3.1, 4:1.1.7 and 4:2 must be met, as appropriate. The following packagings are authorized:</u></p> <p><u>The mass of each cartridge must not exceed 1 kg.</u></p> <p><u>The following packagings are authorized:</u></p> <p><u>1) For fuel cell cartridges, wooden (4C1, 4C2), plywood (4D), fibreboard (4G), or reconstituted wood (4F) boxes, plywood drums (1D), fibre drums (1G), plastic drums (1H2), plastic jerricans (3H2) or solid plastic boxes (4H2). Packagings must meet Packing Group II performance standards; and</u></p> <p><u>2) For fuel cell cartridges contained in equipment or packed with equipment, strong outer packagings. When fuel cell cartridges are packed with equipment, they must be packed in inner packagings or placed in the outer packaging with cushioning material or divider(s) so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the contents within the outer packaging. Fuel cell cartridges which are installed in equipment must be protected against short circuit and the entire system must be protected against inadvertent operation.</u></p> | | |

Chapter 11**CLASS 9 — MISCELLANEOUS DANGEROUS GOODS**

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DGP-WG/07-WP/65:

| 902 | PACKING INSTRUCTION 902 | 902 |
|--|-------------------------|-----|
| <p>Magnetized material will be accepted only when:</p> <ul style="list-style-type: none">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:<ul style="list-style-type: none">1) does not exceed 0.418 A/m; or2) produces a magnetic compass deflection of 2 degrees or less. <p><u>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.</u></p> <hr/> <p>The following note is moved from the end of the packing instruction:</p> <hr/> <p><i>Note.— For loading instructions, see 7:2.10</i></p> <p><i>Determination of shielding requirements</i></p> <p>...:</p> <p>Note.— For loading restrictions, see 7:2.10.</p> | | |

...

| 903 | PACKING INSTRUCTION 903 | 903 |
|---|-------------------------|-----|
| <p>The general packing requirements of 4;1 must be met.</p> <p>This entry applies to cells and batteries containing lithium in any form, including lithium polymer and lithium ion cells and batteries.</p> <p>Lithium Cells and batteries may only be transported under this packing instruction if they meet the following requirements:</p> <ul style="list-style-type: none">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 <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3; <p>...</p> | | |

DGP-WG/07-WP/1:

| 904 | PACKING INSTRUCTION 904 | 904 |
|-----|--|-----|
| ≠ | <p>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 <u>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")</u>, 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.</p> | |
| + | <p>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.</p> <p style="text-align: center;"><i>Note.— For loading restrictions see 7;2.11; for special marking requirement see 5;2.4.7.</i></p> | |

DGP-WG/07-WP/44:

| 905 | PACKING INSTRUCTION 905 | 905 |
|-----|---|-----|
| | <p>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.</p> <p>Life-saving appliances, such as life-rafts, life vests, aircraft survival kits or aircraft evacuation slides, may only contain the dangerous goods listed below:</p> <p>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;</p> <p>...</p> | |

...

DGP-WG/07-WP/65:

| 910 | PACKING INSTRUCTION 910 | 910 |
|--|-------------------------|-----|
| <p>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.</p> | | |
| ... | | |
| <hr/> <p>DGP-WG/07-WP/1:</p> <hr/> | | |
| <p>e) Inner packagings must be tightly packed in strong outer packagings and must be so packed, secured or cushioned as to prevent any breakage, <u>puncture or leakage of contents</u> 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.</p> | | |
| <p>f) <u>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 on it 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.</u></p> | | |
| ... | | |
| <hr/> <p>DGP-WG/07-WP/65:</p> <hr/> | | |
| <p>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. <u>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.</u></p> | | |
| ... | | |

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DGP-WG/07-WP/13 and DP/1

| 915 | PACKING INSTRUCTION 915 | 915 |
|---|-------------------------|-----|
| ... | | |
| <p>Kits must not be packed with other dangerous goods in the same outer packaging, <u>with the exception of Dry ice. If Dry ice is used, the provisions in Packing Instruction 904 must be met.</u></p> | | |
| ... | | |

DGP-WG/07-WP/5 and WP/69

| 918 | PACKING INSTRUCTION 918 | 918 |
|---|-------------------------|-----|
| <p>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.</p> | | |
| <p>Lithium-e 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. <u>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.</u></p> | | |
| <p>The equipment and the packages of lithium-e Cells or batteries must be overpacked <u>placed in an overpack. The overpack must bear applicable marks and labels as set out in Part 5;1 and 5;2.4.9.</u></p> | | |
| <p>For the purpose of this packing instruction, "equipment" means apparatus requiring the lithium batteries with which it is packed for its operation.</p> | | |

Reference for amendments to Part 5: DGP-WG/07-WP/6, unless otherwise indicated.

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:

...

DGP-WG/07-WP/1:

- ~~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;~~
- ig)** 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);
- jh)** before a package or overpack is reused, all inappropriate dangerous goods labels and markings are removed or completely obliterated; and
- ki)** 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 a)** 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 these 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 A₁ or 3000 A₂, 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:

...

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;9.1.9:

1.2.3.2.2 The consignor 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.~~

1.2.3.2.3 For package designs where a competent authority issued certificate is not required, the consignor 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)

7.6.1.2.3.1 Determination of transport index

7.6.1.2.3.1.1 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 2-445-1;
- 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.

7.6.1.2.3.1.2 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 2-445-1. Multiplication factors for freight containers

| Size of load* | Multiplication factor |
|--|-----------------------|
| size of load $\leq 1 \text{ m}^2$ | 1 |
| $1 \text{ m}^2 < \text{size of load} \leq 5 \text{ m}^2$ | 2 |
| $5 \text{ m}^2 < \text{size of load} \leq 20 \text{ m}^2$ | 3 |
| $20 \text{ m}^2 < \text{size of load}$ | 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 ~~2-45-2~~ 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 ~~7.6.1.4~~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 ~~2-45-2~~5-2. Categories of packages and overpacks

| <i>Conditions</i> | | |
|---|---|-----------------|
| <i>Transport index</i> | <i>Maximum radiation level at any point on external surface</i> | <i>Category</i> |
| 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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DGP-WG/07-WP/43:

2.4.1 Marking with proper shipping name and UN number

...

2.4.9 Marking of overpacks

DGP-WG/07-WPs/1 and 6

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 h) to i). Packaging specification markings must not be reproduced on the overpack.

2.4.10 Additional markings of packages containing dangerous goods in limited quantities

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Chapter 3

LABELLING

...

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) 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.

...

3.5 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.)

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DGP-WG/07-WP/42 (Revised):

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;

b) orientation labels, may meet the specification of either Figure 5-25 or ISO Standard 780-1985.

...

DGP-WG/07-WP/34:

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.

Figure 5-24. Cargo aircraft only

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Chapter 4

DOCUMENTATION

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DGP-WG/07-WP/63:

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** substances, 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.

...

Reference for amendments to Part 6: DGP-WG/07-WP/7, unless otherwise indicated.

Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

...

Chapter 1

APPLICABILITY, NOMENCLATURE AND CODES

...

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.

...

Chapter 2


MARKING OF PACKAGINGS OTHER THAN INNER PACKAGINGS

...

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 13 and performance tests in Chapter to 4 6. For embossed metal packagings the capital letters "UN" may be applied as the symbol;

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Chapter 4

PACKAGING PERFORMANCE TESTS

...

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.

...

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.

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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**

≠ 5.1.64.1 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.

5.1.64.2 Quality assurance systems must conform to the requirements of the appropriate national authority.

~~5.1.4~~**5 Initial inspection and testing**

≠ 5.1.45.1 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.

5.1.56 Periodic inspection and testing

5.1.56.1 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.

5.1.56.2 ~~For~~ 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.~~

...

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~~ 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~~ Cylinders for dissolved acetylene — Periodic inspection and maintenance.

SO 11623:2002 Transportable gas cylinders — Periodic inspection and testing of composite gas cylinders.

...

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 

- ≠ ~~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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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 6.3.5. Methods of testing other than those described in these Regulations 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: 

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

| | | |
|--------|--------------------|-------------------------------|
| u n | 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 an 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 | |
| * | | | * | | | * | * | when dry ice is used | * |
| * | | | | * | | * | | | * |
| | * | | * | | | | * | | * |
| | * | | | * | | | * | | * |
| | | * | * | | | | * | | * |
| | | * | | * | * | | | | * |

| Type of packaging ^a | | Tests required | | | | | | |
|-----------------------------------|--------------------|----------------|--------------------------|--------------------------------|----------------|---|-------------------|--|
| Rigid outer packaging | 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 |
| | 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. |
| Fibreboard drum | | X | 5 | 0 | 5 | | 2 | |
| Plastics box | X | | 3 | 3 | 6 | | 2 | |
| Plastics drum/jerrican | | X | 3 | 0 | 3 | | 2 | |
| Boxes of other material | X | | 0 | 5 | 5 | | 2 | |
| Drums/jerricans of other material | | X | 0 | 0 | 5 | | 2 | |
| | 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.

6.25.3 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 onto the base;
- ~~2~~ b) flat onto the top;
- ~~3~~ c) flat onto the longest side;
- ~~4~~ d) flat onto the shortest side;
- ~~5~~ e) onto 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 onto the top chime, with the centre of gravity directly above the point of impact;
- ~~7~~ b) diagonally onto the base chime;
- ~~8~~ c) flat onto 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.

~~6.36.5.4~~ 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 penetrating 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

...

7.4 REQUIREMENTS FOR INDUSTRIAL PACKAGES

...

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 ~~or II in Part 6, Chapters 1 to 3 4, or other requirements at least equivalent to those standards of these Instructions;~~ satisfy the requirements prescribed for packing group I or II 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:

...

7.10 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 hydrogenous 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 these radionuclides.~~

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

| <i>Fissile material</i> | <i>Fissile material mass (g) mixed with substances having an average hydrogen density less than or equal to water</i> | <i>Fissile material mass (g) mixed with substances having an average hydrogen density greater than water</i> |
|----------------------------|---|--|
| Uranium-235 (X) | 400 | 290 |
| Other fissile material (Y) | 250 | 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/m³ 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).

...

7.21 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.

...

Part 7

OPERATOR'S RESPONSIBILITIES

...

Chapter 1

ACCEPTANCE PROCEDURES

...

1.1 ACCEPTANCE OF DANGEROUS GOODS BY OPERATORS

DGP-WG/07-WP/47:

Delete paragraphs 7;1.1.1 and 7;1.3 and replace with the following:

1.1.1 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 1.3 unless it is accompanied by two copies of the dangerous goods transport document or, where permitted, by alternative documentation. 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 THE ACCEPTANCE CHECK

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 dangerous goods as described in 1.3 unless the operator has, by use of a checklist, verified the following:

- a) the documentation 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) the specification marking on the package, if applicable, is suitable for the packing group of the dangerous goods contained within;]
- e) proper shipping names, UN numbers, labels and special handling instructions appearing on the interior package(s) are clearly visible or reproduced on the outside of an overpack;
- f) the labelling of the package, overpack or freight container is as required by Part 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;
- h) the package or overpack does not contain 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;
- j) 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.

Note 1.— Minor discrepancies, such as the omission of dots and commas in the proper shipping name appearing on the transport document 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.— 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.

1.3 ACCEPTANCE OF FREIGHT CONTAINERS AND UNIT LOAD DEVICES

1.3.1 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.

1.3.2 When an operator accepts a unit load device or other type of pallet containing consumer commodities, dry ice or magnetized material as permitted by 1.3.1, the operator must attach an identification tag as required by 2.7.1 to the unit load device.”

Editorial Note.— It is suggested that a more logical sequence of paragraphs might be:

- 1.1 Acceptance of dangerous goods by operators
 - 1.2 The acceptance check
 - 1.3 Acceptance of freight containers and unit load devices
 - 1.4 Cargo acceptance procedures
 - 1.5 Special responsibilities in accepting infectious substances
 - 1.6 Undeliverable consignments of radioactive material
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Chapter 2

STORAGE AND LOADING

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2.9.3 Stowage during transport and storage in transit

...

DGP-WG/07-WP/46 and DP/3:

...

2.9.3.3 Loading of freight containers and accumulation of packages, overpacks and freight containers must be controlled as follows:

...

- 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 apply;

...

Chapter 4

PROVISION OF INFORMATION

...

DGP-WG/07-WP/65:

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.

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;

...

DGP-WG/07-WP/55:

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 Part 3, Chapter 3).]

...

4.9 TRAINING

DGP-WG/07-WP/1:

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.

...

Chapter 5**PROVISIONS CONCERNING PASSENGERS AND CREW**

...

DGP-WG/07-WP/1:

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.

Part 8**PROVISIONS CONCERNING
PASSENGERS AND CREW**

...

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW**1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW**

DGP-WG/06-WP/12:

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.

...

The source for the remaining amendments in 8;1 is from DGP-WG06-WP/54 and other papers, as indicated:

DGP-WG/07-WP/35:

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. 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

DGP-WG/07-WP/26:

- ea) 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;

DGP-WG/06-WP/12:

Note.— Devices containing liquid oxygen are forbidden as or in carry-on baggage, checked baggage or on the person.

- eb) ~~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;
- bc) 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;~~
- hd) 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;
- ie) 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;
- if) 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;

- eg) one small medical or clinical thermometer which contains mercury, for personal use, when in its protective case;

Articles used in dressing or grooming

- bh) ~~non-radioactive medicinal or toilet~~ try 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 toiletry articles (including aerosols)” is intended to include such items as hair sprays, perfumes, and colognes and medicines containing alcohols;

- ki) 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

- ai) 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.

- ~~bk) 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;

- el) 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;

- ≠ gm) 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;

- ≠ po) 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;

- pp) 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;

DGP-WG/07-WP/54:

- 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. Spare batteries must be individually protected so as to prevent short circuits (e.g. by placement in original retail packaging or 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 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.

DGP-WG/06-WP/29:

Lithium ion batteries with an aggregate equivalent lithium content of more than 8 grams but not more than 25 grams may be carried in carry-on baggage if they are individually protected so as to prevent short circuits and are limited to two spare batteries per person.

- [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:

DGP-WG/07-WP/23, WP/21 and WP/31:

- 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) 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) 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 for metal fuel cell cartridges;
 - d) for hydrogen in metal hydride the fuel cell cartridges shall have a water capacity of 120 mL or less;
- 5) each fuel cell system and each fuel cell cartridge ~~must be marked with a manufacturer's certification that it~~ 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. 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;~~
- 7) no more than two spare fuel cell cartridges may be carried by a passenger;
- 8) fuel cell systems containing fuel and fuel cell cartridges including spare cartridges are permitted in carry-on baggage only;
- 9) 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) 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) in addition to the languages which may be required by the State of Origin for the markings specified above, English should be used.]

Other

- ≠ f) 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;

- H)** 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;
- EU)** 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.

APPENDIX B

**AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL
INSTRUCTIONS FOR THE SAFE TRANSPORT OF DANGEROUS
GOODS BY AIR**

Part S-3

**DANGEROUS GOODS LIST
AND LIMITED QUANTITIES EXCEPTIONS**

**(ADDITIONAL INFORMATION
FOR PART 3 OF THE
TECHNICAL INSTRUCTIONS)**

...

Chapter 2

DANGEROUS GOODS LIST

...

DGP-WG/07-WP/53:

Add A223 in Column 7 of Table S-3-1 for each of the substances listed in the new Appendix 6 to the Supplement, List of Toxic by Inhalation Liquids shown below.

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Chapter 3

SPECIAL PROVISIONS

...

[A223 This substance is toxic by inhalation.](#)

Insert new appendix as follows:

**Appendix 7
LIST OF TOXIC BY INHALATION LIQUIDS**

| <i>UN No.</i> | <i>Name</i> | <i>Class</i> | <i>UN packing group</i> | <i>Subsidiary risk</i> | <i>RTECS</i> | <i>LC₅₀ (ppm)</i> | <i>SVC (ppm)</i> | <i>Notes</i> |
|---------------|---------------------------------|--------------|-------------------------|------------------------|--------------|------------------------------|------------------|--|
| 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 | Subsidiary risk | RTECS | LC ₅₀ (ppm) | SVC (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 | Ethylchloroarsine | 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 | Subsidiary risk | RTECS | LC ₅₀ (ppm) | SVC (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 ethylene 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 sulfide 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 | |
| 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. |

| <i>UN No.</i> | <i>Name</i> | <i>Class</i> | <i>UN packing group</i> | <i>Subsidiary risk</i> | <i>RTECS</i> | <i>LC₅₀ (ppm)</i> | <i>SVC (ppm)</i> | <i>Notes</i> |
|---------------|------------------------------|--------------|-------------------------|------------------------|--------------|------------------------------|------------------|---|
| 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 | |

APPENDIX C

AMENDMENTS TO THE EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS (DOC 9481)

DGP-WG/07-WP/21:

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 Halon extinguisher
- Remove external electrical power from device (if applicable)
- Once fire has been suppressed, move device to an area without flammable material, such as a galley oven (if not adjacent to the cockpit), if possible
- 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

...

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 A USE HALON 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 runaway 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.

ONCE FIRE HAS BEEN SUPPRESSED, MOVE DEVICE TO AN AREA WITHOUT ANY FLAMMABLE MATERIAL, SUCH AS A GALLEY OVEN (IF NOT ADJACENT TO COCKPIT), IF POSSIBLE

A battery fire that appears to have been extinguished may reignite after some period of time. Battery fires often emit sparks, flammable gasses or molten material several feet high, and may easily ignite surrounding materials. By moving the device to an area without flammable material, this risk may be reduced. The device should not be moved if it is too hot to safely handle, nor should it be placed adjacent to the cockpit.

**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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— END —