



**DANGEROUS GOODS PANEL (DGP)  
MEETING OF THE WORKING GROUP OF THE WHOLE**

**Montréal, 28 October to 8 November 2013**

**Agenda Item 6: Other business**

**REPORT OF THE MEETING OF THE  
WORKING GROUP OF THE WHOLE (DGP-WG13)  
Montréal, 15 to 19 April 2013**

(Presented by the Secretary)

**SUMMARY**

This paper presents the report of the DGP Working Group of the Whole (WG13) Meeting held in Montreal, Canada from 15 to 19 April 2013. Appendix A to the report includes a consolidation of proposed amendments to the Technical Instructions and Appendix B includes proposed amendments to the Supplement to the Technical Instructions.

The DGP is invited to note the contents of this working paper and to agree to the proposed amendments presented in Appendices A and B.

**1. INTRODUCTION**

1.1 The meeting of the Dangerous Goods Panel Working Group of the Whole (DGP-WG/13) was opened by Mr. Vincent Galotti, Deputy Director, Standardization and Infrastructure of ICAO's Air Navigation Bureau (ANB), on 15 April 2013. Mr. Geoff Leach was elected Chairperson of the meeting and Ms. Janet McLaughlin was elected Vice-Chairperson.

**2. ATTENDANCE**

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

<b>Members</b>	<b>Advisers/Observers</b>	<b>State/International Organization</b>
	M. Böhm	Austria
A. Tusek	T. Farquharson	Australia
B. Carrara	P. H. Leite Paludo	Brazil

<b>Members</b>	<b>Advisers/Observers</b>	<b>State/International Organization</b>
	S. Silvia Dias	
M. Paquette	D. Evans T. Howard D. Sylvestre	Canada
	J. Abouchaar P. S. Chan (Hong Kong SAR) Y. Li X. Ni Z. Qiu X. Sun S. Mok Wang (Hong Kong SAR) H. Zhao	China
J. Le Tonqueze		France
H. Brockhaus	G. Closhen B.-U. Wienecke	Germany
	C. Carboni	Italy
	A. Awano H. Shima H. Sugimoto K. Yanagawa	Japan
T. Muller	R. Dardenne K. Vermeersch	the Netherlands
M. Evans		New Zealand
S-W. Park		Republic of Korea
	D. Kurdchenko	Russian Federation
	S. Garcia Wolfrum	Spain
	N. Hagmann R. Joss	Switzerland
H. Al Muhairi	W. Al Obaidli P. Balasubramanian R. Jarvis P. King A. Wagih	United Arab Emirates
G. Leach	J. Hart S. Pinnock V. Trojanowska D. Warden	United Kingdom
J. McLaughlin	C. Betts M. Givens C. Glasow S. Kelley D. Pfund C. U. Kroha	United States
	N. Capadona	IAEA
D. Brennan	S. Acton-Gervais P. Oppenheimer D. Tindley	International Air Transport Association (IATA)
M. Rogers		International Federation of Air Line

Members	Advisers/Observers	State/International Organization
		Pilots' Associations (IFALPA)
K. Rooney	X. Chen L. Kong L. McGuigan D. Robert	International Civil Aviation Organization (ICAO)
	E. Sigrist	European Chemical Industry Council (CEFIC)
	A. Altemos J. Johnson N. McCulloch F. Wybenga	Dangerous Goods Advisory Council (DGAC)
	L. Calleja-Barcena	European Aviation Safety Agency (EASA)
	P. Wildschut	International Federation of Freight Forwarders Associations (FIATA)
	A. McCulloch	Global Express Association (GEA)
	G. Kerchner	The Rechargeable Battery Association (PRBA)

### 3. REVIEW OF THE REPORT

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

##### 3.1.1 Adoption of Annex 19 — Safety Management (DGP-WG/13-WP/23)

3.1.1.1 The Secretary reported that during the Air Navigation Commission's (ANC) review of the request to convene DGP/24, the subject of safety management systems (SMS) in relation to dangerous goods was raised. SMS was also raised by the Council during its review of Amendment 11 to Annex 18. This review took place shortly after the Council had adopted new Annex 19 — *Safety Management* to the Convention on International Civil Aviation. A Council representative, referring to the newly-adopted Annex 19, expressed hope that DGP would somehow incorporate a reference to SMS in the amended Standard for inspection systems in paragraph 11.1 of Annex 18.

3.1.1.2 The working group was asked to provide information on experience gained through implementation of SMS in their States for both operators and other entities performing dangerous goods functions. Several members described how SMS in relation to dangerous goods were typically covered under their operations regulations. One member described how relations between dangerous goods and operations had strengthened through implementation of SMS and how both were discovering connections between the two areas they were not previously aware of. Some reported that although specific programmes for shippers had not been implemented by the civil aviation authority (CAA), safety programmes for dangerous goods were covered in some ways by other government departments.

3.1.1.3 The Secretary, noting that Annex 6 required States to establish a State safety programme, asked panel members who did not speak to provide information on SMS in their States before DGP/24. An amendment incorporating SMS into dangerous goods requirements, at least by way of a reference, would be proposed at that meeting.

### 3.1.2 **Dangerous Goods in the Mail (DGP-WG/13-WP/29)**

3.1.2.1 A proposal to replace the recommendation for States to establish procedures for controlling the introduction of dangerous goods into air transport through the post (paragraph 11.4 of Annex 18) into a Standard was made. Justification for the proposal was based on the new requirement in the Technical Instructions for procedures of designated postal operators (DPOs) to be reviewed and approved by CAAs. It was noted that cooperation and coordination between ICAO and the Universal Postal Union (UPU) and between DPOs and CAAs had already improved since this requirement had been approved. It was suggested that replacing the recommendation with a Standard would further emphasize the need for close cooperation and coordination.

3.1.2.2 It was noted that Part 1;2.3.1 of the Technical Instructions included a recommendation for appropriate national authorities to ensure provisions related to dangerous goods in the post were complied with and queried whether this should be turned into a mandatory requirement as well.

3.1.2.3 There was support for the proposal but agreement that decisions related to dangerous goods in the post should not be made without input from the Universal Postal Union (UPU). Since no representatives of that organization were present, a decision on the amendment proposed was deferred. The Secretary had been in contact with the UPU and discussed the possibility of a joint meeting with them to discuss this and other items related to the post raised at DGP-WG/13. Many members would be able to attend that meeting as it followed a UN Sub-Committee meeting they would also be attending. It was not known if there was a limit to the number who would be able to attend. If there was a limit to the number of DGP members who could attend, the Secretary suggested that geographical and multimodal representation would be taken into account.

3.1.2.4 A decision on the proposed amendment, in addition to the suggested amendment to Part 1;2.3.1 of the Instructions (see paragraph 3.1.2.2), would be made at DGP/24.

## 3.2 **Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2015-2016 Edition**

### **Part 1 — General**

#### 3.2.1 **Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 1 (DGP-WG/13-WP/11)**

3.2.1.1 Draft amendments to Part 1 were proposed to reflect the decisions taken by the UN. The following issues were raised during the discussion:

- a) It was questioned whether text in paragraph 1.1.1.6 of the UN Model Regulations related to radioactive material being subject to the excepted package requirements of 1.5.1.5 (1;6.1.5 of the Instructions) when transported by mail should be included in Part 1;2.3.2 c) of the Instructions. It was suggested that adding the text would introduce a conflict for transport by air (e.g. an air waybill or similar document was

required for excepted packages but not provided by the post). This issue would be brought to the attention of the UPU.

- b) It was anticipated that an editorial amendment to the note under paragraph 1.1.1.9 of the UN Model Regulations would be made in order to include a reference to the exception for light bulbs containing Division 2.2 gases in 2.2.2.4 (2;2.2.3 d) of the Instructions). The note under new paragraph 1;2.6 of the Instructions would be amended accordingly.
- c) Revised references in Part 1;6.1.5.1 a) (provisions for the transport of excepted packages or radioactive material) would be reviewed. It was suggested some of the deleted references should be retained in the Technical Instructions. Whether or not a certificate issued by the competent authority was ever applicable to excepted packages of radioactive material was questioned and, if not, whether the addition of a reference to 5;1.2.2.2 was needed. The Secretariat would consult with the IAEA.
- d) A new definition for large salvage packagings was added to the UN Model Regulations. The definition was not included in the Technical Instructions because they are not permitted in air transport. A cross reference to the UN Model Regulations was instead provided next to the term in Part 1;3. It was suggested that the definition should be added so that “large” could be quantified. The definition was added in square brackets pending a review of all definitions not currently included in the Technical Instructions.
- e) Revisions in Part 6;6.2.2 in addition to those introduced in the 18th Revised Edition of the Model Regulations were made for the sake of alignment with the UN text and the IAEA Regulations.

3.2.1.2 It was agreed that DGP-WG/13-WP/11 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/24 working paper.

### **3.2.2 Operator Approval to Carry Dangerous Goods in Airmail (DGP-WG/13-WP/2 Rev.)**

3.2.2.1 The working group was asked to clarify whether operators who do not hold an approval to carry dangerous goods are permitted to carry dangerous goods in airmail. If an approval was needed, it was suggested that this be stated in the report and that a note to clarify this be added to Part 1;2.3.2. If an approval was not needed, it was suggested that this be clarified in Part 1;2.3.2.

3.2.2.2 It was noted that although there were States where operators were required to have approvals to transport dangerous goods, this was not currently an ICAO requirement. It was also noted that there were no requirements for DPOs to inform the operator of the presence of any dangerous goods in the mail, making it impossible for the operator to perform an acceptance check for dry ice when used. It was also noted that packages of lithium batteries contained in equipment permitted in the mail did not bear the lithium battery handling label making it impossible for even the DPO to identify that these mail articles contained dangerous goods.

3.2.2.3 The working group had sympathy for the issues raised, but believed the scope of the problem went beyond Annex 18 and the Technical Instructions. Some felt that it would need to be addressed in Annex 6, although it was pointed out that the approval in Annex 6 referred to the carriage of dangerous goods as cargo and cargo did not include mail. The Secretary reported that the Air Navigation Commission (ANC) would be reviewing the amendments proposed to Annex 6 that incorporate a new

chapter for dangerous goods. Following the ANC's review, the amendments would be sent to States for comment. The Secretary suggested members to raise the issue through this process if they felt it necessary. She also reminded the group that coordination with the Universal Postal Union (UPU) was needed if any revisions were made to provisions related to the mail.

### **3.2.3 Dangerous Goods Training for Flight Operations Officers (DGP-WG/13-WP/4) and Training of Flight Operations Officer/Flight Dispatcher (DGP-WG/13-WP/38)**

3.2.3.1 The working group was reminded of the new requirement in the Technical Instructions introduced at DGP/23 to provide personnel with responsibilities for operational control of the aircraft with the same information that is required to be provided to the pilot-in-command (NOTOC) (which will become mandatory on 1 January 2014). It was noted that these employees could be asked to explain or interpret the information contained in a NOTOC in the event of an emergency, but that there were no specific training requirements for them in Table 1-4. It was therefore proposed to add "flight operations officers" to the table as a new category of personnel requiring dangerous goods training.

3.2.3.2 A separate proposal also noted that Annex 1 — *Personnel Licensing* included Standards for training required in order to obtain flight operations officer/flight dispatcher licences and that one of the subjects required was operational procedures for the carriage of freight and dangerous goods. It was suggested that this provided even more justification for adding such personnel to Tables 1-4 and 1-5. That proposal included flight operations officers/flight dispatchers in the same category as flight crew members, loadmasters and load planners.

3.2.3.3 It was argued that a new category for flight operations officers/flight dispatchers was more appropriate since these employees would not need to perform all of the duties flight crew, loadmasters and load planners would perform. The counter-argument was that flight crew members work closely with flight operations officers and should therefore be provided the same training. Most cautioned against adding to the already long list of categories and the potential to lose sight of the requirement in the Technical Instructions for every person performing a dangerous goods function to be trained commensurate with their responsibilities. It was therefore agreed to include flight operations officers in the same category as flight crew.

3.2.3.4 During discussion it was proposed that a transition period should be provided for the training. The group did not support this on the basis that the new functions for flight operations officers/flight dispatchers would become mandatory on 1 January 2014 and training would be required before they performed these functions.

3.2.3.5 The proposal as presented in DGP-WG/13-WP/38 was agreed.

### **3.2.4 Instructor Qualifications (DGP-WG/13-WP/5)**

3.2.4.1 The working group was presented with a proposal to enhance the requirements for instructors of dangerous goods training courses. The group was reminded that the only requirements currently in the Instructions were to have adequate instructional skills, to have successfully completed a dangerous goods training programme in the same category that will be instructed, and to have attended recurrent training if more than 24 months had elapsed since last delivering an initial or recurrent course. It was suggested that these requirements were vague and open to interpretation, in particular in relation to "adequate" instructional skills. It was also suggested that there was potential for an instructor to be less knowledgeable than the students under the current requirements and that the current requirements fell short of industry best practices.

3.2.4.2 There was support for the intent of the proposal, but the overwhelming view was that the material would be more appropriate in the Supplement to the Technical Instructions as guidance material. There was also concern that the text was too prescriptive and that a degree of flexibility was needed to satisfy the demand for training. The depth of an instructor's dangerous goods knowledge could vary according to the type of personnel they would be training and the quality of training would not be degraded as long as students were trained commensurate with their responsibilities. The text focused on dangerous goods expertise, but there were other skills a good instructor needed to have including the ability to clearly communicate. A training officer from the Secretariat's Aviation Safety Training Section cautioned that the material moved away from a competency-based approach and that instructor qualifications should be based on a determination of what the competencies of a trainer would be. These would include both dangerous goods and instructor competencies.

3.2.4.3 It was agreed that the text should be developed in the form of guidance material. Several members offered to work with the proposer to modify the text in order to address the issues raised. A revised proposal would be presented at DGP/24.

### 3.2.5 **Definition of Shipper (DGP-WG/13-WP/7)**

3.2.5.1 It was noted that terms such as "freight forwarder" and "operator" were currently defined in Part 1;3 of the Technical Instructions, but that there was no definition for "shipper". A definition for "shipper" was therefore proposed.

3.2.5.2 Although some felt introducing a definition for shipper was appropriate, others were not in favour. It was believed that the focus should be on the functions performed and not what the person performing those functions was called. The functions were defined in the Technical Instructions, making a definition for the person performing them irrelevant. There were particular concerns with the use of the term "offer" and how this could be interpreted. It was felt that using it limited the definition to those offering dangerous goods to an operator. There were numerous functions performed by a shipper which weren't covered by this definition.

3.2.5.3 Although the definition presented was not supported, it was felt by some that the subject was worthy of further discussion. This would be done through correspondence and, if necessary, a new proposal would be presented at DGP/24.

### 3.2.6 **Amendment to Provisions Concerning the Training Requirements (DGP-WG/13-WP/8)**

3.2.6.1 A proposal to delete the reference to "stores" in Part 1;4.1.1 and 7;4.10 was presented. It was felt that referring to "stores" in addition to "cargo" was redundant since stores were considered cargo.

3.2.6.2 There were some concerns that by removing the reference to stores the emphasis on the need for training for those performing functions related to the transport of company material (COMAT) would be eliminated. Some felt that although redundant, there was no harm in keeping the text, recognizing that there were frequent misunderstandings related to COMAT. The majority felt that it should be deleted and that keeping it was an oversight. The amendment was agreed.

3.2.6.3 It was also proposed that initial and recurrent dangerous goods training programmes should be established for agencies engaged in security screening of crew in addition to passengers by amending 1;4.1.1 g). This was agreed. A similar amendment to Category 12 under Table 1-4 would also be made.

3.2.6.4 It was discovered during the discussion that a reference to the requirement for battery-powered devices with installed batteries and spare batteries intended as replacements for electronic devices falling under the exceptions for dangerous goods of the operator to be transported in accordance with the Instructions (1;2.2.4) was missing in the definition for “Stores” in 1;3. It would be added.

3.2.6.5 One panel member suggested that, in his interpretation of the provisions in the Instructions, stores were not included as cargo. Although it was the intent of the panel when modifying the definition for cargo in an earlier edition of the Instructions to ensure that it included stores, the need for clarification would be considered.

3.2.6.6 The Secretary reminded the group of the amendments to Annex 6 which include a new chapter on dangerous goods. She noted that the amendments did include a definition for COMAT. It was hoped that the new Standards would help eliminate misunderstandings.

### 3.2.7 **Bundles of Cylinders (DGP-WG/13-WP/33)**

3.2.7.1 A definition for bundles of cylinders was not included in the Technical Instructions because they are not permitted in air transport. A cross reference to the UN Model Regulations is instead provided next to the term in Part 1;3. It was reported that some cargo acceptance staff believed that cylinders fastened to a pallet would be considered a bundle and therefore not permitted for transport. The definition in the UN Model Regulations specifies that bundles of cylinders are interconnected by a manifold. It was proposed that this part of the definition should be included in the Technical Instructions to avoid confusion by cargo acceptance staff.

3.2.7.2 Although some members were not in favour of adding a definition for something not permitted in the Technical Instructions, others supported the proposal on the basis it would help eliminate confusion and reduce the chance of authorized cylinders being rejected. The amendment was agreed.

### 3.2.8 **Fuel Cell Definitions (DGP-WG/13-WP/34)**

3.2.8.1 An entry for “fuel cell cartridge” is contained in Attachment 2, Glossary of Terms. This entry refers to fuel cells which are defined in Part 1;3.1. There is also a definition for fuel cell engine in Part 1;3.1. It was proposed to move these definitions from Part 1;3.1 to the Glossary of Terms for ease of use.

3.2.8.2 The proposal was not supported as this would affect harmonization with the UN Model Regulations and remove legal status (definitions in the Glossary, which is an attachment to the Instructions, did not have legal status).

### 3.2.9 **Establishment and Maintenance of Training Programmes (DGP-WG/13-WP/44)**

3.2.9.1 A proposal to add a reference to independent training centres in Part 1;4.1.1 was made at DGP-WG/13 (see paragraph 3.2.1 of DGP-WG/13-WP/51). Although there was support for specialized training centres being covered in the Technical Instructions, there was no agreement on specific text.

3.2.9.2 A new proposal for a note under Part 1;4.1.1 was proposed to clarify that approved training programmes that establish and maintain dangerous goods training programmes on behalf of the various entities listed in 1;4.1.1 were subject to the training requirements of the Technical Instructions. Reference to a definition for approved dangerous organizations in Annex 1 — *Personnel Licensing* was also provided in the note. Some members felt this text would be more appropriate in Annex 1, but others felt this would not be appropriate as Annex 1 did not cover all dangerous goods personnel.



3.2.9.3 The proposer explained that there was confusion in his State with what name would go on a training certificate, i.e. was it the name of the organization that provided the training or was it the name of the operator.

3.2.9.4 It was determined during discussions that translation in the Instructions of “on behalf of” in Part 1;4.1.1 had a different meaning in the proposer’s language and that this could be the cause of confusion in his State. A proposal for new wording which would have the same meaning in all languages would be brought to DGP/24.

### **3.2.10 Recognition of Records of Training (DGP-WG/13-WP/45)**

3.2.10.1 A proposal to clarify whether training records issued in one State were valid in foreign States by way of a new note under Part 1;4.2.5 was proposed. This proposal was made by the same presenter of DGP-WG/13-WP/44 (see paragraph 3.2.9 above). The proposal was withdrawn once a potential solution was found for the problem raised in DGP-WG/13-WP/44 as it was felt this would also solve the problem in this paper.

### **3.2.11 Dangerous Goods in Air Mail (DGP-WG/13-WP/49 Rev.)**

3.2.11.1 The working group was asked to consider the possibility of extending the list of dangerous goods permitted in the mail. It was noted that the recent amendments to allow lithium batteries contained in equipment in the mail had resulted in improved collaboration and cooperation between ICAO and the UPU, which would contribute to enhanced safety, and that this improved relationship was also being seen between DPOs and CAAs. It was recognized that dangerous goods were introduced into the mail on a daily basis, despite the fact that they were forbidden. It was argued that extending the list of dangerous goods permitted in the mail, provided that DPOs were subject to the same requirements express handlers were subject to, would benefit safety.

3.2.11.2 The presenter reported that extensive work had been done by his CAA and the DPO in that State to explore ways of controlling the introduction of dangerous goods into airmail using a proportionate, risk-based approach. Part of this involved determining what kinds of forbidden dangerous goods were typically being sent. Figures based on a sample of approximately 32,000 items revealed that a large percentage of these items were low hazard dangerous goods. It was felt that resources expended on dealing with these items negatively affected the attention that should be given to the detection of higher risk dangerous goods that did end up in the mail such as fireworks, gallium, dangerous chemicals and chemical oxygen generators.

3.2.11.3 Following extensive collaboration and cooperation between the CAA and the DPO, an exemption was granted which would allow the carriage in domestic mail of a small number of the most commonly carried, low-hazard dangerous goods. It was suggested similar provisions should be considered for international airmail.

3.2.11.4 There was a general feeling that the idea was worthy of discussion but that much would need to be considered before moving forward with it. A way of accepting dangerous goods in the mail would need to fit within the dangerous goods regulations and doing this would be challenging. It was suggested that using the excepted quantity provisions might be something that could be considered. Treating dangerous goods in the mail the same way as dangerous goods in cargo would also be necessary but challenging. It was felt by some that dangerous goods not permitted in the mail would continue to be discovered and finding ways to allow them in the mail safely was the only option. A counter argument was that other ways to solve the problem should be considered such as education and outreach so that dangerous goods would not end up in the mail to begin with.

3.2.11.5 The Secretary reminded the group that any decisions involving dangerous goods in the mail would need to be taken with the UPU. It was agreed that the proposal would be discussed at the joint DGP/UPU meeting (see paragraph 3.1.2.3 of this report).

3.2.11.6 The presenter thanked the group for their comments and agreed that nothing could happen without the UPU's commitment. He was encouraged by some of the ideas put forward by the group and suggested that other States carry out the same exercise his State did to determine the kinds of forbidden dangerous goods that were typically being sent.

### 3.2.12 **Definition of "Loadmaster" (DGP-WG/13-WP/51)**

3.2.12.1 The working group was reminded of the new reference to loadmasters in Tables 1-4 and 1-5 that was incorporated in the current edition of the Technical Instructions. It was reported that some regulators were considering the person in charge of aircraft loading to be the loadmaster and questioning the level of dangerous goods training provided to that person. A definition for loadmaster was therefore proposed to clarify that this person was responsible for planning the distribution of the cargo on the aircraft and typically oversees and supervises the loading.

3.2.12.2 Although some members did not feel a definition was necessary, others supported the idea but had concerns with the actual definition proposed. These members felt the definition was too restrictive.

3.2.12.3 A revised definition would be developed and presented to DGP/24.

## **PART 2 — Classification**

### 3.2.13 **Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 2 (DGP-WG/13-WP/12)**

3.2.13.1 Draft amendments to Part 2 were proposed to reflect the decisions taken by the UN. The following issues were raised during the discussion:

- a) It was suggested to add a reference in 2;5.2.3 to Test O.2 (test for oxidizing liquids) of the *Manual of Tests and Criteria* since Tests O.1 and O.3 were referred to in 2;5.2.2.
- b) There had been much discussion at DGP-WG/12 on provisions introduced in the 17th Revised Edition of the Model Regulations related to exceptions for medical devices or equipment containing infectious substances (see paragraph 3.2.7 of the DGP-WG/12 Report (DGP-WG/13-WP/1). It was reported that the issue was still being discussed at the UN Sub-Committee and that although progress had been made, a resolution had not yet been reached. The Secretary provided the working group with a proposal for amending the provisions prepared by the Council on Safe Transportation of Hazardous Articles, Inc. (COSTHA) which will be presented at the Forty-Third Session of the UN Sub-Committee and asked for comments to be provided to her in advance of the meeting.
- c) An editorial amendment to the definition for "freight container in the case of radioactive material transport" was needed to remove redundant text for small versus large freight container.

- d) Consequential amendments to the references to asbestos in Part 2;9.2 were needed for the sake of alignment with the revised names in Table 3-1. The Secretariat would update other references to asbestos as necessary.

3.2.13.2 It was agreed that DGP-WG/13-WP/12 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/24 working paper.

### 3.2.14 **Dry Ice with Patient Specimens** (DGP-WG/13-WP/31)

3.2.14.1 A proposal to permit dry ice when used as a refrigerant for patient specimens transported by post was proposed. It was noted that this was permitted for infectious substances assigned to Category B packed in accordance with Packing Instructions 650. It was reported that the transport of some substances classified as exempt patient specimens needing refrigeration was very common. Some could be transported using reusable gel ice packs but others, such as plasma, needed dry ice. An amendment to Part 1;2.3.2 a) was proposed along with new requirements in Part 2;6.3.2.3.6 for triple packaging.

3.2.14.2 There was support for the intent of the proposal but it was felt additional requirements needed to be considered. It was agreed that the proposal would be discussed at the joint DGP/UPU meeting (see paragraph 3.1.2.3 of this report).

### 3.2.15 **Classification of Self-Reactive Substances not Listed in** **Table 2-6 (DGP-WG/13-WP/47)**

3.2.15.1 The working group was asked to consider the text of Part 2;4.2.3.2.5 which detailed what should be in “the approval document” for a self reactive substance not listed in Table 2-6 but did not, in fact, require such an approval to be granted. It was also queried whether classification of such substances should be subject to approval by the appropriate national authority, as opposed to the classification actually being done by such an authority. If the working group agreed, the Secretary would be asked to bring a proposal to the UN Sub-Committee.

3.2.15.2 Not everyone felt there was a need for an amendment. It was felt that the intent of the provision was clear: if a self-reactive substance was not listed in Table 2-6, assignment to a generic entry must be made by the appropriate authority based on a test report. The presenter stressed that the issue was primarily one of a reference being made to an approval for which there was no requirement. The issue of multi-modal harmonization was raised and although it was suggested that bringing a proposal to the UN might result in complicated discussions (on the basis that many other regulations would be affected by a change) it was agreed to raise the issue with the UN Sub-Committee.

### 3.2.16 **Transport of Empty Type B (U) or Type B(M) Packages** (DGP-WG/13-WP/58)

3.2.16.1 Delays in transporting empty Type B(U) and Type B(M) containers were reported. It was suggested that while there is a specific provision for these empty packages to be transported as UN 2908 — **Radioactive material, excepted package — empty packaging**, this can rarely be done because the radiation level at the external surface regularly exceeds the 5 µSv/h permitted for classification as an excepted package due to the presence of depleted uranium in the shielding material. These packages are therefore subject to full regulation and are typically classified as either low specific material (LSA-I) or as Type B(U) or Type B(M). There is often confusion at acceptance, however, for the following reasons:

- a) If classified as Type B(U) or Type B(M), the radionuclide required on the transport document (e.g. U-dep, solid, metal oxide) would differ from the radionuclide authorized for the package design and indicated on the design certificate. This leads to confusion with acceptance staff.
- b) If classified as LSA-1, the container may be shipped as an industrial package (IP-1), in which case the shipment no longer requires a Type B package design approval. But this often leads to confusion when acceptance staff see the Type B(U) or Type B(M) specification markings on the package.

3.2.16.2 It was felt that this was a problem that should be discussed at the IAEA, but it was also recognized that this would take a significant amount of time and that clarification in the Technical Instructions would be beneficial in the interim. Three notes were therefore proposed to address the problem:

- a) A note under Part 2;7.2.4.1.1.5 explaining the need to classify the empty package as either LSA-1 or Type B(U) or Type B(M);
- b) A note under Part 5;4.1.5.7.1 to address confusion outlined in 3.2.16.1 b) by explaining that the radionuclide indicated on the transport document might differ from the radionuclide(s) authorized on the package design certificate.
- c) A note under 5;2.4.5.1 c) to address confusion outlined in 3.2.16.1 a) by explaining that the specification mark should be obliterated;

*Note.— Paragraph 5;2.4.5.1 c) will become 5;2.4.5.4 as a result of amendments proposed in DGP-WG/13-WP/11 (see paragraph 3.2.1).*

3.2.16.3 Although the proposal was agreed, it was hoped that the problem could be addressed more comprehensively through the IAEA Transport Safety Standards Committee (TRANSSC) rather than through notes in the Technical Instructions. A representative of the IAEA suggested that a proposal could be considered at their meeting in June. She explained, however, that even if a proposal was adopted during the revision process, it would not be incorporated in the UN Model Regulations for another four to six years.

### **Part 3 — Dangerous Goods List, Special Provisions and Limited and Excepted Quantities**

#### **3.2.17 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 3 (DGP-WG/13-WP/13)**

3.2.17.1 Draft amendments to Part 3 were proposed to reflect the decisions taken by the UN. The following issues were raised during the discussion:

- a) It was noted that references to special provisions proposed for inclusion in the Supplement were included with the proposed amendments to Table 3-1 for discussion purposes only and would be removed (but maintained in the Supplement).
- b) A standalone entry for “Refrigerant gas R 113” was needed for UN 1082.
- c) New entries for adsorbed gases were introduced (UN 3510 — UN 3518). It was agreed that additional requirements would be considered for these substances and that the entries classified as Division 2.3 gases should be forbidden from transport. A typographical error was noted whereby Packing Instructions 218 was assigned to some entries instead of Packing Instruction 219.
- d) The entries for columns 10 to 11 and 12 to 13 for UN 3507 — **Uranium hexafluoride, radioactive material, excepted package** should be replaced with “see 877”.
- e) A new entry for UN 3509 — **Packaging discarded, empty, uncleaned** assigned to Class 9 was introduced in the UN Model Regulations along with a new special provision permitting their use under certain conditions when they have contained dangerous goods other than radioactive material. The entry was marked as forbidden on both passenger and cargo aircraft in DGP-WG/13 on the basis that Part 4;1.1.15 required empty packagings which previously contained dangerous substances to be subject to the same requirements of the Technical Instructions as they would if the package was filled with that substance unless the hazard was nullified. The special provision added to the Model Regulations was proposed for inclusion in the Supplement to the Technical Instructions as A227 (see DGP-WP/43) to allow for the possibility of transporting UN 3509 under an exemption. Some members questioned whether Special Provision A2 should be assigned to the entry to allow for the possibility of an approval, while others questioned whether any provisions were necessary since there was little likelihood the packagings would be shipped by air. It was agreed to place the new entry in DGP-WG/13-WP/13 and new Special Provision A227 in DGP-WG/13-WP/43 in square brackets and a decision would be taken at DGP/24.
- f) It was agreed new provisions for large extinguishers should be included in Special Provision A19, subject to an editorial amendment.
- g) Editorial revisions were made to Special Provision A190 including an amendment to clarify that transport was subject to the requirements in the Technical Instructions in addition to the conditions set out in the special provision.
- h) A missing reference was added to Special Provision A194.

- i) Editorial revisions were made to Special Provision A195.

3.2.17.2 It was agreed that DGP-WG/13-WP/13 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/24 working paper.

### 3.2.18 UN3242 — Azodicarbonamide (DGP-WG/13-WP/9)

3.2.18.1 A proposal was presented at DGP-WG/12 to amend Table 3-1 and Packing Instruction 459 in order to permit UN 3242 — **Azodicarbonamide** on both passenger and cargo aircraft. It had been suggested that forbidding them from transport was unjustified, on the basis that formulations of azodicarbonamide classified as UN 3224 or UN 3226 were permitted on both passenger and cargo aircraft, even though they each have a lower self-accelerating decomposition temperature (SADT). It was also noted that the limited quantity value for UN 3242 listed in the UN Model Regulations was higher than it was for UN 3224 and UN 3226. It was suggested at DGP-WG/12 that the SADT value was not the determining factor in making these substances forbidden, the determining factor was the fact that these substances had desensitized explosive properties. Permitting them could therefore not be supported without further analysis and review.

3.2.18.2 A revised proposal was presented to DGP-WG/13 which took into account the concerns expressed at DGP-WG/12. Before presenting the proposal, the working group was asked to note a few editorial errors in the working paper, i.e. “AZDICARBONAMIDE” should be replaced with “AZODICARBONAMIDE” in the title to the paper, “2-” should be inserted before “**Bromo-2-nitropropane-1,3-diol**” in the last sentence of paragraph 1.3, and the asterisks (\*) should be removed from the end of the entries for Fibreboard (4G) and Fibre (1G) under outer packagings of combination packagings in proposed new Packing Instruction 4XX on page A-2.

3.2.18.3 It was noted that the UN Model Regulations state that UN 3242 is not a desensitized explosive even though it is classified as Division 4.1. It was suggested that classification was based on the fact that the substances were similar to self-reactive substances but had an SADT greater than 75°C. It was noted that UN 3241 (**2-Bromo-2-nitropropane-1,3-diol**) was similar to UN 3242 but was permitted for transport by air. UN 3241 was also permitted to be carried in excepted quantities, which was in alignment with the Model Regulations.

3.2.18.4 DGP-WG/12 also noted that the UN packing provisions for these substances were more restrictive than those in Packing Instruction 459. A new packing instruction was therefore proposed for UN 3242.

3.2.18.5 Those who expressed concerns at DGP-WG/12 agreed that, based on a preliminary technical review, the substance should be permitted for air transport. They asked, however, to defer the decision on the proposal until after advice was sought from an expert group on the explosion risks of unstable substances which would be meeting in the near future. Some did not feel the advice of this group was necessary, but others felt the group’s expertise would provide greater comfort in making a decision.

3.2.18.6 There were some concerns that the new packing instruction needed to be further aligned with the Model Regulations. It was agreed that it would be reviewed and revised if necessary. The proposal would then be reconsidered at DGP/24.

### 3.2.19 Chemicals under Pressure Authorizations (DGP-WG/13-WP/18)

3.2.19.1 The potential for a substance forbidden for transport by air to be classified as one of the new entries for chemicals under pressure (UN Nos. 3500, 3501, 3502, 3503, 3504 and 3505) and

transported by air was raised. An amendment to Special Provision A187 was therefore proposed to prohibit chemicals under pressure from being classified as chemicals under pressure if they contained liquid or solid components that were forbidden for transport by air.

3.2.19.2 There was support for the proposal but it was felt that the wording could be clearer. A revised proposal was agreed.

**3.2.20 Life-Saving Appliances, not Self-Inflating**  
**(DGP-WG/13-WP/20) and Dangerous Goods List — UN**  
**3072 Life-Saving Appliances, not Self-Inflating**  
**(DGP-WG/13-WP/53)**

3.2.20.1 Clarification was sought on which types of articles were intended to be classified as UN 3072, **Life-saving appliances, not self-inflating**. Inconsistencies in classifying articles such as emergency locator transmitters, emergency position indicating radio beacons and personal locating beacons which contained only lithium batteries were reported whereby some manufacturers classified them as life-saving appliances, not self-inflating (UN 3072) while others classified them as lithium batteries contained in equipment (UN 3091 or UN 3481). Articles classified as UN 3072 would not be subject to any of the requirements which applied to lithium batteries contained in equipment, and it was suggested they should be. Two amendments were proposed to address this:

- a) assigning Special Provision A182 to UN 3072 so that equipment containing only lithium batteries would be classified as UN 3091 or UN 3481; and
- b) adding an additional packing requirement to Packing Instruction 955.

3.2.20.2 Assigning Special Provision A182 to UN 3072 was fully supported. The amendment to Packing Instruction 955 generated considerably more discussion. Alternate wording for the packing instruction was proposed in two different working papers. One added a requirement for lithium batteries to be subject to Part 2;9.3 of the Instructions, while the other specified that the requirements for UN 3091 or UN 3481 must be met. It was suggested that the reference to Part 2;9.3 dealt with classification and testing, while the reference to the requirements in UN 3091 and UN 3481 dealt with packing requirements. It was felt that the amendments should be combined so that classification, testing, and packing were addressed. It was questioned, however, whether all of the requirement for UN 3091 and UN 3481 needed to be applied. It was decided that no decision on amending Packing Instruction 955 would be made at the meeting; a new proposal would be prepared for DGP/24.

3.2.20.3 Assigning Special Provision A182 to UN 3072 was agreed. It would be brought to the attention of the UN Sub-Committee.

**3.2.21 Small Quantities of Peroxyacetic Acid**  
**(DGP-WG/13-WP/22)**

3.2.21.1 A new special provision was proposed for assignment to UN 3107, **Organic peroxide type E, liquid** which would allow venting of small quantities of oxygen in specialized packagings containing peroxyacetic acid. It was reported that this substance was commonly used as a sterilizer for health care purposes and that there was a need to transport the material by air for use in sterilizing medical equipment using custom packagings. Exemptions to permit transport in small containers provided certain requirements were met had been issued by appropriate national authorities in four States. These requirements were included in the proposed special provision. It was proposed that the new special provision be added to the Technical Instructions to eliminate the need for exemptions and to facilitate international transport.

3.2.21.2 It was noted that Special Provision A75 had been amended in the 2013-2014 Edition of the Instructions to allow limited venting. The working group was asked to specify in that special provision that the requirements in 4;1.1.6, 4;1.1.12 and 4;7.1.2 did not apply which would be consistent with the proposed new special provision.

3.2.21.3 There was sympathy for the proposal, but a number of concerns were raised, including:

- a) The proposal was written as a special provision, but there were a number of packing requirements in the text. It was suggested it be added to the packing instruction.
- b) Limiting the packaging to a fibreboard box was questioned. It was noted that metal packaging would not be appropriate based on the venting needs. Fibreboard boxes were currently being used and had been authorized in State exemptions.
- c) The amount of venting permitted was not quantified. Confirmation that the amount of venting allowed would not have any negative effects on safety was needed. The proposer questioned the need for a formal dispersion analysis on the basis that in his opinion the amount of gases released would be so inconsequential.
- d) There was no justification provided for the inner and outer limits proposed.
- e) Some of the requirements that States required when granting exemptions listed in the body of the working paper were not included with the proposed provision, including the requirement for orientation arrows.

3.2.21.4 A new proposal would be developed for DGP/24 addressing the concerns raised.

### 3.2.22 **Table 3-1 Column Header** (DGP-WG/13-WP/35)

3.2.22.1 An amendment to the headings over columns 10, 11 and 12 and 13 of Table 3-1 was proposed in order to clarify that dangerous goods permitted on passenger aircraft in accordance with columns 10 and 11 were also permitted on cargo aircraft, but that dangerous goods permitted on cargo aircraft in accordance columns 12 and 13 applied to cargo aircraft only. It was recognized that this was explained clearly in Note 2 under Part 3;2.1.1 but that revising the headers would provide further clarity. The proposal was agreed.

### 3.2.23 **Transport of Article UN 1362 as Excepted Quantity** (DGP-WG/13-WP/41)

3.2.23.1 It was noted that the quantity permitted for **Carbon, activated** (UN 1362) under the provisions for dangerous goods in excepted quantities was larger than the maximum net quantity per package permitted on passenger or cargo aircraft. The working group was asked to consider adopting one of two proposals to address this:

- a) reduce the excepted quantities permitted by replacing “E1” with “E2” in column 9 of Table 3-1 for UN 1362; or
- b) remove the provision for excepted quantities for UN 1362 by replacing “E1” with “E0” in column 9 of Table 3-1 for UN 1362.



3.2.23.2 It was agreed that having a larger excepted quantity limit than the limits provided in Columns 11 and 13 was anomalous, but it was noted that the quantity limits for passenger and cargo aircraft were extremely restrictive and that the other modal regulations did not have such restrictive limits. It was suggested that before making any changes to the excepted quantity code, which was currently in alignment with the Model Regulations, an investigation into whether there was any justification for the low quantity limits should be done. If it was determined there was none, consideration could be given to increasing them.

3.2.23.3 The issue would be revisited at DGP/24.

### **3.2.24 Keep Away from Heat Label for Substances Assigned Special Provision A136 (DGP-WG/13-WP/42 Rev.)**

3.2.24.1 It was noted that Special Provision A136 was assigned to substances liable to exothermic decomposition at elevated temperatures. The special provision includes a requirement for the substances to be shaded from direct sunlight and all sources of heat. It was proposed to amend the special provision to include a requirement for a statement to this effect on the dangerous goods transport document and a requirement to apply the keep away from heat label. It was noted that these requirements were included in Special Provision A20, which was assigned to self-reactive substances of Division 4.1 and organic peroxides of Division 5.2.

3.2.24.2 There was some support for the proposal recognizing that it would be impossible to know that the package should be kept away from heat without a label. Other members reminded the group of discussions in the past on whether keeping the handling label was necessary on the basis that if temperature control was needed, it should be forbidden from transport by air since this would not be possible to comply with. It was also noted that the air mode was the only mode to have the specific label and statement on the dangerous goods transport document. It was argued, however, that if there was a safety concern when the substance was exposed to heat there needed to be some way to communicate this. If there was no safety concern, the special provision should be removed.

3.2.24.3 It was questioned whether there would only be a risk in higher quantities and perhaps none for the low quantities permitted in the Instructions. The limits in the UN Model Regulations were higher. The question would be raised by the Secretary at the UN and a decision on the proposal would be taken at DGP/24 based on the UN's response.

### **3.2.25 Size and Placement of the Limited Quantity Mark (DGP-WG/13-WP/52)**

3.2.25.1 The meeting was reminded of the provision for the limited quantities mark to be reduced to not less than 50 mm × 50 mm when the package size was too small to bear the regular 100 mm × 100 mm mark, provided the marking remained clearly visible. Although the mark should only be reduced to a size necessary to fit onto the package, which might be larger than 50 × 50 mm, in reality manufacturers produced two sizes: 50 × 50 mm and 100 × 100 mm. It was felt to be unrealistic to expect manufacturers to produce multiple sizes. A proposal to only specify the two different sizes in Figure 3-1 was therefore made.

3.2.25.2 Although there was sympathy for the proposal, the group did not support the amendment. There were concerns that the revised text might lead some to consider that markings which were neither 50 mm × 50 mm nor 100 × 100 mm were non-compliant. There were also concerns with multi-modal harmonization. It was stressed that the marking needed to be as visible as possible in relation to the size of the package. 100 × 100 mm was the standard, but smaller marks were permitted if the package dimension was such that it could not bear the standard size. A 50 mm × 50 mm could be acceptable on a package

even though a larger one would fit. It was hoped that enforcers would exercise a degree of common sense during inspections.

3.2.25.3 The meeting was also asked to confirm whether the requirement for placement of labels in 5;3.2.8 applied to the limited quantity mark or if this requirement applied only to hazard labels. It was agreed that there were no specific requirements for the placement of the limited quantity mark and it did not have to appear on the same side as the hazard label(s).

### 3.2.26 **Dangerous Goods List — ID 8000 Consumer Commodity** (DGP-WG/13-WP/54)

3.2.26.1 A number of anomalies were raised in relation to consumer commodities (ID 8000). A study was done comparing the requirements for consumer commodities with the requirements for the same item if it were assigned to another UN number and shipped in limited quantities. It was noted that:

- a) some outer package limits for consumer commodities far exceeded the outer package limit for the item when assigned to the UN number assigned to the specific substance;
- b) the Class 9 hazard label and emergency response code which apply for consumer commodities in most cases was different to the code applied when the item was assigned to the UN number assigned to the specific substance;
- c) The quantity limitations for dangerous goods in limited quantities, including limits which applied when different dangerous goods were contained in one outer packaging (3;4.3) did not apply to consumer commodities.

3.2.26.2 Whether or not there was a need for an entry for consumer commodities was questioned in the working paper but the presenter withdrew his proposal to consider removing it from the dangerous goods list. Many members expressed relief that this proposal was withdrawn. An example of some of the complications which would be introduced without ID 8000 was provided to the working group. It was suggested that the provisions were used extensively in many places and were part of a long-standing system that hadn't posed any safety concerns.

3.2.26.3 There was no proposal presented, but consideration would be given to further reviewing the suggested anomalies.

### 3.2.27 **Special Provision A123 (DGP-WG/13-WP/62)**

3.2.27.1 The working group was asked to clarify the intent of Special Provision A123. The entry applied to electric storage batteries which were not otherwise listed in the dangerous goods list. It included requirements for batteries to be prepared for transport so as to prevent short circuit or unintentional activation in relation to batteries that had the potential for dangerous evolution of heat. The wording of the special provisions led some to believe that the batteries could be intentionally activated if there was no potential for a dangerous evolution of heat. If this was the intent of the special provision, it was suggested that some additional requirements were needed.

3.2.27.2 It was suggested that this issue was not solely covered by dangerous goods regulations since these were not dangerous goods. There were efforts being undertaken in one State to determine whether there was at any time a danger when something was activated. It was agreed that the issue should be discussed but addressing it would also involve airworthiness. Members were asked to consider the issue between now and DGP/24 so that the issue could be revisited.

### **3.2.28 Packing Instruction 971/Asymmetric Capacitors (DGP-WG/13-WP/68)**

3.2.28.1 Asymmetric capacitors (UN 3508) were being added to Table 3-1 as part of the UN harmonization exercise (see DGP-WG/13-WP/13) (paragraph 3.2.17 of this report). It was noted that Packing Instruction 971, which currently applies to electric double layer capacitors (UN 3499), was assigned to the asymmetric capacitor entry, but the packing instruction was not amended to incorporate UN 3508. It was also noted that the additional requirement in Packing Instruction 971 for electric double layer capacitors to be fitted with a metal strap would render asymmetric capacitors useless as a minimum charge was needed to be maintained for the capacitors to remain viable. A requirement for protection from short circuit was therefore added in the Model Regulations for UN 3508. An amendment to Packing Instructions 971 to address these issues was proposed to the panel.

3.2.28.2 The meeting was informed of an upcoming proposal to the UN Subcommittee meeting which would not require the Wh marking on pre-existing capacitors in Special Provisions A186 and A196. It was therefore proposed to add this exception to the special provisions in square brackets pending the decision of the Subcommittee.

3.2.28.3 The proposal was agreed, subject to some editorial revisions.

## **Part 4 — Packing Instructions**

### **3.2.29 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 4 (DGP-WG/13-WP/14)**

3.2.29.1 Draft amendments to Part 4 were proposed to reflect the decisions taken by the UN. The following issues were raised during the discussion:

- a) Provisions for large fire extinguishers in Packing Instruction 213 would be retained in square brackets subject to a review in conjunction with Special Provision A19. Additional packing requirements would be considered.
- b) Editorial amendments were needed in Packing Instructions 219 and the wording of paragraph 2) would be aligned with similar wording in Part 2; 2.1.2 e), i.e. “must be less than 300 kPa at 50°C” instead of “must not exceed 300 kPa at 50°C”. It was noted that this slightly altered the intent by excluding “300 kPa” but that consistency should be maintained.
- c) Adsorbed gases forbidden for transport would be moved from Packing Instruction 219 to the Supplement.
- d) The notes under the mark for UN 3373 in Packing Instruction 650 and the mark for UN 3245 in Packing Instruction 959 were redundant and would be deleted.
- e) It was suggested that text in 4;9.1.7, which was formed in the negative, should be revised for the sake of clarity. Although it was agreed that the wording was confusing, some believed it should not be altered since it was developed by the IAEA and would be incorporated in all the modal regulations. A representative from the IAEA reported on a project to improve the language in the safety standards and that amendment proposals could be submitted until 17 May 2013. Accordingly, a revision

to the text in 4;9.1.7 would be proposed by the Secretariat. A minor revision would be made to the Technical Instructions for incorporation in the 2015-2016 Edition.

- f) A table to include the quantity permitted would be added to Packing Instruction 877.

3.2.29.2 It was agreed that DGP-WG/13-WP/14 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/23 working paper.

### 3.2.30 **Packing Instruction 570 (DGP-WG/13-WP/59)**

3.2.30.1 A proposal to remove other metal (4N) boxes from the list of permitted outer packagings in Packing Instruction 570, assigned to organic peroxides, was presented. Metal packagings were not permitted for Organic peroxides, Type C in the Model Regulations, and although the Model Regulations did allow metal packagings for other organic peroxides, the DGP had historically not introduced them. The amendment was agreed.

## **Part 5 — Shipper's Responsibilities**

### 3.2.31 **Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 5 (DGP-WG/13-WP/15)**

3.2.31.1 Draft amendments to Part 5 were proposed to reflect the decisions taken by the UN. The following issues were raised during the discussion:

- a) A reference to provisions for applications and approvals for radioactive material transport was added to paragraph 5.1.5.1.4 c) of the UN Model Regulations (5;1.2.1.4 c) of the Technical Instructions). These provisions (paragraph 6.4.23.2 of the Model Regulations) were not in the Technical Instructions, and it was suggested that at least some of them should be added. The provisions would be reproduced in square brackets in the working paper on UN harmonization for DGP/24 and the panel would determine whether to include any of them in the Instructions (see Appendix A, Part 6;7.22).
- b) Revised provisions for excepted packages of radioactive material would need further review.
- c) New text in 5;2.4.5.1 (special marking requirement for radioactive material) was considered redundant as it was a general requirement for all dangerous goods. It would not be adopted.
- d) The paragraph numbering in Part 5;3.5.1 was aligned more closely with the Model Regulations but it was suggested this made the provisions less readable due to the length of the paragraph numbers and references to them. The paragraph numbering system used in the current edition would be retained.

3.2.31.2 It was agreed that DGP-WG/13-WP/15 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/24 working paper.

**3.2.32 Clarification on the Application of “Labels”  
(DGP-WG/13-WP/3)**

3.2.32.1 It was noted that references to labels in the UN Model Recommendations described hazard labels, while references to labels in the Technical Instructions described handling labels in addition to hazard labels. The requirements for affixing labels in Part 5;3.2.8 were identical to the ones in the Model Regulations. It was suggested that these requirements applied solely to hazard labels and an amendment to 5;3.2.8 was proposed to specify this.

3.2.32.2 There was initial support for the proposal until it was realized that some of the provisions in 5;3.2.8 should also be applied to handling labels.

3.2.32.3 A revised proposal would be prepared for DGP/24.

**3.2.33 Transition Period (DGP-WG/13-WP/39)**

3.2.33.1 It was proposed to add a one-month transition period to all future editions of the Technical Instructions to provide for dangerous goods shipments entering the transport system at the end of one period of validity, but which did not complete their journey until after the start of the next one. Transition periods had been provided for certain new provisions in the past; it was felt that making it a standing practice made practical sense. A recommendation to indicate which edition of the Technical Instructions was being used for the consignment was also proposed.

3.2.33.2 Although there was some support for the proposal, the majority did not support it as presented. Those who supported it noted that transitional arrangements were provided in the other modes. Shippers often prepared packages for transport considerably in advance of when they offered the goods. If they prepared a consignment at the end of one year but for whatever reason were unable to ship it until the new year, was it reasonable to expect them to unpack and repack?

3.2.33.3 Those who did not support the proposal suggested that transitional periods had been provided in the past on a case-by-case basis. It was suggested that a standing item be added to the panel agenda for transitional periods. These members believed, however, that applying a blanket transitional period would cause problems, particularly for operators performing acceptance checks. Would they need two sets of provisions? How would an operator know when a shipper prepared a package? It was also noted that the proposal only applied to “packages”; it was suggested that should a transitional period be introduced it should apply to the whole of the Technical Instructions, not just that specific aspect.

3.2.33.4 The proposer thanked the group for their comments and would consider presenting an alternate proposal for DGP/24.

**Part 6 — Packaging Nomenclature, Marking, Requirements and Tests**

**3.2.34 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 6 (DGP-WG/13-WP/16)**

3.2.34.1 Draft amendments to Part 6 were proposed to reflect the decisions taken by the UN. Whether or not to include provisions for applications and approvals for radioactive material transport in Part 6 would be considered at DGP/24 (see paragraph 3.2.31.1 a) of this report and Appendix A, Part 6;7.22). The only other issue raised was in relation to new Part 6;7.23.4 which applied to

consignments of fissile material only permitted for transport under exclusive use. These provisions would need further review on the basis that transport under exclusive use was much more complicated by air.

3.2.34.2 It was agreed that DGP-WG/13-WP/16 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/24 working paper.

## **Part 7 — Operator’s Responsibilities**

### **3.2.35 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 7 (DGP-WG/13-WP/17)**

3.2.35.1 Draft amendments to Part 7 were proposed to reflect the decisions taken by the UN. No issues were raised other than the need for minor editorial revisions.

3.2.35.2 It was agreed that DGP-WG/13-WP/17 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/24 working paper.

### **3.2.36 Visibility of ULD tag (DGP-WG/13-WP/32)**

3.2.36.1 A new note was proposed for inclusion under Part 7;2.8.4 to emphasize that unit load device (ULD) identification tags should be clearly visible through protective pouch windows. The need for the note was prompted by discoveries during dangerous goods ramp inspections of worn-away protective pouches or other labels restricting the visibility of information on the tags.

3.2.36.2 There was much support for the proposal with many members stating that this was a common problem. There were, however, some suggested revisions, i.e.:

- a) replacing the word “pouch” with “tag holder on the unit load device”;
- b) indicating that the red hatching around the tag should also be visible; and
- c) moving the provision before paragraph 2.8.4.

3.2.36.3 Many also felt that the provision should be a requirement instead of a recommendation and that a more comprehensive review of paragraph 2.8 was needed before agreeing to any text.

3.2.36.4 A new proposal would be presented at DGP/24.

### **3.2.37 Errors in Loading Dangerous Goods (DGP-WG/13-WP/36)**

3.2.38 A new requirement to ensure that operators load dangerous goods in accordance with load instructions (when applicable) and with the information to the pilot-in-command was proposed.

3.2.39 There was little support for the proposal as it was felt it was not a dangerous goods issue but rather an operations one. It was suggested that the need for such a provision was more of an enforcement issue.

3.2.40 The proposal was withdrawn.

**3.2.41 Table 7-1 Segregation between Packages  
(DGP-WG/13-WP/37)**

3.2.41.1 A new note indicating that packages containing dangerous goods of Division 4.1, Classes 6, 7 or 9 did not need to be segregated from other classes or divisions was proposed for inclusion under Table 7-1. It was suggested that this would remove potential for confusion when not seeing these classes/divisions in the headings of Table 7-1.

3.2.41.2 Although there was some support, a number of objections were raised on the basis that there were national authorities who did require segregation. There was also concern that the note might take focus away from intention of Table 7-1, noting the text in 7;2.2.1 which stated “as a minimum, the segregation scheme shown in Table 7-1 must be followed ...”.

3.2.41.3 The proposal was withdrawn.

**3.2.42 Where Tickets are Issued (DGP-WG/13-WP/40)**

3.2.42.1 A potential conflict was noted between the requirement in Part 7;5.1.2 for the operator or the operator’s handling agent to display notices wherever tickets were sold warning passengers of the types of dangerous goods which they are forbidden to transport aboard an aircraft and the recommendation in Part 8;1.1.3 for any organization or enterprise other than the operator, such as travel agents, to provide this information. An amendment to Part 7;5.1 was therefore proposed to specify the requirement was where tickets were issued by an air operator.

3.2.42.2 The chairman recalled discussions with ICAO’s Legal Bureau on whether a requirement could be made for travel agents. The answer was “no” on the basis that this would be beyond the remit of ICAO.

3.2.42.3 The proposal was not agreed.

**3.2.43 Passenger Check-in (DGP-WG/13-WP/48)**

3.2.43.1 The working group was invited to discuss whether the requirements for passengers to receive information on dangerous goods needed to take into account the possibility that a passenger may now check in weeks or even months in advance of their flight through on-line check in. The situation was made less clear by the absence of a definition of “check in” in any ICAO publication.

3.2.43.2 It was agreed that there was nothing to preclude a passenger from checking in at any time prior to a flight which may even be one year. The concept of checking in had changed drastically over the years. It was traditionally a process where information could be provided to passengers immediately prior to boarding the aircraft. Today there was less and less human interaction with passengers and it was suggested that this might actually cease completely. It was suggested that finding a way to get dangerous goods information to passengers within an appropriate time frame could no longer be done within the framework of the Instructions; the panel would need to work with other organizations to find a solution. Keeping pace with evolving technology was a challenge the panel would continue to face. Recognizing that many passengers received boarding passes on their mobile devices, it was suggested that sending dangerous goods information to these devices could be considered.

3.2.43.3 There was no proposal made, but the presenter would take the comments of the group into account and come back to the panel with a new paper at DGP/24.

### 3.2.44 **Stowage of Toxic and Infectious Substances** (DGP-WG/13-WP/57)

3.2.44.1 The working group was asked to consider removing the segregation requirements for toxic and infectious substances in Part 7;2.9. It was suggested that there was no longer any justification to keep the requirements, which had been in the Technical Instructions since 1984. At that time the requirements for package testing were new and the packing instructions contained far less detail than they did now. It was noted that there were no segregation requirements in the UN Model Regulations for infectious substances. The segregation requirements for infectious substances in the Technical Instructions applied only to UN 2814 and UN 2900 which required robust packagings. The Model Regulations did have requirements for Division 6.1, but these were relaxed for substances in Packing Group II and III provided competent authority was satisfied and this was not a multi-modal issue. It was suggested that acceptance checks as well as checks during loading and unloading made segregation unnecessary.

3.2.44.2 The proposal to delete Part 7;2.9 was agreed.

### 3.2.45 **Information to Pilot in Command** (DGP-WG/13-WP/63)

3.2.45.1 An amendment to Part 7;4.1.2 and 4.1.3 which allowed the operator to summarize the total quantity of dry ice/lithium batteries loaded per hold instead of providing the quantities per package with the information to the pilot-in-command was made to clarify that the operator was given a choice to comply with Part 7;4.1.1 or with Part 7;4.1.2/4.1.3. The proposal was agreed.

### 3.2.46 **Provision of Information** (DGP-WG/13-WP/64)

3.2.46.1 The working group was asked to consider the current provision of information requirements in cargo acceptance areas and to passengers be extended to postal outlets.

3.2.46.2 Some members felt that a requirement should not be added because this could be addressed during the CAA's review and approval of the DPO's procedures for preventing the introduction of dangerous goods in the mail stream.

3.2.46.3 The Secretary reminded the group that such discussions should be held with the UPU. This issue would be raised at the joint DGP/UPU meeting (see paragraph 3.1.2.3 of this report).

## **Part 8 — Provisions Concerning Passengers and Crew**

### 3.2.47 **Medical Devices** (DGP-WG/13-WP/25) **and Medical Devices** **Containing Lithium Batteries** (DGP-WG/13-WP/19)

3.2.47.1 An inconsistency between the current edition of the Technical Instructions which showed portable medical devices containing lithium batteries as being permitted in carry-on baggage only and the 2011-2012 Edition where no distinction was made between checked and carry-on baggage had been reported to the Secretariat prior to DGP-WG/13. It was suggested at that time that there was justification for an editorial amendment to remove this inconsistency. This led to a discussion through correspondence whereby other issues pertaining to the provisions for portable medical electronic devices containing lithium batteries were raised, particularly as they related to the separate entry in Table 3-1 for consumer electronic devices containing lithium batteries. While some members agreed that a corrigendum was warranted, others questioned whether the change could really be considered editorial, particularly in light of the additional issues raised. It was decided that a decision could wait for DGP-WG/13 when the subject could be examined more thoroughly.



3.2.47.2 Proposals were presented to DGP-WG/13 to allow medical devices containing lithium batteries in checked baggage and to remove the limit for spare batteries and the requirement for operator approval when the watt hour rating or lithium content did not exceed 100 Wh or 2 g respectively. It was recognized that a more conservative approach had been set for medical devices when they were introduced into the provisions because of the higher limits for lithium metal content and watt hours compared to those for personal electronic devices (i.e. 8 g versus 2 g and 160 Wh versus 100 Wh); these limits had been set to allow for medical devices which typically exceeded the limits for personal electronic devices. It was argued that although more conservative requirements were justified for larger batteries, there was no logical reason for more stringent requirements when medical devices were carried than when personal electronic devices were carried if the battery size was the same.

3.2.47.3 The meeting was provided with data to demonstrate a real need for passengers with certain health issues to carry multiple spares, specifically for portable oxygen concentrators (POCs). These were powered by lithium batteries and were increasingly being used instead of oxygen cylinders. It was noted that the potential risks aboard aircraft associated with the use of pressurized oxygen cylinders was also reduced if they were replaced by the use of POCs. It was estimated that passengers using POCs would need four spare batteries on a six-hour flight.

3.2.47.4 The working group supported the proposal and agreed an addendum to the Instructions was warranted. The Secretary reported, however, that this would not likely be possible within an acceptable time frame due to the tight schedule of the ANC and Council during what was an Assembly year.

3.2.47.5 It was noted that there was nothing in the Instructions to preclude medical devices from being carried under the provisions for personal electronic devices provided they fell within the lithium content/watt hour limits set for those devices. It was suggested that a small editorial amendment to the provision for portable electronic devices to clarify this could be incorporated in the Instructions by way of a corrigendum. This would address the needs of passengers who needed to carry more than two spares for their medical devices and allow them to carry the devices in checked baggage. The comprehensive amendment originally proposed would then be incorporated in the 2015-2016 Edition of the Instructions. This was agreed.

### **3.2.48 Self-Inflating Safety Devices (DGP-WG/13-WP/21)**

3.2.48.1 The working group was reminded of discussions at DGP/22 on the potential for applying passenger provisions contained in Part 8 for self-inflating life jackets to different types of self-inflating safety vests which were coming to the market such as those for motorcycle and horseback riders. Although no objections to the possibility were raised, no proposal was presented at time. Further developments in the field of self-inflating safety devices have since been reported along with additional requests from passengers to carry more than one self-inflating life jacket. Accordingly, a proposal was made to merge the current provisions for avalanche rescue backpacks and self-inflating life jackets currently included in Table 8-1 into a more general provision which could be applied to new and emerging self-inflating safety devices.

3.2.48.2 Although there was support for the development of a generic entry for self-inflating safety devices, it was felt that a separate entry should be maintained for avalanche rescue packs because of the provision for them to contain a pyrotechnic trigger mechanism.

3.2.48.3 A revised amendment which kept the entry for avalanche rescue backpacks separate while making a more generic entry for self-inflation personal safety devices was presented and agreed, subject to editorial amendments. It was noted that the new provisions limited carriage to one avalanche safety backpack and one self-inflating personal safety device.

### 3.2.49 **Security Type Equipment (DGP-WG/13-WP/30)**

3.2.49.1 Security-type equipment such as attaché cases, cash boxes and cash bags were shown to be forbidden for carriage by passengers and crew in the preamble to Table 8-1 of Part 8, while Table 8-1 contained a provision allowing security-type equipment to be carried in checked baggage. A proposal to remove the text forbidding this type of equipment from Part 8;1.1.1 was made.

3.2.49.2 The meeting was reminded that security-type equipment was listed as totally forbidden in Table 3-1. An exception had been introduced in the 2011-2012 Edition of the Technical Instructions to allow certain security-type equipment containing dangerous goods that were not subject the Instructions provided specific conditions were met (see paragraph 3.2.39 of the DGP-WG/09 Report). The restriction remained for other types. The proposer suggested that the text in the preamble to the table contradicted the provision in the table, but most believed it was necessary to specify that the equipment (other than the types specified) could not be carried under any circumstance.

3.2.49.3 The amendment was not agreed.

### 3.2.50 **Pacemakers (DGP-WG/13-WP/50)**

3.2.50.1 An amendment to the passenger provisions was proposed at DGP-WG/12 to include cardiac pacemakers externally fitted on a patient, recognizing that the provision in Part 8 of referred to pacemakers implanted into a person. The proposal was not accepted because of the potential for the new provision to apply to any device fitted externally on a person and this would be too far reaching. A new proposal was presented to the working group.

3.2.50.2 However, on reflection it was suggested that perhaps the provisions should allow for other medical devices as there were apparently other medical devices powered by lithium batteries that were externally fitted on a person such as insulin pumps for diabetics and external chemotherapy. The revised provision would exclude these.

3.2.50.3 The presenter would take account of comments received and re-visit this subject at DGP/24.

## **Attachment 2 — Glossary of Terms**

### 3.2.51 **Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Attachment 2 (DGP-WG/13-WP/10)**

3.2.51.1 Draft amendments to Attachment 2 (Glossary of terms) were proposed to reflect the decisions taken by the UN. It was agreed that DGP-WG/13-WP/10 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/24 working paper.

**3.3 Agenda Item 3: Development of recommendations for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2015-2016 Edition**

**3.3.1 Draft Amendments to the Supplement to the Technical Instructions to Align with the UN Recommendations (DGP-WG/13-WP/43)**

3.3.1.1 Draft amendments to the Supplement to the Technical Instructions were proposed to reflect the decisions taken by the UN. It was agreed that DGP-WG/13-WP/43 would be further reviewed by panel members and any discrepancies would be incorporated in the DGP/24 working paper.

**3.4 Agenda Item 4: Development of recommendations for amendments to the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) for incorporation in the 2015-2016 Edition**

**3.4.1 Lithium Battery Incidents in the Cabin — Additional Guidance for Crew Members (DGP-WG/13-WP/61)**

3.4.1.1 The working group was invited to review and comment on a draft document developed by the IATA Cabin Safety Task Force on dealing with events after an incident involving a lithium battery fire in the passenger cabin. The group was also asked to consider if the procedures or a subset of the procedures would be appropriate for inclusion in the 2015-2016 Edition of Doc 9481.

3.4.1.2 There was general support for the concept, particularly in relation to guidance on what to do with the battery/device after the event, e.g. never allowing it to travel onwards, removing it from the aircraft once landed and returning it to the passenger. There were concerns with some of the terminology and whether or not some of the text was appropriate. On the basis that the paper was a late submission, it was agreed that members would provide further comments after working with their cabin safety offices within their States. The material would be reviewed again at DGP/24.

**3.5 Agenda Item 5: Review of provisions for the transport of lithium batteries**

**General**

**3.5.1 Secondary Lithium Batteries (DGP-WG/13-WP/60)**

3.5.1.1 A proposal for a new special provision was proposed at DGP-WG/12 to allow for the transport of lithium ion batteries larger than 35 kg on cargo aircraft without an approval as currently required in accordance with Special Provision A99 (see paragraph 3.5.1 of DGP-WG/13-WP/1). There was general support for the amendment at that time, but some concerns were raised. A new special provision was proposed to DGP-WG/13 which took into account some of the concerns raised, provided background information on approvals that were already being issued by national authorities, justification for weight limits set and the decision not to include limits on the state of charge.

3.5.1.2 The provision would be restricted to one battery per package, and the package would be subject to all requirements in the Instructions in addition to some specific requirements such as Packing Group I performance requirements, fire and flame resistant packaging, and specific marking and

documentation requirements. The working group was asked to consider incorporating this special provision in the 2013-2014 Edition of the Technical Instructions by way of an addendum.

3.5.1.3 There was general agreement that provisions needed to be developed on the basis that these batteries were currently being shipped under approval and there was no guarantee that every approval provided for sufficient safety features. It was felt, however, that more work was needed before anything could be introduced into the Instructions.

3.5.1.4 Comments provided included:

- a) The provisions would be more appropriate in the packing instructions rather than a special provision.
- b) The larger the battery, the larger the risk. These risks needed to be mitigated. It was difficult to mitigate the chemical hazard of lithium batteries, but limiting the state of charge could mitigate the energy density risk.
- c) Packaging needed to be considered so that if an incident occurred it could be contained. Research was being done in one State on packaging that could withstand pressure build up if the batteries self-ignited, the results of which were encouraging.
- d) Large format batteries were shown to react differently than consumer size batteries. This would need to be taken into consideration.
- e) A representative of the battery industry questioned the need for impact resistant casing noting that this was not possible for certain equipment such as satellite batteries. Others noted that these could be handled with an approval. He also questioned the 35 kg mass limit.

3.5.1.5 The proposer was grateful for the comments received and hoped that he could work with those who commented on a proposal that could be accepted at DGP/24.

### **3.5.2 Transport of waste lithium batteries and damaged or defective batteries (DGP-WG/13-IP/1)**

3.5.2.1 Packing instructions and special provisions were being added to the 18th Revised Edition of the Model Regulations for the transport of damaged or defective batteries and for waste batteries. The group was asked to consider including the provisions adopted by the UN Sub-Committee in the Supplement to the Technical Instructions as guidance material, recognizing that there was a need to transport the batteries by all modes.

3.5.2.2 It was noted that Special Provision A183 prohibits the transport of waste batteries for disposal or recycling unless approved by the appropriate authority of the State of Origin and the State of the Operator. It was also noted that Special Provision A154 of the Technical Instructions prohibits the transport of lithium batteries identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit. It was recognized that additional provisions would be necessary for transport by air.

3.5.2.3 A number of panel members reported that they had already issued approvals for these types of batteries. Although there was support for guidance, it was not felt that the UN provisions were adequate for air transport.

3.5.2.4 Guidance would be developed for DGP/24, taking into account the unique needs for air transport.

**Agenda item 5.1: Improved hazard communication for energy storage devices**

**3.5.2.5 Electric Storage Systems — Appropriate Hazard Communication (DGP-WG/13-WP/67)**

3.5.2.5.1 The meeting was provided with a paper that was submitted to the United Nations Sub-Committee on hazard communication for electronic storage systems. The group was invited to provide comments it.

3.5.2.5.2 A battery industry representative cautioned against more changes to the lithium battery provisions. The many changes made to the provisions in recent years had caused confusion and it was hoped that the provisions would remain stable. However, it was pointed out that even if the UN were to adopt new provision in this biennium, they would not become applicable until 2017 at the earliest.

3.5.2.5.3 There was support for raising the issues in the paper to the UN. It was recognized that the Class 9 label did nothing to communicate the risks associated with lithium batteries. It was difficult to justify having the same hazard label for lithium batteries as dry ice. How to communicate the hazard was still open for debate.

**Agenda item 5.2: Simplification and clarification of provision**

**3.5.3 Proposed Simplification of Provisions for Lithium Batteries (DGP-WG/13-WP/6)**

3.5.3.1 It was noted that text related to the classification of lithium batteries in Part 2;9.3 was repeated in the lithium battery packing instructions. Recognizing that these packing instructions were already long and detailed, it was proposed to replace the text in the packing instructions with a reference to Part 2;9.3.

3.5.3.2 Some members felt that the information should be repeated on the basis that some small shippers did not look anywhere other than the packing instruction. It was suggested that all of the information should at least be contained in Section II. Others felt that users needed to be aware of the various parts of the Instructions and that having repeated text made updating difficult and increased the possibility of forgetting to update all parts when revisions were made.

3.5.3.3 The amendment was agreed.

**3.5.4 Lithium Batteries – Section IB – Gross Mass Limitation (DGP-WG/13-WP/28) and Package Mass Limits on Lithium Ion and Lithium Metal Cells and Batteries (DGP-WG/13-WP/55)**

3.5.4.1 DGP-WG/13-WP/28 contained two proposals. The first proposed a consequential amendment in Part 5;4.1.5.1 to provide the gross mass of each package for Section IB lithium batteries but was withdrawn since this was addressed in a corrigendum to the Instructions that was in the process of being published. The second proposed replacing the gross mass requirement in Section IB of Packing Instructions 965 and 968 with the net mass on the alternative written communication. This was agreed, in conjunction with a proposal in DGP-WG/13-WP/55 to change the gross mass limitations in Tables 965-IB and 968-IB to net mass.

### 3.5.5 **Lithium Battery Packing Instruction Requirements** (DGP-WG/13-WP/46)

3.5.5.1 A number of inconsistencies in the packing instructions for lithium batteries were highlighted along with differences between the Instructions and the Model Regulations. These included:

- a) Section IB of Packing Instructions 965 and 968 and Section II of all packing instructions included a requirement for packages containing lithium batteries to pass a drop test without damage to cells or batteries, shifting of the contents so as to allow battery-to-battery or cell-to-cell contact and release of contents. Although the requirements of Part 6 applied to Section IA of Packing Instructions 965 and 968 and Section I of the remaining lithium battery packing instructions, there were no specific references in Part 6 to damage to cells or batteries or to shifting of contents resulting in battery-to-battery or cell-to-cell contact. It was noted that the same difference was found between Packing Instruction P903 and Special Provision 188 of the UN Model Regulations. The working group was asked to consider whether this requirement should be added to Section I and IA (as applicable) of Packing Instructions 965 to 968.
- b) It was questioned whether or not the arrangement of cells or batteries in blister packs commonly used in retail packages for batteries were acceptable. It was suggested that these retail packagings did not meet the strict interpretation of the requirement to prevent cell-to-cell or battery-to-battery contact. If the working group felt the blister packs were acceptable, amendments to the applicable packing instruction sections should be considered. Amendment to Special Provision 188 in the UN Model Regulations would also be required.
- c) Section IA.2 of Packing Instructions 965 and 968 allowed for the transport of lithium batteries with a mass of 12 kg or more to be packed in packagings not meeting the requirements of Part 6 provided they had a strong, impact-resistant outer casing and were packed in strong outer packagings or protective enclosures if approved by the appropriate authority of the State of Origin. The Model Regulations contained the same provision along with an additional one for pallets or other handling devices and a requirement for terminals not to support the weight of other items. The working group was asked to consider whether this text should be added to the Technical Instructions.

3.5.5.2 With regard to a), it was thought reasonable for Section I batteries to be subject to the additional tests of section IA and II. With regard to b) it was agreed that blister packs, which resulted in battery to battery contact, were an acceptable package and that they were commonly used in industry. It was suggested that perhaps the requirement to avoid cell-to-cell or battery-to-battery contact could be dispensed with, since this was really intended to prevent short circuit, a provision which already existed. Comments on a) and b) would be taken to the UN. With regard to c), it was suggested that it was a conscious decision to not include the additional provision for pallets or handling devices.

### 3.5.6 **Consideration of What is “Equipment”** (DGP-WG/13-WP/56)

3.5.6.1 The working group was asked to clarify what constitutes “equipment” when referring to UN 3091, **Lithium metal batteries contained in equipment** and UN 3481, **Lithium ion batteries contained in equipment**. It was suggested that certain articles containing lithium batteries whose sole purpose was to provide external power source to another piece of electronic equipment should be treated

as lithium batteries on their own and classified as UN 3090, **Lithium metal batteries** or UN 3480, **Lithium ion batteries**. New text to clarify this was proposed for inclusion in the packing instructions for lithium batteries contained in equipment and in the passenger provisions to differentiate between spare batteries which must be in carry-on luggage and lithium batteries contained in equipment which could be in checked baggage.

3.5.6.2 A representative of the battery industry disagreed with the proposal. He suggested these articles should be considered equipment containing lithium batteries. To be classified as lithium batteries, the articles would be subject to UN testing but that this was not done. Instead the cell or battery inside the device was submitted for testing and then incorporated into the article. Not everyone agreed with this point of view. The working group was reminded of the paper presented at a previous working group meeting reporting on an incident involving e-bicycle batteries classified as lithium batteries contained in equipment. The presenter of that paper was told the batteries should not have been considered contained in equipment because it was not attached to the bicycle.

3.5.6.3 There was support for the intent of the proposal but it was felt the issue, at least in relation to the packing instructions, was a multi-modal one that should be addressed at the UN. Clearly defining what constituted contained in equipment was complicated and would need to be developed carefully.

3.5.6.4 The working group did feel the amendment to the passenger provisions could be considered. This amendment was agreed, subject to some revisions to the wording.

#### **Agenda item 5.3: Development of guidance material**

No papers were submitted under this agenda item.

#### **Agenda item 5.4: Monitoring activities in States including the sharing of knowledge and information, training programmes, and outreach activities**

No papers were submitted under this agenda item.

### **3.6 Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by Air Navigation Commission or the Dangerous Goods Panel**

#### **Agenda item 6.1: Dangerous goods incident and accident data collection**

##### **3.6.1 Identification and Justification for Non-Recurrent Work Items (DGP-WG/13-WP/66)**

3.6.1.1 The Secretary briefed the meeting on procedures the ANC had put into place for new panel work projects. Proposals for new projects were assessed by an ANC Working Group of the Whole for Strategic Review and Planning prior to approval by the ANC. Consideration was given to whether the project addressed safety or efficiency needs. A proper assessment was based on sufficient information being provided by the panel. Proposals for new work projects would only be assessed if submitted on a template known as a “job-card”. A sample of this job-card and guidelines for filling it were provided to the group. The meeting was asked to take this process into account when identifying the need for new projects in the future.

### 3.6.2 **Dangerous goods incident and accident information system** (DGP-WG/13-WP/27)

3.6.2.1.1 The group was reminded of discussions at DGP-WG/12 on a global dangerous goods incident and accident reporting system. It had been decided at that meeting that work on the system would begin through correspondence. It was difficult, however, to progress the work without meeting face to face. It was therefore proposed to form a working group at DGP-WG/13.

3.6.2.1.2 Clearly identifying the needs and the scope of the system was recognized as the first step in the development process, keeping in mind that the needs of a global system might differ from those of a State system. The high-level needs were seen to be identifying hazards, increasing awareness of them, and taking measures to eliminate them. The next step would be to specify what functions would be required to achieve this. This would involve determining what information would need to be generated and what data would need to be collected to do so.

3.6.2.1.3 It was reported that the UNECE had begun development of a global accident reporting system and suggested that the DGP Secretariat contact the Secretary of the Sub-Committee to see if any efforts could be combined.

3.6.2.1.4 Managing input would be important. Whenever possible, responses would be defined in order to allow for standardized input and output and to eliminate the need for translation. Some narrative text might be necessary, but translation requirements would need to be considered. The Secretary noted that ICAO had many years of experience with data collection and translation in relation to the ICAO Accident/Incident Data Reporting (ADREP) System (which used the European Coordination Centre for Aviation Incident Reporting System (ECCAIRS) as a platform). The same types of input controls would be considered for this system. How often States needed to report would also need to be considered. Immediate reporting might be necessary for serious incidents, whereas periodic reporting of multiple incidents might be sufficient for minor incidents. Certain types of repeated incidents, such as the discovery of common dangerous goods found in passenger baggage, could be summarized and reported to ICAO at defined time intervals. The working group was reminded of discussions at DGP-WG/12 on proposed definitions for dangerous goods events/dangerous goods discrepancies (see paragraph 3.2.5 of DGP-WG/13-WP/1). Although the definitions were not adopted, it was suggested the idea be revisited so that incidents could be categorized into different levels of seriousness, at least for the purpose of this database system.

3.6.2.1.5 There was strong support for the development of the system. Working would continue through correspondence and a working group devoted to this issue will review material at DGP/24.

### **Agenda Item 6.2: Dangerous goods requirements in Annex 6 – Operation of Aircraft**

#### 3.6.3 **Annex 6 and Dangerous Goods** (DGP-WG/13-WP/24)

3.6.3.1 The working group was presented with a draft amendment which introduced a new chapter including dangerous goods requirements into Annex 6 — Operation of Aircraft proposed by the Fifteenth Operations Panel Working Group of the Whole Meeting (OPSP/WG/WHL/15, Montréal 11 to 15 March, 2013). The amendment was a revised version of material developed by the OPSP dangerous goods sub-group (OPSP-DGSG) comprised of members and representatives from both the OPSP and the DGP. The OPSP-DGSG had worked diligently to prepare an amendment which could meet a 2014 applicability date. The OPSP/WG/WHL fully supported the intent of the original material developed by the OPSP-DGSG but expressed concerns that the language and terminology used was not consistent with the general drafting style of Annex 6. It was subsequently redrafted in line with the structure of Annex 6.



The Secretary noted that further revisions to Annex 6 were made by the Secretariat in preparation for the ANC's review.

3.6.3.2 The meeting was reminded that the need for introducing Standards related to dangerous goods into Annex 6 was prompted by safety oversight audits which revealed a lack of awareness by some civil aviation authorities of the scope of their operational responsibilities for oversight of dangerous goods activities. Dangerous goods in cargo clearly posed a significant threat to safety if not carried in accordance with Annex 18 and the Technical Instructions, yet there was nothing in Annex 6 other than a simple reference to Annex 18 to address this responsibility. It was critical for all States to understand how dangerous goods fit into the certification and operations processes.

3.6.3.3 The amendment proposal contained dangerous goods Standards in a new Chapter 14 to Annex 6 along with guidance material that would be contained in an attachment to the Annex. The proposed SARPs covered requirements applicable to all operators, regardless of whether or not they were authorized to transport dangerous goods as cargo, and additional requirements for those operators which were authorized to transport dangerous goods as cargo.

3.6.3.4 The amendment to Annex 6 was recognized as a significant contribution to safety and supporting SMS principles and implementation. Panel members were encouraged to provide the Secretary with comments so that the views of the working group could be conveyed to the ANC during its preliminary review. The Secretary noted that the amendment proposal would then be sent to States and that panel members would have the opportunity to provide comments at that time through their CAAs. These comments would be taken into account during a final review by the ANC. The Council would then be asked to adopt the amendment for applicability in November 2014.

3.6.3.5 Finally, the meeting was asked to consider whether any consequential amendments to Annex 18 were necessary or if there were any deficiencies which needed to be addressed. These could be considered at DGP/24.

**Agenda Item 6.3: Development of guidance material on countering the potential use of dangerous goods in an act of unlawful interference**

**3.6.4 Joint Task Force of the Dangerous Goods Panel and the AVSEC Panel  
(DGP-WG/13-WP/65 Rev.)**

3.6.4.1 The meeting was reminded of the increasing importance the ICAO Council was placing on the need for coordination between the Aviation Security Panel (AVSECP) and the DGP along with the request by the Secretary General for the establishment of a joint task force to develop guidance material on countering the potential use of dangerous goods in an act of unlawful interference.

3.6.4.2 An initial meeting of the Joint Task Force of the Dangerous Goods and Aviation Security Panels was held on 25 and 26 March 2013 in Singapore. The task force developed proposed terms of reference and initial action items. A report from that meeting was prepared for both panels to approve.

3.6.4.3 The report had already been presented to the Twenty-Fourth Meeting of the Aviation Security Panel (AVSECP/24) which met from 8 to 12 April 2013 in Montreal. AVSECP/24 welcomed the establishment of the task force. It recommended that the task force consider all dangerous goods in its work, not only those of high consequence. The proposed terms of reference were amended accordingly. Other refinements were proposed, and the revised version was agreed by the panel.

3.6.4.4 Immediate action items for the task force include:

- a) a comparison between Annex 17 and Annex 18 in an effort to determine potential overlaps and/or contradictions; and
- b) clarification of key terms including high consequence versus high risk.

3.6.4.5 DGP-WG/13 was encouraged by the work of the joint task force. It agreed to the proposed action items and terms of reference as revised by AVSECP/24 and welcomed AVSECP's decision to expand the scope of the work beyond high-consequence dangerous goods.

**Agenda Item 6.4: Development of performance standards for air operators and designated postal operators**

No papers were submitted under this agenda item.

**3.7 Agenda Item 7: Other business**

**3.7.1 Report of the Working Group of the Whole Meeting (2012)  
(DGP-WG/12) (DGP-WG/13-WP/1)**

3.7.1.1 The report of the WG/12 meeting was noted.

**3.7.2 Report of an Incident Involving UN 3426 Acrylamide  
(DGP-WG/13-WP/26)**

3.7.2.1 An explosion of drums containing **Acrylamide solution** (UN 3425) that occurred hours after unloading from an aircraft was reported to ICAO by the Civil Aviation Authority of Israel (CAAI). A draft report of the incident was provided to panel members for review. Representatives of the CAAI were invited to discuss the report with the working group through audio conferencing.

3.7.2.2 The group had a number of questions and comments on the report, some of which were provided during the audio conference. The CAAI asked that further comments be provided to them by 31 May 2013 so that they could be taken into account when finalizing the report. The working group was grateful to the Israel Civil Aviation Authority for sharing the details of the incident report. This was an example of cooperation between States, something that was recommended in Annex 18, paragraph 11.2.

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## APPENDIX

### CONSOLIDATION OF AMENDMENTS TO THE TECHNICAL INSTRUCTIONS AGREED AT WG/12

#### Part 1

#### GENERAL

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#### Chapter 2

#### LIMITATION OF DANGEROUS GOODS ON AIRCRAFT

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##### 2.3 TRANSPORT OF DANGEROUS GOODS BY POST

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2.3.2 The following dangerous goods may be acceptable in mail for air carriage subject to the provisions of the appropriate national 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

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UN Model Regulations, paragraph 1.1.1.6, ST/SG/AC.10/40/Add.1

Highlighted text is in the UN Model Regulations but not the TIs. Whether or not to include in TIs to be determined. To be discussed with UPU/IAEA.

DGP-WG/13-WP/11 (see paragraph 3.2.1 a) of this report)

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- c) radioactive material in an excepted package conforming to the requirements of 1;6.1.5, the activity of which does not exceed one-tenth of that listed in Part 2, Chapter 7, Table 2-452-14, and that does not meet the definitions and criteria of classes, other than Class 7, or divisions, as defined in Part 2;

...

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UN Model Regulations, new paragraph 1.1.1.9, ST/SG/AC.10/40/Add.1

Potential contradictions with Special Provision A69 and location of text to be discussed.

DGP-WG/13-WP/11 (see also paragraph 3.2.1.1 b) of this report)

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##### 2.6 LAMPS CONTAINING DANGEROUS GOODS

The following lamps are not subject to these Instructions provided that they do not contain radioactive material and do not contain mercury in quantities above those specified in Special Provision A69:

- a) lamps that are collected directly from individuals and households when transported to a collection or recycling facility;
- b) lamps each containing not more than 1 g of dangerous goods and packaged so that there is not more than 30 g of dangerous goods per package, provided that:
  - 1) the lamps are certified to a manufacturer's quality management system; and

Note.— The application of ISO 9001:2008 may be considered acceptable for this purpose.

2) each lamp is either individually packed in inner packagings, separated by dividers, or surrounded with cushioning material to protect the lamps and packed into strong outer packagings meeting the general provisions of 4:1.1 and capable of passing a 1.2 m drop test.

c) used, damaged or defective lamps each containing not more than 1 g of dangerous goods with not more than 30 g of dangerous goods per package when transported from a collection or recycling facility.

The lamps must be packed in strong outer packagings that are sufficient for preventing release of the contents under normal conditions of transport meeting the general provisions of 4:1.1 and that are capable of passing a drop test of not less than 1.2 m.

Note.— Lamps containing radioactive material are addressed in 2:7.2.2.2 b) and light bulbs containing Division 2.2 gases are addressed in 2:2.2.3 d).]

## Chapter 3

### GENERAL INFORMATION

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

#### 3.1 DEFINITIONS

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UN Model Regulations, Chapter 1.2, ST/SG/AC.10/40/Add.1  
(DGP WG/13 WP/11 (see paragraph 3.2.1 of this report))

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**Approval.** For the transport of ~~Class 7~~ radioactive 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.

*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.

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DGP WG/13 WP/33 (see paragraph 3.2.7 of this report)

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**Bundles of cylinders.** An assembly of cylinders that are fastened together and which are interconnected by a manifold and transported as a unit. (See UN Recommendations, Chapter 1.2). Not permitted for air transport.

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UN Model Regulations, Chapter 1.2, ST/SG/AC.10/40/Add.1  
(DGP WG/13 WP/11 (see paragraph 3.2.1 of this report))

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**Confinement system.** For the transport of ~~Class 7~~ radioactive 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.

...

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

...

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

...

**Design.** For the transport of ~~Class 7~~ radioactive material, the description of fissile material excepted under 2;7.2.3.5.1 f), 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.** For the transport of ~~Class 7~~ radioactive material, the sole use, by a single shipper, of an aircraft or of a large freight container, in respect of which all initial, intermediate and final loading and unloading and shipment is are carried out in accordance with the directions of the shipper or consignee, where so required by these Instructions.

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The definition for *freight container in the case of radioactive material transport* is repeated in 2;7.1.3. It is proposed to replace the definition in this part with a cross reference to 2;7.1.3 as indicated below.

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**~~Freight container in the case of radioactive material transport.~~** ~~An article of transport equipment designed to facilitate the transport of packaged goods by one or more modes of transport without intermediate reloading, which is of a permanent enclosed character, rigid and strong enough for repeated use, and must be fitted with devices facilitating its handling, particularly in transfer between aircraft and from one mode of transport to another. A small freight container is that which has either an overall outer dimension less than 1.5 m, or an internal volume of not more than 3 m<sup>3</sup>. 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. See 2;7.1.3.~~

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UN Model Regulations, Chapter 1.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/11 (see paragraph 3.2.1.1 d) of this report)

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~~[Large salvage packaging. (See UN Recommendations, Chapter 1.2). Not permitted for air transport. A special packaging which:~~

- ~~a) is designed for mechanical handling; and~~
- ~~b) exceeds 400 kg net mass or 450 litres capacity but has a volume of not more than 3 m<sup>3</sup>;~~

~~into which damaged, defective or leaking dangerous goods packages, or dangerous goods that have spilled or leaked are placed for purposes of transport for recovery or disposal.]~~

...

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UN Model Regulations, Chapter 1.2, ST/SG/AC.10/40/Add.1  
(DGP WG/13 WP/11 (see paragraph 3.2.1 of this report)

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~~Management system, for the transport of radioactive material. A set of interrelated or interacting elements (system) for establishing policies and objectives and enabling the objectives to be achieved in an efficient and effective manner.~~

...

**Maximum normal operating pressure.** For the transport of ~~Class 7~~ radioactive 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.

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DGP-WG/12-WP/36 (see paragraph 3.2.6 of DGP-WG/13-WP/1):

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**Net quantity. Either:**

- ~~a) The mass or volume of the dangerous goods contained in a package excluding the mass or volume of any packaging material; or~~
- ~~b) the mass of an unpackaged article of dangerous goods (e.g. UN 3166).~~

For the purposes of this definition, “dangerous goods” means the substance or article as described by the proper shipping name shown in Table 3-1, e.g. for “Fire extinguishers”, the net quantity is the mass of the fire extinguisher. For articles packed with equipment or contained in equipment, the net quantity is the net mass of the article, e.g. for lithium ion batteries contained in equipment, the net quantity is the net mass of the lithium ion batteries in the package.

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UN Model Regulations, Chapter 1.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/11 (see paragraph 3.2.1 of this report)

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**Neutron radiation detector.** A device that detects neutron radiation. In such a device, a gas may be contained in a hermetically sealed electron tube transducer that converts neutron radiation into a measureable electric signal.

**Radiation detection system.** An apparatus that contains radiation detectors as components.

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

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

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DGP-WG/13-WP/8 (see paragraph 3.2.6 of this report)

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**Stores (supplies).** a) Stores (supplies) for consumption; and b) Stores (supplies) to be taken away.

*Stores (supplies) for consumption.* Goods, whether or not sold, intended for consumption by the passengers and the crew on board aircraft, and goods necessary for the operation and maintenance of aircraft, including fuel and lubricants.

*Stores (supplies) to be taken away.* Goods for sale to the passengers and the crew of aircraft with a view to being landed.

Items that meet the classification as dangerous goods and which are transported in accordance with Part 1;2.2.2-~~or~~, Part 1;2.2.3 or Part 1;2.2.4 are considered as “cargo”.

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UN Model Regulations, Chapter 1.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/11 (see paragraph 3.2.1 of this report)

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

**Through or into.** For the transport of ~~Class 7~~ radioactive material, through or into the countries in which a consignment is transported but specifically excluding countries “over” which a consignment is carried by air, provided that there are no scheduled stops in those countries.

**Chapter 4****TRAINING**

*Parts of this Chapter are affected by State Variations AE 2, BR 7, CA 18, HK 1;  
see Table A-1*

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DGP-WG/13-WP/8 (see paragraph 3.2.6 of this report)

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4.1.1 Initial and recurrent dangerous goods training programmes must be established and maintained by or on behalf of:

- a) shippers of dangerous goods, including packers and persons or organizations undertaking the responsibilities of the shipper;
- b) operators;
- c) ground handling agencies which perform, on behalf of the operator, the act of accepting, handling, loading, unloading, transferring or other processing of cargo, ~~or mail or stores~~;
- d) ground handling agencies located at an airport which perform, on behalf of the operator, the act of processing passengers;
- e) agencies, not located at an airport, which perform, on behalf of the operator, the act of checking in passengers;
- f) freight forwarders;
- g) agencies engaged in the security screening of passengers and crew and their baggage and/or cargo, ~~or mail or stores~~; and
- h) designated postal operators.

...

4.2 TRAINING CURRICULA

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DGP-WG/12-WP/4 and DGP-WG/12-WP/17 (see paragraphs 3.2.2 and 3.2.4 of DGP-WG/13-WP/1)

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 staff	
	1	2	3	4	5	6	7	8	9	10	11	12
	<b>Categories of staff</b>											
General philosophy	x	x	x	x	x	x	x	x	x	x	x	x
Limitations	x		x	x	x	x	x	x	x	x	x	x
General requirements for shippers	x		x			x						
Classification	x	x	x			x						x
List of dangerous goods	x	x	x			x				x		
Packing requirements	x	x	x			x						
Labelling and marking	x	x	x	x	x	x	x	x	x	x	x	x
Dangerous goods transport document and other relevant documentation	x		x	x		x	x					
Acceptance procedures						x						
Recognition of undeclared dangerous goods	x	x	x	x	x	x	x	x	x	x	x	x
Storage and loading procedures					x	x		x		x		
Pilots' notification						x		x		x		
Provisions for passengers and crew	x	x	x	x	x	x	x	x	x	x	x	x
Emergency procedures	x	x	x	x	x	x	x	x	x	x	x	x

**KEY CATEGORY**

- 1 — Shippers and persons undertaking the responsibilities of shippers
- 2 — Packers
- 3 — Staff of freight forwarders involved in processing dangerous goods
- 4 — Staff of freight forwarders involved in processing cargo or mail (other than dangerous goods)
- 5 — Staff of freight forwarders involved in the handling, storage and loading of cargo or mail
- 6 — Operator's and ground handling agent's staff accepting dangerous goods
- 7 — Operator's and ground handling agent's staff accepting cargo or mail (other than dangerous goods)
- 8 — Operator's and ground handling agent's staff involved in the handling, storage and loading of cargo or mail and baggage
- 9 — Passenger handling staff

DGP-WG/13-WP/38 (see paragraph 3.2.3 of this report)

- 10 — Flight crew members, loadmasters and load planners and flight operations officer/flight dispatcher
- 11 — Crew members (other than flight crew members)

DGP-WG/13-WP/8 (see paragraph 3.2.6 of this report)

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



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DGP-WG/12-WP/4 and DGP-WG/12-WP/17 (see paragraphs 3.2.2 and 3.2.4 of DGP-WG/13-WP/1)

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

Contents	Categories of staff				
	<del>7</del> 13	<del>8</del> 14	915	<del>40</del> 16	<del>44</del> 17
General philosophy	X	X	X	X	X
Limitations	X	X	X	X	X
Labelling and marking	X	X	X	X	X
Dangerous goods transport document and other relevant documentation	X				
Recognition of undeclared dangerous goods	X	X	X	X	X
Provisions for passengers and crew	X	X	X	X	X
Emergency procedures	X	X	X	X	X

**KEY CATEGORY**

~~7~~13— Operator's and ground handling agent's staff accepting cargo or mail (other than dangerous goods)

~~8~~14— Operator's and ground handling agent's staff involved in the handling, storage and loading of cargo or mail (other than dangerous goods) and baggage

~~9~~15— Passenger handling staff

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DGP-WG/13-WP/38 (see paragraph 3.2.3 of this report)

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~~40~~16— Flight crew members, loadmasters and load planners and flight operations officer/flight dispatcher

~~44~~17— Crew members (other than flight crew members)

*Note 1.— Depending on the responsibilities of the person, the aspects of training to be covered may vary from those shown in Tables 1-4 and 1-5. For example, in respect of classification, staff involved in implementing security procedures (e.g. screeners and their supervisors) need only be trained in the general properties of dangerous goods.*

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

4.2.8 Staff of designated postal operators 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 1-6.

DGP-WG/12-WP/4 and DGP-WG/12-WP/17 (see paragraphs 3.2.2 and 3.2.4 of DGP-WG/13-WP/1)

**Table 1-6. Content of training courses for staff of designated postal operators**

<i>Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum</i>	<i>Designated postal operators</i>		
	<u>Categories of staff</u>		
	A	B	C
General philosophy	x	x	x
Limitations	x	x	x
General requirements for shippers	x		
Classification	x		
List of dangerous goods	x		
Packing requirements	x		
Labelling and marking	x	x	x
Dangerous goods transport document and other relevant documentation	x	x	
Acceptance of the dangerous goods listed in 1;2.3.2	x		
Recognition of undeclared dangerous goods	x	x	x
Storage and loading procedures			x
Provisions for passengers and crew	x	x	x
Emergency procedures	x	x	x

**KEY CATEGORY**

- A — Staff of designated postal operators involved in accepting mail containing dangerous goods
- B — Staff of designated postal operators involved in processing mail (other than dangerous goods)
- C — Staff of designated postal operators involved in the handling, storage and loading of mail

*Note.*— Guidance on the aspects of training to be covered by staff of designated postal operators can be found in S-1;3.

...

UN Model Regulations, Chapter 1.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/11 (see paragraph 3.2.1 of this report)

## Chapter 6

### GENERAL PROVISIONS CONCERNING CLASS 7 RADIOACTIVE MATERIAL

#### 6.1 SCOPE AND APPLICATION

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*, (2009<sup>12</sup> Edition), IAEA Safety Standards Series No. ~~TSR-R-46~~, IAEA, Vienna (2009<sup>12</sup>). Explanatory material can be found in *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* (2005 Edition), IAEA Safety Standard Series No. TS-G-1.1 (Rev. 4<sup>2</sup>), IAEA, Vienna (2008<sup>12</sup>). The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risk.

6.1.2 The objective of these Instructions is to establish requirements that must be satisfied to ensure safety and to protect persons, property and the environment from the effects of radiation in 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 ~~requirements~~ conditions 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.

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 are 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.

6.1.4 These Instructions do not apply to any of the following:

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

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*Note.— The highlighted text below does not appear in the UN Model Regulations.*

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- b) radioactive material in or on a person who is to be transported for medical treatment because the person has been subject to accidental or deliberate intake of or contamination from radioactive material or to contamination and is to be transported for medical treatment, [taking into account the necessary radiological protection measures with respect to other passengers and crew, subject to approval by the operator];

≠ *Note.— Guidance material may be found on [www.icao.int/safety/DangerousGoods/Pages/Guidance-Material.aspx](http://www.icao.int/safety/DangerousGoods/Pages/Guidance-Material.aspx).*

- c) radioactive material in consumer products which have received regulatory approval, following their sale to the end user;
- d) natural material and ores containing naturally occurring radionuclides (which may have been processed) 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 2.7.2.2.1 b) Table 2-12 or calculated in accordance with 2.7.2.2.2 a) and 2.7.2.2.3 to 2.7.2.2.6; For natural materials and ores containing naturally occurring radionuclides that are not in secular equilibrium, the calculation of the activity concentration must be performed in accordance with 2.7.2.2.4;
- e) 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 2.7.1.

### 6.1.5 Specific provisions for the transport of excepted packages

6.1.5.1 Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles and empty packages as specified in 2;7.2.4.1.1 are subject only to the following provisions of Parts 5 to 7:

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UN Model Regulations, Chapter 1.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/11 (see paragraph 3.2.1.1 c) of this report)

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- a) the applicable provisions specified in ~~5;1.1 i), 5;1.2.4~~ **5;1.1 (as applicable)**, 5;1.4, **5;1.2.2.2, 5;1.2.4**, 5;1.6.3, ~~5;1.7, 5;2.2, 5;2.3~~, 5;2.4.2, 5;3.2.12 e), 5;3.3, ~~5;3.4~~, 5;4.4, 7;2.5, ~~7;3.2.2~~ and 7;4.4, ~~4;1.1.13, 7;2.10.3.1, 7;1.6, 7;3.2.1 and 7;3.2.4; and~~
- b) the requirements for excepted packages specified in 6;7.3; ~~and~~  
**except when the radioactive material possesses other hazardous properties and has to be classified in a class other than Class 7 in accordance with Special Provision A130 or A194, where the provisions listed in a) and b) above apply only as relevant and in addition to those relating to the main class or division.**
- ~~c) if the excepted package contains fissile material, one of the fissile exceptions provided by 2;7.2.3.5 must apply and the requirement of 6;7.6.2 must be met.~~

6.1.5.2 Excepted packages must be subject to the relevant provisions of all other parts of these Instructions. **If the excepted package contains fissile material, one of the fissile exceptions provided by 2;7.2.3.5 must apply and the requirements of 7;2.10.4.3 must be met.**

## 6.2 RADIATION PROTECTION PROGRAMME

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.

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UN Model Regulations, Chapter 1.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/11 (see paragraph 3.2.1.1 e) of this report)

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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,~~ **within the restriction that the doses to individuals are subject to dose constraints.** A structured and systematic approach must be adopted and must include consideration of the interfaces between transport and other activities.

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UN Model Regulations, Chapter 1.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/11 (see paragraph 3.2.1 of this report)

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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 6.2.2 and 6.2.4 to 6.2.7, 7;2.9.1.1 and 7;2.9.1.2. Programme documents must be available, on request, for inspection by the relevant competent authority.

- 6.2.4 For occupational exposure arising from transport activities, where it is assessed that the effective dose **either**:
- 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~~ **or**
  - 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", **IAEA** 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.

6.2.7 Personnel must be appropriately trained in the radiation hazards involved and the precautions to be observed in order to ensure restriction of their exposure and that of other persons who might be affected by their actions.

### 6.3 QUALITY ASSURANCE MANAGEMENT SYSTEM

~~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, shipper or user must be prepared to provide facilities for competent authority inspection during manufacture and use and to demonstrate to any cognizant competent authority that:~~

- ~~a) the manufacturing methods and materials used are in accordance with the approved design specifications; and~~
- ~~b) all packagings are periodically inspected and, as necessary, repaired and maintained in good condition so that they continue to comply with all relevant requirements and specifications, even after repeated use.~~

A management system based on international, national or other standards acceptable to the competent authority must be established and implemented for all activities within the scope of the Instructions, as identified in 1:6.1.3, 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, shipper or user must be prepared to:

- a) provide facilities for inspection during manufacture and use; and
- b) demonstrate compliance with these Instructions to the competent authority.

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

### 6.4 SPECIAL ARRANGEMENT

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

6.4.2 ~~Consignments for which conformity with any provision applicable to Class 7 radioactive material is impracticable must not be transported except under special arrangement. Provided the competent authority is satisfied that conformity with the Class 7 radioactive material 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.

### 6.6 NON-COMPLIANCE

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

- a) the shipper, consignee, operator and any organization involved during transport, who may be affected, as appropriate, must be informed of the non-compliance;
- ~~ai) the shipper must be informed of the non-compliance by the operator if the non-compliance is identified during transport; or~~

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

~~b) 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~~

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

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## Part 2

# CLASSIFICATION OF DANGEROUS GOODS

## INTRODUCTORY CHAPTER

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### 2. CLASSES, DIVISIONS, PACKING GROUPS — DEFINITIONS

2.4 For packing purposes, dangerous goods other than those of Classes 1, 2 and 7, Divisions 5.2 and 6.2 and self-reactive substances of Division 4.1 are assigned to three packing groups in accordance with the degree of danger they present:

Packing Group I: Substances presenting high danger

Packing Group II: Substances presenting medium danger

Packing Group III: Substances presenting low danger

The packing group to which a substance is assigned is indicated in the Dangerous Goods List in Part 3, Chapter 2, Table 3-1.

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UN Model Regulations, paragraph 2.0.1.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13.1 of this report)

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Articles are not assigned to packing groups. For packing purposes, any requirement for a specific packaging performance level is set out in the applicable packing instruction.

### 4. PRECEDENCE OF HAZARD CHARACTERISTICS

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UN Model Regulations, paragraph 2.0.3.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13.1 of this report)

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4.2 Apart from radioactive material in excepted packages (where the other hazardous properties take precedence), radioactive material having other hazardous properties must always be classified in Class 7 and the subsidiary risk must also be identified. For radioactive material in excepted packages, except for UN 3507, Uranium hexafluoride, radioactive material, excepted package, Special Provision A130 applies.

4.3 An article which, apart from its other hazards, also meets the criterion for a magnetized material, must be identified in accordance with the provisions of this section and in addition as a magnetized material.

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## Chapter 2

## CLASS 2 — GASES

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UN Model Regulations, paragraph 2.2.1.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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2.1.2 The transport condition of a gas is described according to its physical state as:

- a) compressed gas — a gas which when packaged under pressure for transport is entirely gaseous at  $-50^{\circ}\text{C}$ ; this category includes all gases with a critical temperature less than or equal to  $-50^{\circ}\text{C}$ ;
- b) liquefied gas — a gas which when packaged under pressure for transport is partially liquid at temperatures above  $-50^{\circ}\text{C}$ . A distinction is made between:

*High pressure liquefied gas:* a gas with a critical temperature between  $-50^{\circ}\text{C}$  and  $+65^{\circ}\text{C}$ , and

*Low pressure liquefied gas:* a gas with a critical temperature above  $+65^{\circ}\text{C}$ ;

- c) refrigerated liquefied gas — a gas which when packaged for transport is made partially liquid because of its low temperature; or
- d) dissolved gas — a gas which when packaged under pressure for transport is dissolved in a liquid phase solvent.
- e) adsorbed gas — a gas which when packaged for transport is adsorbed onto a solid porous material resulting in an internal receptacle pressure of less than 101.3 kPa at  $20^{\circ}\text{C}$  and less than 300 kPa at  $50^{\circ}\text{C}$ .

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## Chapter 3

## CLASS 3 — FLAMMABLE LIQUIDS

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## 3.2 ASSIGNMENT OF PACKING GROUPS

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UN Model Regulations, paragraphs 2.3.2.2 and 2.3.2.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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~~3.2.2 Criteria for inclusion in Packing Group III~~

3.2.2 Viscous flammable liquids such as paints, enamels, lacquers, varnishes, adhesives and polishes with having a flash point of less than  $23^{\circ}\text{C}$  may be assigned to Packing Group III in conformity with the procedures prescribed in Part III, subsection 32.3 of the UN *Manual of Tests and Criteria* provided that:

- ab) less than 3 per cent of the clear solvent layer separates in the solvent separation test;
- bc) the mixture or any separated solvent does not meet the criteria for Division 6.1 or Class 8;
- ea) the viscosity expressed as the flowtime in seconds and flash point are in accordance with Table 2-5;
- d) ~~when assigned to Packing Group III, the flammable liquids must not exceed a~~ the net quantity per package ~~of~~ does not exceed 30 L for passenger aircraft or 100 L for cargo aircraft.

3.2.3 Substances classified as flammable liquids due to their being transported or offered for transport at elevated temperatures are included in Packing Group III.

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## Chapter 5

### CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

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#### 5.2 OXIDIZING SUBSTANCES (DIVISION 5.1)

##### 5.2.1 Classification in Division 5.1

5.2.1.1 Oxidizing substances are classified in Division 5.1 in accordance with the test methods, procedures and criteria in 5.2.2, 5.2.3 and the UN *Manual of Tests and Criteria*, Part III, section 34. In the event of divergence between test results and known experience, the appropriate authority of the State of Origin must be consulted to establish the appropriate classification and packing group.

*Note.— Where substances of this division are listed in the Dangerous Goods List in 3;2, reclassification of those substances in accordance with these criteria need only be undertaken when this is necessary for safety.*

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UN Model Regulations, paragraph 2.5.2.2.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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##### 5.2.2 Oxidizing solids

###### 5.2.2.1 Criteria for classification in Division 5.1

5.2.2.1.1 Tests are performed to measure the potential for a solid substance to increase the burning rate or burning intensity of a combustible substance when the two are thoroughly mixed. The procedure is given in the UN *Manual of Tests and Criteria*, Part III, subsection 34.4.1 (test O.1) or alternatively, in subsection 34.4.3 (test O.3). Tests are conducted on the substance to be evaluated mixed with dry fibrous cellulose in mixing ratios of 1:1 and 4:1, by mass, of sample to cellulose. The burning characteristics of the mixtures are compared:

- a) in the test O.1, with the standard 3:7 mixture, by mass, of potassium bromate to cellulose. If the burning time is equal to or less than this standard mixture, the burning times should be compared with those from the Packing Group I or II reference standards, 3:2 and 2:3 ratios, by mass, of potassium bromate to cellulose, respectively; or
- b) in the test O.3, with the standard 1:2 mixture, by mass, of calcium peroxide to cellulose. If the burning rate is equal to or greater than this standard mixture, the burning rates must be compared with those from the Packing Group I or II reference standards 3:1 and 1:1 ratios, by mass, of calcium peroxide to cellulose, respectively.

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UN Model Regulations, paragraph 2.5.2.2.1.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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5.2.2.1.2 The classification test results are assessed on the basis of:

- a) the comparison of the mean burning time (for the test O.1) or burning rate (for the test O.3) with those of the reference mixtures; and
- b) whether the mixture of substance and cellulose ignites and burns.

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UN Model Regulations, paragraph 2.5.2.2.1.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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5.2.2.1.3 A solid substance is classified in Division 5.1 if the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits:

- a) in the test O.1, a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose; or
- b) in the test O.3, a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose.



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UN Model Regulations, paragraph 2.5.2.2.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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#### 5.2.2.2 Assignment of packing groups

Solid oxidizing substances are assigned to a packing group according to the test procedure in the UN *Manual of Tests and Criteria*, Part III, section 34.4.1 [\(Test O.1\)](#) or [alternatively, in subsection 34.4.3 \(Test O.3\)](#), in accordance with the following criteria:

a) [Test O.1](#):

- [i\)](#) Packing Group I: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture, by mass, of potassium bromate and cellulose;
- [bii\)](#) Packing Group II: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for Packing Group I are not met;
- [ciii\)](#) Packing Group III: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for Packing Groups I and II are not met;
- [d iv\)](#) Not Division 5.1: any substance which, in both the 4:1 and 1:1 sample-to-cellulose ratio (by mass) tested, does not ignite and burn, or exhibits mean burning times greater than that of a 3:7 mixture (by mass) of potassium bromate and cellulose.

b) [Test O.3](#):

- [i\)](#) Packing Group I: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate greater than the mean burning rate of a 3:1 mixture (by mass) of calcium peroxide and cellulose;
- [\(ii\)](#) Packing Group II: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:1 mixture (by mass) of calcium peroxide and cellulose, and the criteria for Packing Group I are not met;
- [\(iii\)](#) Packing Group III: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose, and the criteria for Packing Groups I and II are not met;
- [\(iv\)](#) Not Division 5.1: any substance which, in both the 4:1 and 1:1 sample-to-cellulose ratio (by mass) tested, does not ignite and burn, or exhibits a mean burning rate less than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose.

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DGP-WG/13-WP/12 (see paragraph 3.2.13.1 a)

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### 5.2.3 Oxidizing liquids

#### 5.2.3.1 Criteria for classification in Division 5.1

5.2.3.1.1 A test is performed to determine the potential for a liquid substance to increase the burning rate or burning intensity of a combustible substance or for spontaneous ignition to occur when the two are thoroughly mixed. The procedure is given in the UN *Manual of Tests and Criteria*, Part III, subsection 34.4.2 [\(Test O.2\)](#). It measures the pressure rise time during combustion. Whether a liquid is an oxidizing substance of Division 5.1 and, if so, whether Packing Group I, II or III must be assigned, is decided on the basis of the test result (see also precedence of hazards characteristics).

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## Chapter 6

### CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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#### 6.3 DIVISION 6.2 — INFECTIOUS SUBSTANCES

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##### 6.3.2 Classification of infectious substances

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###### 6.3.2.3 Exceptions

6.3.2.3.1 Substances which do not contain infectious substances or substances which are unlikely to cause disease in humans or animals are not subject to these Instructions unless they meet the criteria for inclusion in another class.

6.3.2.3.2 Substances containing micro-organisms which are non-pathogenic to humans or animals are not subject to these Instructions unless they meet the criteria for inclusion in another class.

6.3.2.3.3 Substances in a form that any present pathogens have been neutralized or inactivated such that they no longer pose a health risk are not subject to these Instructions unless they meet the criteria for inclusion in another class.

6.3.2.3.4 Environmental samples (including food and water samples) which are not considered to pose a significant risk of infection are not subject to these Instructions unless they meet the criteria for inclusion in another class.

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UN Model Regulations, paragraphs 2.6.3.2.3.5, 2.6.3.2.3.6 and 2.6.3.2.3.7, ST/SG/AC.10/40/Add.1

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6.3.2.3.5 Dried blood spots, collected by applying a drop of blood onto absorbent material, ~~or~~ are not subject to these Instructions.

~~6.3.2.3.6 Faecal occult blood screening tests and~~ samples are not are not subject to these Instructions.

~~6.3.2.3.7 Blood or blood components that have been collected for the purposes of transfusion or for the preparation of blood products to be used for transfusion or transplantation and any tissues or organs intended for use in transplantation~~ as well as samples drawn in connection with such purposes are not subject to these Instructions.

6.3.2.3.68 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:

- a) The packaging must consist of three components:
  - i) a leakproof primary receptacle(s);
  - ii) a leakproof secondary packaging; and
  - iii) an outer packaging of adequate strength for its capacity, mass and intended use, and with at least one surface having minimum dimensions of 100 mm × 100 mm;
- b) For liquids, absorbent material in sufficient quantity to absorb the entire contents must be placed between the primary receptacle(s) and the secondary packaging so that, during transport, any release or leak of a liquid substance will not reach the outer packaging and will not compromise the integrity of the cushioning material;
- 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.).*

6.3.2.3.79 Except for:

- a) medical waste (UN 3291);
- b) medical devices or equipment contaminated with or containing infectious substances in Category A (UN 2814 or UN 2900); and
- c) medical devices or equipment contaminated with or containing other dangerous goods that meet the definition of another hazard class,

medical devices or equipment potentially contaminated with or containing infectious substances which are being transported for disinfection, cleaning, sterilization, repair, or equipment evaluation are not subject to the provisions of these Instructions if packed in packagings designed and constructed in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents. Packagings must be designed to meet the construction requirements listed in 6;3.

6.3.2.3.79.1 These packagings must meet the general packing requirements of 4;1.1.1, 4;1.1.3.1 and 4;1.1.4 (with the exception of 4;1.1.4.1). If the outer packaging is not liquid tight and the medical devices or equipment are contaminated with or contain liquid infectious substances, a means of containing the liquid in the event of leakage must be provided in the form of a leakproof liner, plastic bag or other equally effective means of containment. These packagings must be capable of retaining the medical devices and equipment when dropped from a height of 1.2 m.

6.3.2.3.79.2 Packages must be marked "Used medical device" or "Used medical equipment". When an overpack is used, it must be marked with the words "Used medical device" or "Used medical equipment" unless the markings are visible.

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## 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, IR 4, JP 26, KG 1; see Table A-1*

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

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#### 7.1.3 Definitions of specific terms

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UN Model Regulations, paragraph 2.7.1.3, ST/SG/AC.10/40/Add.1

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*Fissile nuclides.* Uranium-233, uranium-235, plutonium-239 and plutonium-241. Fissile material is a material containing any of the fissile nuclides. Excluded from the definition of fissile material are the following:

- a) natural uranium or depleted uranium which is unirradiated; ~~and~~
- b) natural uranium or depleted uranium which has been irradiated in thermal reactors only; ~~;~~
- c) material with fissile nuclides less than a total of 0.25 g;
- d) any combination of a), b) and/or c).

These exclusions are only valid if there is no other material with fissile nuclides in the package or in the consignment if shipped unpackaged.

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UN Model Regulations, paragraph 1.2.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13.1 c) of this report)

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*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. In addition, a small freight container is that which has either an overall outer dimension less than 1.5 m, or an internal volume of not more than 3 m<sup>3</sup>. A large freight container is that which has an internal volume of more than 3 m<sup>3</sup>. ~~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.

In addition: Small freight container means a freight container that has an internal volume of not more than 3 m<sup>3</sup>. Large freight container means a freight container that has an internal volume of more than 3 m<sup>3</sup>.

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

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## 7.2 CLASSIFICATION

### 7.2.1 General provisions

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UN Model Regulations, paragraph 2.7.2.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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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 in accordance with 7.2.4.2 to 7.2.4.5, taking into account the material characteristics determined in 7.2.3.

UN Model Regulations, Table 2.7.2.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

Table 2-11. Assignment of UN numbers

UN number	<u>Proper shipping name and description<sup>a</sup></u>
<i>Excepted packages (1.6.1.5)</i>	
UN 2908	<b>Radioactive material, excepted package — empty packaging</b>
UN 2909	<b>Radioactive material, excepted package — articles manufactured from natural uranium or depleted uranium or natural thorium</b>
UN 2910	<b>Radioactive material, excepted package — limited quantity of material</b>
UN 2911	<b>Radioactive material, excepted package — instruments or articles</b>
<u>UN 3507</u>	<u>Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted<sup>b,c</sup></u>
<i>Low specific activity radioactive material (7.2.3.1)</i>	
UN 2912	<b>Radioactive material, low specific activity (LSA-I), non-fissile or fissile excepted<sup>b</sup></b>
UN 3321	<b>Radioactive material, low specific activity (LSA-II), non-fissile or fissile excepted<sup>b</sup></b>
UN 3322	<b>Radioactive material, low specific activity (LSA-III), non-fissile or fissile excepted<sup>b</sup></b>
UN 3324	<b>Radioactive material, low specific activity (LSA-II) fissile</b>
UN 3325	<b>Radioactive material, low specific activity (LSA-III) fissile</b>
<i>Surface contaminated objects (7.2.3.2)</i>	
UN 2913	<b>Radioactive material, surface contaminated objects (SCO-I or SCO-II), non-fissile or fissile excepted<sup>b</sup></b>
UN 3326	<b>Radioactive material, surface contaminated objects (SCO-I or SCO-II), fissile</b>
<i>Type A packages (7.2.4.4)</i>	
UN 2915	<b>Radioactive material, Type A package, non-special form, non-fissile or fissile excepted<sup>b</sup></b>
UN 3327	<b>Radioactive material, Type A package, fissile, non-special form</b>
UN 3332	<b>Radioactive material, Type A package, special form, non-fissile or fissile excepted<sup>b</sup></b>
UN 3333	<b>Radioactive material, Type A package, special form, fissile</b>
<i>Type B(U) package (7.2.4.6)</i>	
UN 2916	<b>Radioactive material, Type B(U) package, non-fissile or fissile excepted<sup>b</sup></b>
UN 3328	<b>Radioactive material, Type B(U) package, fissile</b>
<i>Type B(M) package (7.2.4.6)</i>	
UN 2917	<b>Radioactive material, Type B(M) package, non-fissile or fissile excepted<sup>b</sup></b>
UN 3329	<b>Radioactive material, Type B(M) package, fissile</b>
<i>Type C package (7.2.4.6)</i>	
UN 3323	<b>Radioactive material, Type C package, non-fissile or fissile excepted<sup>b</sup></b>
UN 3330	<b>Radioactive material, Type C package, fissile</b>
<i>Special arrangement (7.2.5)</i>	
UN 2919	<b>Radioactive material, transported under special arrangement, non-fissile or fissile excepted<sup>b</sup></b>
UN 3331	<b>Radioactive material, transported under special arrangement, fissile</b>

UN number	<u>Proper shipping name and description<sup>a</sup></u>
Uranium hexafluoride (7.2.4.5)	
UN 2977	<b>Radioactive material, uranium hexafluoride, fissile</b>
UN 2978	<b>Radioactive material, uranium hexafluoride, non-fissile or fissile excepted<sup>b</sup></b>
<u>UN 3507</u>	<u><b>Uranium hexafluoride, radioactive material, excepted package less than 0.1 kg per package, non-fissile or fissile-excepted<sup>b,c</sup></b></u>
<p><u>a The proper shipping name is found in the column "proper shipping name and description" and is restricted to that part shown in bold letters. In the cases of UN Nos. 2909, 2911, 2913 and 3326, where alternative proper shipping names are separated by the word "or", only the relevant proper shipping name must be used</u></p> <p><u>b The term "fissile-excepted" refers only to material excepted under 7.2.3.5.</u></p> <p><u>c For UN No. 3507, see also Special Provision A194.</u></p>	

### 7.2.2 Determination of activity level

UN Model Regulations, paragraph 2.7.2.2.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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

- a)  $A_1$  and  $A_2$  in TBq;
- b) activity concentration limits for exempt material in Bq/g; and
- c) activity limits for exempt consignments in Bq.

UN Model Regulations, paragraph 2.7.2.2.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

7.2.2.2 For individual radionuclides-:

- a) which are not listed in Table 2-12, determination of the basic radionuclide values referred to in 7.2.2.1 requires multilateral approval. For these radionuclides, activity concentration limits for exempt material and activity limits for exempt consignments must be calculated in accordance with the principles established in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No.115, IAEA, Vienna (1996). It is permissible to use the  $A_2$  value calculated using a dose coefficient for the appropriate lung absorption type as recommended by the International Commission on Radiological Protection, if the chemical forms of each radionuclide under both normal and accident conditions of transport are taken into consideration. Alternatively, the radionuclide values in Table 2-13 may be used without obtaining competent authority approval.
- b) in instruments or articles in which the radioactive material is enclosed or is included as a component part of the instrument or other manufactured article and which meet 7.2.4.1.1.3 c), alternative basic radionuclide values to those in Table 2-12 for the activity limit for an exempt consignment are permitted and require multilateral approval. Such alternative activity limits for an exempt consignment must be calculated in accordance with the principles set out in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No.115, IAEA, Vienna (1996).

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

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UN Model Regulations, paragraph 2.7.2.2.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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

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

where,

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

X(i) is the appropriate value of A<sub>1</sub> or A<sub>2</sub> or the activity concentration limit for exempt material or the activity limit for an exempt consignment as appropriate for the radionuclide i; and

X<sub>m</sub> is the derived value of A<sub>1</sub> or A<sub>2</sub> or the activity concentration limit for exempt material or the activity limit for an exempt consignment in the case of a mixture.

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 7.2.2.4 and 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.

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

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UN Model Regulations, Table 2.7.2.2.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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**Table 2-12. Basic radionuclides values for individual radionuclides**

Radionuclide (atomic number)	Special form A <sub>1</sub> (TBq)	Other form A <sub>2</sub> (TBq)	Activity concentration <u>limit</u> for exempt material (Bq/g)	Activity limit for an exempt consignment (Bq)
Actinium (89)				
...				
Zr-97 (a)	4 × 10 <sup>-1</sup>	4 × 10 <sup>-1</sup>	1 × 10 <sup>1</sup> (b)	1 × 10 <sup>5</sup> (b)
(a) A <sub>1</sub> and/or A <sub>2</sub> values for these parent radionuclides include contributions from daughter radionuclides <u>from their progeny</u> with half-lives less than 10 days, as listed in the following:				
...				

UN Model Regulations, Table 2.7.2.2.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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

<i>Radioactive contents</i>	$A_1$ (Tbq)	$A_2$ (Tbq)	<i>Activity concentration limit 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	$1 \times 10^1$	$1 \times 10^4$
Alpha-emitting nuclides but no neutron emitters are known to be present	0.2	$9 \times 10^{-5}$	$1 \times 10^{-1}$	$1 \times 10^3$
Neutron-emitting nuclides are known to be present or no relevant data are available	0.001	$9 \times 10^{-5}$	$1 \times 10^{-1}$	$1 \times 10^3$

### 7.2.3 Determination of other material characteristics

#### 7.2.3.1 Low specific activity (LSA) material

##### 7.2.3.1.1 (Reserved)

UN Model Regulations, paragraph 2.7.3.1.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

#### 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, that are unirradiated and in solid or liquid form;
- iii) radioactive material for which the  $A_2$  value is unlimited, ~~excluding fissile material~~ **may be included only if not** excepted under 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 7.2.2.1 to 7.2.2.6, ~~excluding fissile material not~~ **may be included only if** excepted under 7.2.3.5.

##### b) LSA-II

- i) water with tritium concentration up to 0.8 TBq/L; ~~or~~
- ii) other material in which the activity is distributed throughout and the estimated average specific activity does not exceed  $10^{-4}$   $A_2/g$  for solids and gases, and  $10^{-5}$   $A_2/g$  for liquids.

##### c) LSA-III — solids (e.g. consolidated wastes, activated materials), excluding powders **that** meeting the requirements of 7.2.3.1.3, 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, **and** 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<sub>2</sub>/g.

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 7.2.3.1.4, the activity in the water would not exceed 0.1 A<sub>2</sub>.

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.

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

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UN Model Regulations, paragraph 2.7.2.3.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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### 7.2.3.2 *Surface contaminated object (SCO)*

7.2.3.2.1 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<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 4 Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters, or 0.4 Bq/cm<sup>2</sup> for all other alpha emitters; ~~and~~
- ii) the fixed contamination on the accessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed  $4 \times 10^4$  Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters, or  $4 \times 10^3$  Bq/cm<sup>2</sup> for all other alpha emitters; ~~and~~
- iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed  $4 \times 10^4$  Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters, or  $4 \times 10^3$  Bq/cm<sup>2</sup> 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<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed 400 Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters, or 40 Bq/cm<sup>2</sup> for all other alpha emitters; ~~and~~
- ii) the fixed contamination on the accessible surface, averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed  $8 \times 10^5$  Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters, or  $8 \times 10^4$  Bq/cm<sup>2</sup> for all other alpha emitters; ~~and~~
- iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm<sup>2</sup> (or the area of the surface if less than 300 cm<sup>2</sup>) does not exceed  $8 \times 10^5$  Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters, or  $8 \times 10^4$  Bq/cm<sup>2</sup> for all other alpha emitters.

### 7.2.3.3 *Special form radioactive material*

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.

7.2.3.3.2 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 7.2.3.3.4 to 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 7.2.3.3.5 a), b), c) or 7.2.3.3.6 a), as applicable;
- b) it would not melt or disperse in the applicable heat test specified in 7.2.3.3.5 d) or 7.2.3.3.6 b), as applicable; and
- c) the activity in the water from the leaching tests specified in 7.2.3.3.7 and 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.

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

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 7.2.3.3.5 or alternative tests as authorized in 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 7.2.3.3.7 for indispersible solid material or 7.2.3.3.8 for encapsulated material.

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  $(3.0 \pm 0.3)$  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  $(3.0 \pm 0.3)$  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.

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UN Model Regulations, paragraph 2.7.2.3.3.6, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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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 7.2.3.3.5 a) and b) provided ~~the mass of the special form radioactive material is~~ that the specimens are alternatively subjected to the impact test prescribed in ISO 2919:2012: "Radiation Protection — Sealed Radioactive Sources — General requirements and classification":
  - i) ~~less than 200 g and the specimens are alternatively subjected to the Class 4 impact test prescribed in ISO 2919:1999 "Radiation protection — Sealed radioactive sources — General requirements and classification"~~ if the mass of the special form radioactive material is less than 200 g; or
  - ii) ~~less than 500 g and the specimens are alternatively subjected to the Class 5 impact test prescribed in ISO 2919:1999 "Radiation protection — Sealed radioactive sources — General requirements and classification"~~ if the mass of the special form radioactive material is more than 200 g but less than 500 g; and
- b) the test prescribed in 7.2.3.3.5 d) provided the specimens are alternatively subjected to the Class 6 temperature test specified in ~~ISO 2919:1999~~ ISO 2919:2012 "Radiation protection — Sealed radioactive sources — General requirements and classification".

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.

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UN Model Regulations, paragraph 2.7.2.3.3.8, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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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  $20^{\circ}\text{C}$ ;
  - 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  $30^{\circ}\text{C}$  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~~ provided that they are acceptable to the competent authority.

#### 7.2.3.4 *Low dispersible radioactive material*

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, taking into account the provisions of 6;7.7.14, 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  $100\ \mu\text{m}$  aerodynamic equivalent diameter would not exceed  $100\ \text{A}_2$ . A separate specimen may be used for each test; and
- c) If subjected to the test specified in 7.2.3.1.4, the activity in the water would not exceed  $100\ \text{A}_2$ . In the application of this test, the damaging effects of the tests specified in b) above must be taken into account.

#### 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 7.2.3.1.4. After each test, it must be determined if the applicable requirements of 7.2.3.4.1 have been met.

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

UN Model Regulations, paragraph 2.7.2.3.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

7.2.3.5 *Fissile material*

7.2.3.5.1 Fissile material and P packages containing fissile material must be classified under the relevant entry as Fissile in accordance with of Table 2-11, the description of which includes the words “FISSILE” or “fissile excepted”. Classification as “fissile excepted” is allowed only if one of the conditions a) to d) of this paragraph is met. Only one type of exception is allowed per consignment (see also 6.7.6.2) unless excepted by one of the provisions of sub-paragraphs a) to f) below and transported subject to the requirements of 7.2.10.4.3. All provisions apply only to material in packages that meets the requirements of 6.7.6.2 unless unpackaged material is specifically allowed in the provision.

a) A mass limit per consignment, provided that the smallest external dimension of each package is not less than 10 cm, 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 2-14, provided that either:

- i) each individual package contains not more than 15 g of fissile nuclides; 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 nuclides in any 10 L volume of material.

Beryllium must not be present in quantities exceeding 1 per cent of the applicable consignment mass limits provided in Table 2-14, except where the concentration of beryllium in the material does not exceed 1 gram beryllium in any 1 000 grams.

Deuterium must also not be present in quantities exceeding 1 per cent of the applicable consignment mass limits provided in Table 2-14, except where deuterium occurs up to natural concentration in hydrogen.

**Table 2-14. 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

ba) 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 nuclides are 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;

eb) 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) Plutonium containing not more than 20 per cent of fissile nuclides by mass up to a maximum of 1 kg of plutonium per consignment. Shipments under this exception must be under exclusive use.

c) Uranium with a maximum uranium enrichment of 5 per cent by mass uranium-235 provided:

i) there is no more than 3.5 g of uranium-235 per package;

ii) the total plutonium and uranium-233 content does not exceed 1 per cent of the mass of uranium-235 per package;

- iii) transport of the package is subject to the consignment limit provided in 7:2.10.4.3 c);
- d) Fissile nuclides with a total mass not greater than 2 g per package provided the package is transported subject to the consignment limit provided in 7:2.10.4.3 d);
- e) Fissile nuclides with a total mass not greater than 45 g either packaged or unpackaged subject to limits provided in 7:2.10.4.3 e);
- f) A fissile material that meets the requirements of 7:2.10.4.3 b), 7.2.3.6 and 5:1.2.2.1.

UN Model Regulations, paragraph 2.7.2.3.6, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

7.2.3.6 A fissile material excepted from classification as Fissile under 7.2.3.5.1 f) must be subcritical without the need for accumulation control under the following conditions:

- a) the conditions of 6:7.10.1 a);
- b) the conditions consistent with the assessment provisions stated in 6:7.10.12 b) and 6:7.10.13 b) for packages; and
- c) the conditions specified in 6:7.10.11 a).

#### 7.2.4 Classification of packages

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.

##### 7.2.4.1.1 Classification as excepted packages

UN Model Regulations, paragraph 2.7.2.4.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

7.2.4.1.1.1 A P<sub>2</sub> packages may be classified as excepted packages if it meets one of the following conditions:

- a) ~~they are~~ it is an empty packagings having contained radioactive material;
- b) ~~they~~ it contains instruments or articles in limited quantities as not exceeding the activity limits specified in columns 2 and 3 of Table 2-14;
- c) ~~they~~ it contains articles manufactured of natural uranium, depleted uranium or natural thorium; or
- d) ~~they~~ it contains radioactive material in limited quantities as not exceeding the activity limits specified in column 4 of Table 2-14;
- e) it contains less than 0.1 kg of uranium hexafluoride not exceeding the activity limits specified in column 4 of Table 2-14.

7.2.4.1.1.2 A package containing radioactive material may be classified as an excepted package provided that the radiation level at any point on its external surface does not exceed 5 µSv/h.

UN Model Regulations, paragraph 2.7.2.4.1.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

7.2.4.1.1.3 Radioactive material which is enclosed in or is included as a component part of an instrument or other manufactured article may be classified under UN 2911 — **Radioactive material, excepted package — instruments or articles** only if 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~~ on its external surface except for the following:
  - i) radioluminescent time-pieces or devices;
  - ii) consumer products that either have received regulatory approval ~~according to~~ in accordance with 1:6.1.4 b) or do not individually exceed the activity limit for an exempt consignment in Table 2-12 (column 5), provided such

products are transported in a package that bears the marking "RADIOACTIVE" on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; and

iii) other instruments or articles too small to bear the marking "RADIOACTIVE", provided that they are transported in a package that bears the marking "RADIOACTIVE" on its internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package;

- 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
- d) the limits specified in columns 2 and 3 of Table ~~2-15~~ 2-14 are met for each individual item and each package, respectively.

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UN Model Regulations, paragraph 2.7.2.4.1.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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7.2.4.1.1.4 Radioactive material in forms other than as specified in 7.2.4.1.1.3 and with an activity not exceeding the limits specified in column 4 of Table ~~2-15~~ 2-14 may be 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 either:
  - i) an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package; or
  - ii) the outside of the package, where it is impractical to mark an internal surface.

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UN Model Regulations, new paragraph 2.7.2.4.1.5, ST/SG/AC.10/40/Add.1

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7.2.4.1.1.5 Uranium hexafluoride not exceeding the limits specified in column 4 of Table 2-14 may be classified under UN 3507 Radioactive material, excepted package — uranium hexafluoride, less than 0.1 kg per package, non-fissile or fissile-excepted provided that:

- a) the mass of uranium hexafluoride in the package is less than 0.1 kg; and
- b) the conditions of 7.2.4.5.1 and 7.2.4.1.1.4 a) and b) are met.

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UN Model Regulations, paragraph 2.7.2.4.1.7, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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Move the following paragraph accordingly.

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~~7.2.4.1.1.5.7~~ An empty packaging which had previously contained radioactive material may be classified under UN 2908 — **Radioactive material, excepted package — empty packaging** ~~only if~~ 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, when averaged over any 300 cm<sup>2</sup>, does not exceed:
  - (i) 400 Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters; and
  - (ii) 40 Bq/cm<sup>2</sup> 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.

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DGP-WG/13-WP/58 (see paragraph 3.2.16 of this report)

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Note.— The external radiation level at the surface of empty Type B(U) or Type B(M) packages may exceed 5 μSv/h due to the presence of depleted uranium in the shielding material. Such empty packages cannot be transported as UN 2908 — Radioactive material, excepted package — empty packaging as they do not meet the conditions specified in 7.2.4.1.1.2. These packages remain subject to all applicable parts of these Instructions and may be classified either as low specific

*material (LSA-I) due to the presence of depleted uranium as specified in 7.2.3.1.2 a) ii) or as Type B(U) or Type B(M) package as specified in 7.2.4.6.2 or 7.2.4.6.3.*

UN Model Regulations, paragraph 2.7.2.4.1.6, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

7.2.4.1.1.6 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** only if provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

**Table 2-152-14. Activity limits for excepted packages**

Physical state of contents	Instruments or article		Materials
	Item limits*	Package limits*	Package limits*
<b>Solids</b>			
Special form	$10^{-2} A_1$	$A_1$	$10^{-3} A_1$
Other form	$10^{-2} A_2$	$A_2$	$10^{-3} A_2$
<b>Liquids</b>	$10^{-3} A_2$	$10^{-1} A_2$	$10^{-4} A_2$
<b>Gases</b>			
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 7.2.2.4 to 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 definition of LSA in 7.1.3 and the conditions of 7.2.3.1, 4;9.2.1 and 7;2.9.2 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 definition of SCO in 7.1.3 and the conditions of 7.2.3.2, 4;9.2.1 and 7;2.9.2 are met.

#### 7.2.4.4 Classification of Type A packages

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

UN Model Regulations, new paragraph 2.7.2.4.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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

- for special form radioactive material —  $A_1$ ;
- for all other radioactive material —  $A_2$ .

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

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

where

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

A<sub>1</sub>(i) is the A<sub>1</sub> value for radionuclide i;

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

A<sub>2</sub>(j) is the A<sub>2</sub> value for radionuclide j.

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UN Model Regulations, new paragraph 2.7.2.4.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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#### 7.2.4.5 Classification of uranium hexafluoride

7.2.4.5.1 Uranium hexafluoride must only be assigned to:

a) UN 2977 — Radioactive material, uranium hexafluoride, fissile; or

b) UN 2978 — Radioactive material, uranium hexafluoride, non-fissile or fissile excepted; or

c) UN 3507 — Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted

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UN Model Regulations, new paragraph 2.7.2.4.5.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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7.2.4.5.2 The contents of a P package containing uranium hexafluoride must not contain comply with the following requirements:

a) for UN Nos. 2977 and 2978, the mass of uranium hexafluoride must not be different from that authorized allowed for the package design, and for UN 3507, the mass of uranium hexafluoride must be less than 0.1 kg;

b) a the mass of uranium hexafluoride must not be 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) the uranium hexafluoride other than must be in solid form or at an and the internal pressure must not be above atmospheric pressure when presented for transport.

#### 7.2.4.6 Classification as Type B(U), Type B(M) or Type C packages

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UN Model Regulations, 2.7.2.4.6.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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7.2.4.6.1 Packages not otherwise classified in 7.2.4 (7.2.4.1.1 to 7.2.4.5) must be classified in accordance with the competent authority certificate of approval certificate for the package issued by the country of origin of design.



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UN Model Regulations, 2.7.2.4.6.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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7.2.4.6.2 ~~A package may only be classified as a~~ **The contents of a** Type B(U), **Type B(M) or 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 a physical or chemical state different from those authorized for the package design;~~
- must be** as specified in their certificates **the certificate** of approval.

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UN Model Regulations, paragraphs 2.7.2.4.6.3 and 2.7.2.4.6.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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7.2.4.6.3 ~~(Deleted)~~ ~~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.~~

7.2.4.6.4 ~~(Deleted)~~ ~~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.

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## Chapter 8

### CLASS 8 — CORROSIVE SUBSTANCES

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**Table 2-162-15.** Summary of criteria for assigning packing groups to corrosive substances

<i>Packing group</i>	<i>Exposure time</i>	<i>Observation period</i>	<i>Effect</i>
I	≤ 3 min	≤ 60 min	Full thickness destruction of intact skin
II	> 3 min ≤ 1 h	≤ 14 d	Full thickness destruction of intact skin
III	> 1 h ≤ 4 h	≤ 14 d	Full thickness destruction of intact skin
III	—	—	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55°C when tested on both materials

## Chapter 9

### CLASS 9 — MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES, INCLUDING ENVIRONMENTALLY HAZARDOUS SUBSTANCES

*Parts of this Chapter are affected by State Variations DE 5, NL 4; see Table A-1*

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#### 9.2 ASSIGNMENT TO CLASS 9

9.2.1 Class 9 includes, inter alia:

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Some examples of articles in Class 9 are:

- Engines, internal combustion;
- Life-saving appliances, self-inflating;
- Battery-powered equipment or vehicle.

Some examples of substances in Class 9 are:

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DGP-WG/13-WP/12 (see paragraph 3.2.13.1 d) of this report)

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- ~~Blue, brown or white asbestos;~~ Asbestos, amphibole (amosite, tremolite, actinolite, anthophyllite, crocidolite)
- Asbestos, chrysotile
- Carbon dioxide, solid (dry ice);
- Zinc dithionite.

#### 9.3 LITHIUM BATTERIES

9.3.1 Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form must be assigned to UN Nos. 3090, 3091, 3480 or 3481 as appropriate. They may be transported under these entries if they meet the following provisions:

- a) each cell or battery is of the type proved to meet the requirements of each test of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3;

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UN Model Regulations, paragraph 2.9.4, ST/SG/AC.10/40/Add.1

DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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Cells and batteries manufactured according to a type meeting the requirements of subsection 38.3 of the UN Manual of Tests and Criteria, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in these Instructions.

Cell and battery types only meeting the requirements of the Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before 1 July 2003 may continue to be transported if all other applicable requirements are fulfilled.

*Note 1.— Batteries must be of a ~~design~~ type proved to meet the testing requirements of the UN Manual of Tests and Criteria, Part III, subsection 38.3, irrespective of whether the cells of which they are composed are of a tested design type.*

~~*Note 2.— Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.*~~

...

Part 3

**DANGEROUS GOODS LIST,  
SPECIAL PROVISIONS AND  
LIMITED AND EXCEPTED QUANTITIES**

...

Chapter 2

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

...

Table 3-1. Dangerous Goods List

UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1 DGP WG/13-WP/13 (see paragraph 3.2.17 of this report) Change to heading above columns 10 and 11: DGP-WG/13-WP/35 (see paragraph 3.2.22 of this report)											
Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger <i>and cargo</i> aircraft		Cargo aircraft <i>only</i>	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13
Ammonium nitrate with more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance	0222	1.1D						FORBI	DDEN	FORBI	DDEN
Seat-belt pretensioners† <u>Safety devices, pyrotechnic†</u>	0503	1.4G			A32 A56		E0	FORBI	DDEN	135	75 kg
Air bag modules†	0503	1.4G			A32 A56		E0	FORBI	DDEN	135	75 kg
Air bag inflators†	0503	1.4G			A32 A56		E0	FORBI	DDEN	135	75 kg
Trifluorochloroethylene, stabilized	1082	2.3	2.1	AU 1 CA 7 IR 3 NL 1 US 3	A2			FORBI	DDEN	FORBI	DDEN

Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger <i>and</i> cargo aircraft		Cargo aircraft <i>only</i>	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13

DGP-WG/13-WP/13 (see paragraph 3.2.17.1 b) of this report)

<b>Refrigerant gas R 1113</b>	1082	2.3	2.1	AU 1 CA 7 IR 3 NL 1 US 3	A2			FORBI	DDEN	FORBI	DDEN
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UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1  
DGP WG/13 WP/13 (see paragraph 3.2.17 of this report)

<b>Printing ink, flammable</b>	1210	3			A3 A72 A192	I II III	E3 E2 E1	351 353 Y341 355 Y344	1 L 5 L 1 L 60 L 10 L	361 364 366	30 L 60 L 220 L
<b>Printing ink related material</b> (including printing ink thinning or reducing compound), flammable	1210	3			A3 A72 A192	I II III	E3 E2 E1	351 353 Y341 355 Y344	1 L 5 L 1 L 60 L 10 L	361 364 366	30 L 60 L 220 L
<b>Paint</b> (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)	1263	3			A3 A72 A192	I II III	E3 E2 E1	351 353 Y341 355 Y344	1 L 5 L 1 L 60 L 10 L	361 364 366	30 L 60 L 220 L
<b>Paint related material</b> (including paint thinning or reducing compound)	1263	3			A3 A72 A192	I II III	E3 E2 E1	351 353 Y341 355 Y344	1 L 5 L 1 L 60 L 10 L	361 364 366	30 L 60 L 220 L
<b>Tear gas candles</b>	1700	6.1	4.1	AU 1 CA 7 IR 3 NL 1 US 3	A1	⚡	E0	FORBI	DDEN	679	50 kg
<b>Ammunition, toxic, non-explosive</b> without burster or expelling charge, non-fuzed	2016	6.1		AU 1 CA 7 IR 3 NL 1 US 3	A1	⚡	E0	FORBI	DDEN	679	75 kg
<b>Ammunition, tear-producing, non-explosive</b> without burster or expelling charge, non-fuzed	2017	6.1		AU 1 CA 7 IR 3 NL 1 US 3	A1	⚡	E0	FORBI	DDEN	679	50 kg

Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger <i>and</i> cargo aircraft		Cargo aircraft <i>only</i>	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13
<b>Blue asbestos</b> (crocidolite), <b>amphibole*</b> (amosite, tremolite, actinolite, anthophyllite, crocidolite) †	2212	9			A61			FORBI	DDEN	FORBI	DDEN
<b>Brown asbestos</b> (amosite, myosrite) †	2212	9			A61			FORBI	DDEN	FORBI	DDEN
<b>White asbestos</b> , (chrysotile, actinolite, anthophyllite, tremolite) †	2590	9		US 4	A61	III	E1	958	200 kg	958	200 kg
<b>Radioactive material, excepted package — limited quantity of material</b>	2910	7			A23 A130 A193			See	Part	1;6	
<b>Paint</b> (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)	3066	8			A3 A72 A192	II III	E2 E1	851 Y840 852 Y841	1 L 0.5 L 5 L 1 L	855 856	30 L 60 L
<b>Paint related material</b> (including paint thinning or reducing compound)	3066	8			A3 A72 A192	II III	E2 E1	851 Y840 852 Y841	1 L 0.5 L 5 L 1 L	855 856	30 L 60 L

DGP-WG/13-WP/20

See also paragraph 3.2.20 of this report

<b>Life-saving appliances, not self-inflating</b> containing dangerous goods as equipment	3072	8		Miscellaneous				E0	See 955	No limit	See 955
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UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1

DGP WG/13 WP/13 (see paragraph 3.2.17 of this report)

<b>Environmentally hazardous substance, solid, n.o.s.*</b>	3077	9		CA 13 DE 5 US 4	A97 A158 A179 A197	III	E1	956 Y956	400 kg 30 kg G	956	400 kg
<b>Environmentally hazardous substance, liquid, n.o.s.*</b>	3082	9		CA 13 DE 5 US 4	A97 A158 A197	III	E1	964 Y964	450 L 30 kg G	964	450 L

Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger <i>and</i> cargo aircraft		Cargo aircraft <i>only</i>	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13
Lithium metal batteries (including lithium alloy batteries) †	3090	9		US 2 US 3	A88 A99 A154 A164 A183	II	E0	See	968	See	968
Lithium metal batteries contained in equipment (including lithium alloy batteries) †	3091	9		US 2 US 3	A48 A99 A154 A164 A181 A185	II	E0	970	5 kg	970	35 kg
Lithium metal batteries packed with equipment (including lithium alloy batteries) †	3091	9		US 2 US 3	A99 A154 A164 A181 A185	II	E0	969	5 kg	969	35 kg
Articles, pressurized, hydraulic containing non-flammable gas	3164	2.2			A48 A114 <u>A195</u>		E0	208	No limit	208	No limit
Articles, pressurized, pneumatic containing non-flammable gas	3164	2.2			A48 A114 <u>A195</u>		E0	208	No limit	208	No limit
Seat-belt pretensioners <u>Safety devices, electrically initiated</u> †	3268	9		BE 3 US 16	A32 A115 A119	III	E0	961	25 kg	961	100 kg
Air bag inflators	3268	9		BE 3 US 16	A32 A115 A119	III	E0	961	25 kg	961	400 kg
Air bag modules	3268	9		BE 3 US 16	A32 A115 A119	III	E0	961	25 kg	961	400 kg
Batteries, containing sodium †	3292	4.3			A94 A183	II	E0	FORBI	DDEN	492	No limit
Cells, containing sodium †	3292	4.3			A94	II	E0	492	25 kg	492	No limit
Chemical kit	3316	9			A44 A163	<u>II</u> <u>III</u>	E0	960 Y960 <u>960</u> <u>Y960</u>	10 kg 1 kg <u>10 kg</u> <u>1 kg</u>	960 <u>960</u>	10 kg <u>10 kg</u>
First aid kit	3316	9			A44 A163	<u>II</u> <u>III</u>	E0	960 Y960 <u>960</u> <u>Y960</u>	10 kg 1 kg <u>10 kg</u> <u>1 kg</u>	960 <u>960</u>	10 kg <u>10 kg</u>

Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger <i>and</i> cargo aircraft		Cargo aircraft <i>only</i>	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13
<b>Oxygen generator, chemical †</b> (including when contained in associated equipment, e.g. passenger service units (PSUs), protective breathing equipment (PBE), etc.)	3356	5.1		AU 1 CA 7 FR 7 IR 3 NL 1 US 3 US 18	A1 A111 A116 A144	⚡	E0	FORBI	DDEN	565	25 kg
<b>Paint, flammable, corrosive</b> (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)	3469	3	8		A3 A72 <a href="#">A192</a>	I II III	E0 E2 E1	350 352 Y340 354 Y342	0.5 L 1 L 0.5 L 5 L 1 L	360 363 365	2.5 L 5 L 60 L
<b>Paint related material, flammable, corrosive</b> (including paint thinning or reducing compound)	3469	3	8		A3 A72 <a href="#">A192</a>	I II III	E0 E2 E1	350 352 Y340 354 Y342	0.5 L 1 L 0.5 L 5 L 1 L	360 363 365	2.5 L 5 L 60 L
<b>Paint related material corrosive, flammable</b> (including paint thinning or reducing compound)	3470	8	3		A72 <a href="#">A192</a>	II	E2	851 Y840	1 L 0.5 L	855	30 L
<b>Paint, corrosive, flammable</b> (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base)	3470	8	3		A72 <a href="#">A192</a>	II	E2	851 Y840	1 L 0.5 L	855	30 L
<b>Lithium ion batteries</b> (including lithium ion polymer batteries)	3480	9		US 3	A51 A88 A99 A154 A164 A183	⚡	E0	See	965	See	965
<b>Lithium ion batteries contained in equipment</b> (including lithium ion polymer batteries)	3481	9		US 3	A48 A99 A154 A164 A181 A185	⚡	E0	967	5 kg	967	35 kg
<b>Lithium ion batteries packed with equipment</b> (including lithium ion polymer batteries)	3481	9		US 3	A88 A99 A154 A164 A181 A185	⚡	E0	966	5 kg	966	35 kg



Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger <i>and</i> cargo aircraft		Cargo aircraft <i>only</i>	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13

"Electric double layer" is now part of the proper shipping name for UN 3499:

<b>Capacitor, electric double layer</b> (with an energy storage capacity greater than 0.3 Wh)	3499	9			A186		E0	971	No limit	971	No limit
<b>Mercury contained in manufactured articles</b>	3506	8	6.1		A48 A69 A191	III	E0	869	No limit	869	No limit

UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/13 (see paragraph 3.2.17.1 d) of this report)

<b>Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted</b>	<u>3507</u>	<u>8</u>	<u>7</u>		<u>A139</u> <u>A194</u>	<u>!</u>	<u>E0</u>	<u>See</u>	<u>877</u>	<u>See</u>	<u>877</u>
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UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1  
DGP WG/13 WP/13 (see paragraph 3.2.17 of this report)

<b>Capacitor, asymmetric</b> (with an energy storage capacity greater than 0.3Wh)	<u>3508</u>	<u>9</u>			<u>A196</u>		<u>E0</u>	<u>971</u>	<u>No limit</u>	<u>971</u>	<u>No limit</u>
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UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/13 (see paragraph 3.2.17.1 e) of this report)

<b>[Packaging discarded, empty, uncleaned]</b>	<u>3509</u>	<u>9</u>			<u>A227</u>		<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDENI</u>
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UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/13 (see paragraph 3.2.17.1 c) of this report)

<b>[Adsorbed gas, flammable, n.o.s.]</b>	<u>3510</u>	<u>2.1</u>					<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>219</u>	<u>150 kg</u>
<b>Adsorbed gas, n.o.s.*</b>	<u>3511</u>	<u>2.2</u>					<u>E0</u>	<u>219</u>	<u>75 kg</u>	<u>219</u>	<u>150 kg</u>

Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger <i>and</i> cargo aircraft		Cargo aircraft <i>only</i>	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13
<u>Adsorbed gas, toxic, n.o.s.*</u>	<u>3512</u>	<u>2.3</u>					<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Adsorbed gas, oxidizing, n.o.s.*</u>	<u>3513</u>	<u>2.2</u>	<u>5.1</u>				<u>E0</u>	<u>219</u>	<u>75 kg</u>	<u>219</u>	<u>150 kg</u>
<u>Adsorbed gas, toxic, flammable, n.o.s.*</u>	<u>3514</u>	<u>2.3</u>	<u>2.1</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Adsorbed gas, toxic, oxidizing, n.o.s.*</u>	<u>3515</u>	<u>2.3</u>	<u>5.1</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Adsorbed gas, toxic, corrosive, n.o.s.*</u>	<u>3516</u>	<u>2.3</u>	<u>8</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Adsorbed gas, toxic, flammable, corrosive, n.o.s.*</u>	<u>3517</u>	<u>2.3</u>	<u>2.1</u> <u>8</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Adsorbed gas, toxic, oxidizing, corrosive, n.o.s.*</u>	<u>3518</u>	<u>2.3</u>	<u>5.1</u> <u>8</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Boron trifluoride, adsorbed</u>	<u>3519</u>	<u>2.3</u>	<u>8</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Chlorine, adsorbed</u>	<u>3520</u>	<u>2.3</u>	<u>5.1</u> <u>8</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Silicon tetrafluoride, adsorbed</u>	<u>3521</u>	<u>2.3</u>	<u>8</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Arsine, adsorbed</u>	<u>3522</u>	<u>2.3</u>	<u>2.1</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Germane, adsorbed</u>	<u>3523</u>	<u>2.3</u>	<u>2.1</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Phosphorus pentafluoride, adsorbed</u>	<u>3524</u>	<u>2.3</u>	<u>8</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Phosphine, adsorbed</u>	<u>3525</u>	<u>2.3</u>	<u>2.1</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>
<u>Hydrogen selenide, adsorbed</u>	<u>3526</u>	<u>2.3</u>	<u>2.1</u>				<u>E0</u>	<u>FORBI</u>	<u>DDEN</u>	<u>FORBI</u>	<u>DDEN</u>

UN Model Regulations, Alphabetical Index of Substances and Articles, ST/SG/AC.10/40/Add.1  
(DGP WG/13 WP/11 (see paragraph 3.2.13.1 d) of this report)

Actinolite, see ~~White a~~  
~~Asbestos~~, etc.  
amphibole (UN  
No. 2212)



## Chapter 3

### SPECIAL PROVISIONS

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Table 3-2. Special provisions

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UN Model Regulations, Chapter 3.3, SP 66 and 225, ST/SG/AC.10/40/Add.1

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A18 (66) ~~Mercurous chloride and cinnabar are~~ is not subject to these Instructions.

A19 (225) Fire extinguishers under this entry may include installed actuating cartridges (cartridges, power device of Division 1.4C or 1.4S), without changing the classification of Division 2.2 provided the total quantity of deflagrating (propellant) explosives does not exceed 3.2 grams per extinguishing unit.

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UN Model Regulations, Chapter 3.3, SP 225, ST/SG/AC.10/40/Add.1

DGP-WG/13-WP/13 (see paragraph 3.2.17.1 f) of this report) and DGP-WG/13-WP/14 (see paragraph 3.2.29.1 a) of this report)

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[Fire extinguishers must be manufactured, tested, approved and labelled according to the provisions of the country of manufacture. Fire extinguishers under this entry include:

a) portable fire extinguishers for manual handling and operation;

b) fire extinguishers for installation in aircraft;

c) fire extinguishers mounted on wheels for manual handling;

d) fire extinguishing equipment or machinery mounted on wheels or wheeled platforms or units transported similar to (small) trailers, and

e) fire extinguishers composed of a non-rollable pressure drum and equipment, and handled e.g. by fork lift or crane when loaded or unloaded.]

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UN Model Regulations, Chapter 3.3, SP 135 and 138, ST/SG/AC.10/40/Add.1

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A28 (135) The dihydrated sodium salt of dichloroisocyanuric acid does not meet the criteria for inclusion in Division 5.1 and is not subject to these Instructions unless meeting the criteria for inclusion in another class or division.

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UN Model Regulations, Chapter 3.3, SP 289, ST/SG/AC.10/40/Add.1

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A32 ~~Air bag inflators, air bag modules or seat belt pretensioners~~ Safety devices, electrically initiated and safety devices, pyrotechnic installed in vehicles, vessels or aircraft or in completed components such as steering columns, door panels, seats, etc., which are not capable of inadvertent activation are not subject to these Instructions when carried as cargo. The words "not restricted" and the special provision number A32 must be provided on the air waybill when an air waybill is issued.

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UN Model Regulations, Chapter 3.3, SP 251, ST/SG/AC.10/40/Add.1 (changes do not apply to Instructions)

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- ≠ A44 The entry chemical kit or first-aid kit is intended to apply to boxes, cases, etc., containing small quantities of various dangerous goods which are used, for example, for medical, analytical or testing or repair purposes. Components must not react dangerously (see 4;1.1.8). The packing group assigned to the kit as a whole must be the most stringent packing group assigned to any individual substance in the kit. The assigned packing group must be shown on the dangerous goods transport document. Where the kit contains only dangerous goods to which no packing group is assigned, a packing group must not be indicated on the dangerous goods transport document.

The only dangerous goods which are permitted in the kits are substances which may be transported as:

- a) excepted quantities as specified in column 9 of Table 3-1, provided the inner packagings and quantities are as prescribed in 5.1.2 and 5.2.1 a); or
- b) limited quantities under 3;4.1.2.

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UN Model Regulations, Chapter 3.3, SP 235, ST/SG/AC.10/40/Add.1

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- A56 This entry applies to articles which contain Class 1 explosive substances and which may also contain dangerous goods of other classes. These articles are used to enhance safety in vehicles, vessels or aircraft as lifesaving vehicle (e.g. air bag inflators or air bag modules or seat belt pretensioners and pyromechanical devices).

~~The quantities given in columns 11 and 13 of Table 3-1 refer to the net mass of the finished article.~~

*Note.— For the carriage of a vehicle, see Packing Instruction 950, 951 and 952.*

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UN Model Regulations, Chapter 3.3, SP 306, ST/SG/AC.10/40/Add.1

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- A64 (306) This entry may only be used for substances that ~~do not exhibit explosive properties of~~ are too insensitive for acceptance into Class 1 when tested in accordance with test series ~~1 and 2 of Class 1~~ (see UN *Manual of Tests and Criteria*, Part I).

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UN Model Regulations, Chapter 3.3, SP 172, ST/SG/AC.10/40/Add.1

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A78 (172) ~~Where a R~~ radioactive material ~~has with (a)~~ subsidiary risk(s) ~~must~~:

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Subparagraphs a) and b) below are reversed

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- a) ~~Packages must~~ be labelled with subsidiary risk labels corresponding to each subsidiary risk exhibited by the material in accordance with the relevant provisions of 5;3.2; corresponding placards must be affixed to cargo transport units in accordance with the relevant provisions of 5;3.6;
- b) ~~The substance must~~ be allocated to Packing Group I, II or III, ~~as and~~ if appropriate, by application of the ~~packing~~ grouping criteria provided in Part 2 corresponding to the nature of the predominant subsidiary risk. ~~For packing, see also 4;9.1.5.~~
- c) ~~For the purposes of documentation and package marking, the proper shipping name must be supplemented with the name of the constituents which most predominantly contribute to this (these) subsidiary risk(s) and which must be enclosed in parenthesis;~~
- d) ~~The dangerous goods transport document must indicate the subsidiary class or division and, where assigned, the packing group as required by 5:4.1.4.1 d) and e).~~

~~For packing, see also 4:9.1.5.~~

~~The description required in 5;4.1.5.7.1 b) must include a description of these subsidiary risks (e.g. "Subsidiary risk: 3.6.1"), the name of the constituents which most predominantly contribute to this (these) subsidiary risk(s) and, where applicable, the packing group.~~

Radioactive material with a subsidiary risk of Division 4.2 (Packing Group I) must be transported in Type B packages. Radioactive material with a subsidiary risk of Division 2.1 is forbidden from transport on passenger aircraft, and radioactive material with a subsidiary risk of Division 2.3 is forbidden from transport on passenger or cargo aircraft except with the prior approval of the appropriate authority of the State of Origin and the State of the Operator under the conditions established by those authorities. A copy of the document of approval, showing the quantity limitations and the packaging requirements, must accompany the consignment.

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UN Model Regulations, Chapter 3.3, SP 280, ST/SG/AC.10/40/Add.1

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≠ A115 (280) This entry applies to ~~articles which are used as lifesaving~~ safety devices for vehicles, vessels or aircraft, e.g. air bag inflators, or air bag modules or seat belt pretensioners, and pyromechanical devices and which contain dangerous goods of Class 1 or dangerous goods of other classes and when transported as component parts and ~~when~~ if these articles as presented for transport have been tested in accordance with test series 6 (c) of Part I of the UN *Manual of Tests and Criteria*, with no explosion of the device, no fragmentation of the device casing or pressure receptacle, and no projection hazard ~~and~~ nor thermal effect which would significantly hinder firefighting or other emergency response efforts in the immediate vicinity.

This entry does not apply to life saving appliances described in Packing Instruction 955 (UN Nos. 2990 and 3072).

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DGP-WG/13-WP/68 (see paragraph 3.2.28 of this report)

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A186 (361) This entry applies to electric double layer capacitors with an energy storage capacity greater than 0.3 Wh. Capacitors with an energy storage capacity of 0.3 Wh or less are not subject to these Instructions. Energy storage capacity means the energy held by a capacitor, as calculated using the nominal voltage and capacitance. All capacitors to which this entry applies, including capacitors containing an electrolyte that does not meet the classification criteria of any class or division of dangerous goods, must meet the following conditions:

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- d) capacitors must be designed and constructed to safely relieve pressure that may build up in use, through a vent or a weak point in the capacitor casing. Any liquid which is released upon venting must be contained by the packaging or by the equipment in which a capacitor is installed; and
- e) capacitors must be marked with the energy storage capacity in Wh.

[ Note.— The requirement in paragraph e) does not apply to capacitors manufactured before 1 January 2015.]

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DGP-WG/13-WP/18 and Flimsy No. 3 Rev. (see paragraph 3.2.19 of this report)

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A187 (362) This entry applies to liquids, pastes or powders, pressurized with a propellant which meets the definition of a gas in 2;2.1.1 and 2;2.1.2 a) or b).

*Note.— A chemical under pressure in an aerosol dispenser must be transported under UN 1950.*

The following provisions must apply:

- a) The chemical under pressure must be classified based on the hazard characteristics of the components in the different states:

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- d) in addition, chemicals under pressure with components meeting the properties of: Class 1, explosives; Class 3, liquid desensitized explosives; Division 4.1, self-reactive substances and solid desensitized explosives; Division 4.2, substances liable to spontaneous combustion; Division 4.3, substances which, in contact with water, emit flammable gases; Division 5.1, oxidizing substances; Division 5.2, organic peroxides; Division 6.2, infectious substances; or Class 7, radioactive material, must not be used for transport under this proper shipping name.

- e) Chemicals under pressure containing components forbidden for transport on both passenger and cargo aircraft (columns 10 to 13 of Table 3-1) must not be transported by air.

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UN Model Regulations, Chapter 3.3, SP 375, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/13 (see paragraph 3.2.17.1 g) of this report)

A190 (373) Neutron radiation detectors containing non-pressurized boron trifluoride gas in excess of 1 gram and radiation detection systems containing neutron radiation detectors as components may be transported on cargo aircraft in accordance with all applicable requirements of these Instructions irrespective of the indication of "forbidden" in columns 12 and 13 of the Dangerous Goods List and with "Toxic gas" and "Corrosive" labels displayed on each package irrespective of no labels being indicated in column 5, provided the following conditions are met:

a) each radiation detector must meet the following conditions:

- a) the pressure in each neutron radiation detector must not exceed 105 kPa absolute at 20°C;
- b) the amount of gas must not exceed ~~42.8~~ 13 grams per detector and the amount per outer packaging or per radiation detection system must not exceed 51.2 grams;
- iii) each detector must be manufactured under a registered quality assurance programme;  
*Note.— The application of ISO 9001:2008 may be considered acceptable for this purpose.*
- e) each neutron radiation detector must be of welded metal construction with brazed metal to ceramic feed through assemblies. ~~They~~ These detectors must have a minimum burst pressure of 1 800 kPa as demonstrated by design type qualification testing; and
- v) each detector must be tested to a  $1 \times 10^{-10} \text{ cm}^3 \cdot \text{sec}^{-1}$  [or  $\text{cm}^3/\text{s}$ ] leaktightness standard before filling.

b) radiation detectors transported as individual components must be transported as follows:

- d) each neutron radiation detector ~~they~~ must be packed in a sealed intermediate plastic liner with sufficient absorbent material to absorb the entire gas contents.
- ii) Neutron radiation detectors ~~they~~ must be packed in strong outer packagings and the completed package must be that are capable of withstanding a 1.8 metre drop test without leakage of gas contents from detectors.
- iii) the total amount of gas from all detectors per outer packaging must not exceed 52 grams.

c) completed neutron radiation detector systems containing neutron radiation detectors meeting the conditions of paragraph a) must be transported as follows:

- i) the detectors must be contained in a strong sealed outer casing;
- ii) the casing must contain ~~also include~~ sufficient absorbent material ~~sufficient~~ to absorb the entire gas contents of the neutron radiation detectors. Absorbent material must be surrounded by a liner or liners, as appropriate.
- iii) the completed system ~~They~~ must be packed in strong outer packagings capable of withstanding a 1.8 m drop test without leakage unless neutron radiation detectors a system's outer casing are afforded s equivalent protection by the radiation detection system; and

e) the package must be labelled with "Toxic gas" and "Corrosive" subsidiary risk labels.

Transport in accordance with this special provision must be noted on the dangerous goods transport document ~~and~~ A packing instruction must not be shown on the transport document.

When transported as cargo, neutron radiation detectors containing not more than 1 gram of boron trifluoride, including those with solder glass joints, ~~and radiation detection systems containing such detectors where the neutron radiation detectors meet and~~ are not subject to these Instructions provided they meet the requirements in paragraph a) and are packed in accordance with ~~the above conditions~~ paragraph b), ~~are not subject to these Instructions~~ irrespective of the indication of "forbidden" in columns 10 to 13. Radiation detection systems containing such detectors are not subject to these Instructions provided they are packed in accordance with paragraph c). The words "not restricted" and the special provision number A190 must be provided on the air waybill when an air waybill is used.



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UN Model Regulations, Chapter 3.3, SP 367, 368, ST/SG/AC.10/40/Add.1  
See paragraph 3.2.17 of this report.

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A192 (367) For the purposes of documentation and package marking:

- the proper shipping name **Paint related material** may be used for consignments of packages containing paint and paint related material in the same package;
- the proper shipping name **Paint related material, corrosive, flammable** may be used for consignments of packages containing paint, corrosive, flammable and paint related material, corrosive, flammable in the same package;
- the proper shipping name **Paint related material, flammable, corrosive** may be used for consignments of packages containing paint, flammable, corrosive and paint related material, flammable, corrosive in the same package; and
- the proper shipping name **Printing ink related material** may be used for consignments of packages containing printing ink and printing ink related material in the same package.

A193 (368) In the case of non-fissile or fissile-excepted uranium hexafluoride, the material must be classified under UN 3507 or UN 2978.

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UN Model Regulations, Chapter 3.3, 369, ST/SG/AC.10/40/Add.1  
See paragraph 3.2.17.1 h) of this report.

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A194 (369) In accordance with Part 2, Introductory Chapter, paragraph 4, this radioactive material in an excepted package possessing corrosive properties is classified in Class 8 with a radioactive material subsidiary risk.

Uranium hexafluoride may be classified under this entry only if the conditions of 2:7.2.4.1.1.2, 2:7.2.4.1.1.5, 2:7.2.4.5.2 and, for fissile-excepted material, of 2:7.2.3.6 are met.

In addition to the provisions applicable to the transport of Class 8 substances, the provisions of 5:1.6.3, 5:1.2.2.2, 5:1.2.4.1 b), 7:3.2.1 to 7:3.2.4 and 7:1.6 apply.

No Class 7 label is required to be displayed.

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UN Model Regulations, Chapter 3.3, 371, ST/SG/AC.10/40/Add.1  
See paragraph 3.2.17.1 i) of this report.

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- A195 (371) 1. This entry also applies to articles, containing a small pressure receptacle with a release device. Such articles must comply with the following requirements:
- a) the water capacity of the pressure receptacle must not exceed 0.5 litres and the working pressure must not exceed 25 bar at 15°C;
  - b) the minimum burst pressure of the pressure receptacle must be at least four times the pressure of the gas at 15 °C;
  - c) each article must be manufactured in such a way that unintentional firing or release is avoided under normal conditions of handling, packing, transport and use. This may be fulfilled by an additional locking device linked to the activator;
  - d) each article must be manufactured in such a way as to prevent hazardous projections of the pressure receptacle or parts of the pressure receptacle;
  - e) each pressure receptacle must be manufactured from material which will not fragment upon rupture;
  - f) the design type of the article must be subjected to a fire test. For this test, the provisions of paragraphs 16.6.1.2 except letter g, 16.6.1.3.1 to 16.6.1.3.6, 16.6.1.3.7 (b) and 16.6.1.3.8 of the UN Manual of Tests and Criteria must be applied. It must be demonstrated that the article relieves its pressure by means of a fire degradable seal or other pressure relief device, in such a way that the pressure receptacle will not fragment and that the article or fragments of the article do not rocket more than 10 metres;
  - g) the design type of the article must be subjected to the following test. A stimulating mechanism must be used to initiate one article in the middle of the packaging. There must be no hazardous effects outside the package such as disruption of the package, metal fragments or a receptacle which passes through the packaging.
2. The manufacturer must produce technical documentation of the design type, manufacture as well as the tests and their results. The manufacturer must apply procedures to ensure that articles produced in series are made of good quality, conform to the design type and are able to meet the requirements in 1). The manufacturer must provide such information to the appropriate national authority on request.

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UN Model Regulations, Chapter 3.3, 372, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/68 (see paragraph 3.2.28 of this report)

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- A196 (372) This entry applies to asymmetric capacitors with an energy storage capacity greater than 0.3 Wh. Capacitors with an energy storage capacity of 0.3 Wh or less are not subject to these Instructions.

Energy storage capacity means the energy stored in a capacitor, as calculated according to the following equation:

$$Wh = 1/2C_N(U_R^2 - U_L^2) \times (1/3600),$$

using the nominal capacitance ( $C_N$ ), rated voltage ( $U_R$ ) and rated lower limit voltage ( $U_L$ ).

All asymmetric capacitors to which this entry applies must meet the following conditions:

- a) capacitors or modules must be protected against short circuit;
- b) capacitors must be designed and constructed to safely relieve pressure that may build up in use, through a vent or a weak point in the capacitor casing. Any liquid which is released upon venting must be contained by packaging or by equipment in which a capacitor is installed;
- c) capacitors must be marked with the energy storage capacity in Wh; and

[ Note.— The requirement in paragraph c) does not apply to capacitors manufactured before 1 January 2015.]

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d) capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods must be designed to withstand a 95 kPa pressure differential;

Capacitors containing an electrolyte not meeting the classification criteria of any class or division of dangerous goods, including when configured in a module or when installed in equipment are not subject to other provisions of these Instructions.

Capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods, with an energy storage capacity of 20 Wh or less, including when configured in a module, are not subject to other provisions of these Instructions when the capacitors are capable of withstanding a 1.2 metre drop test unpackaged on an unyielding surface without loss of contents.

Capacitors containing an electrolyte meeting the classification criteria of any class or division of dangerous goods that are not installed in equipment and with an energy storage capacity of more than 20 Wh are subject to these Instructions.

Capacitors installed in equipment and containing an electrolyte meeting the classification criteria of any class or division of dangerous goods, are not subject to other provisions of these Instructions provided that the equipment is packaged in a strong outer packaging constructed of suitable material, and of adequate strength and design, in relation to the packaging's intended use and in such a manner as to prevent accidental functioning of capacitors during transport. Large robust equipment containing capacitors may be offered for transport unpackaged or on pallets when capacitors are afforded equivalent protection by the equipment in which they are contained.

*Note.— Notwithstanding the provisions of this special provision, nickel-carbon asymmetric capacitors containing Class 8 alkaline electrolytes must be transported as UN 2795, Batteries, wet, filled with alkali, electric storage.*

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UN Model Regulations, Chapter 3.3, 375, ST/SG/AC.10/40/Add.1

See paragraph 3.2.17 of this report

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A197 (375) These substances when transported in single or combination packagings containing a net quantity per single or inner packaging of 5 L or less for liquids or having a net mass of 5 kg or less for solids, are not subject to any other provisions of these Instructions provided the packagings meet the general provisions of 4:1.1.1, 4:1.1.3.1 and 4:1.1.5.

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## Chapter 4

### DANGEROUS GOODS IN LIMITED QUANTITIES

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#### 4.1 APPLICABILITY

4.1.1 Limited quantities of dangerous goods may only be carried in accordance with the limitations and provisions of this chapter and must meet all the applicable requirements of the Technical Instructions unless otherwise provided for below.

4.1.2 Only dangerous goods which are permitted on passenger aircraft and which meet the criteria of the following classes, divisions and packing groups (if appropriate) may be carried under these provisions for dangerous goods in limited quantities:

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DGP-WG/12-WP/10 (see paragraphs 3.2.11 of DGP-WG/13-WP/1):

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Class 2	Only UN 1950 in Divisions 2.1 and 2.2, UN 2037 in Divisions 2.1 and 2.2 without a subsidiary risk, UN 3478 ( <b>Fuel cell cartridges</b> , containing liquefied flammable gas) and UN 3479 ( <b>Fuel cell cartridges</b> , containing hydrogen in metal hydride)
Class 3	Packing Groups II and III <u>and UN 3473 (<b>Fuel cell cartridges, containing flammable liquids</b>)</u>
Division 4.1	Packing Groups II and III but excluding all self-reactive substances irrespective of packing group
Division 4.3	Packing Groups II and III, solids only <u>and UN 3476 (<b>Fuel cell cartridges, containing water-reactive substances</b>)</u>
Division 5.1	Packing Groups II and III
Division 5.2	Only when contained in a chemical kit or a first-aid kit
Division 6.1	Packing Groups II and III
Class 8	Packing Groups II and III <u>and UN 3477 (<b>Fuel cell cartridges, containing corrosive substances</b>)</u> but excluding UN 2794, UN 2795, UN 2803, UN 2809, UN 3028 and UN 3506.
Class 9	Only UN 1941, UN 1990, UN 2071, UN 3077, UN 3082, UN 3316, UN 3334, <del>and UN 3335</del> <u>and ID 8000</u>

*Note.*— Many articles or substances, including the following, are NOT permitted under these limited quantity provisions:

- a) those permitted only on cargo aircraft;
- b) those in Packing Group I;
- c) those in Class 1 or 7 or Divisions 2.1 (~~other than aerosols~~ except as permitted above), 2.3 or 6.2;
- d) those in Division 4.2 or with a subsidiary risk 4.2.

4.1.3 The limitations and provisions of this chapter for the transport of dangerous goods in limited quantities apply equally to both passenger and cargo aircraft.

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#### 4.5 PACKAGE MARKING

4.5.1 Packages containing limited quantities of dangerous goods must be marked as required by the applicable paragraphs of 5;2, except that 5;2.4.4.1 does not apply.

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UN Model Regulations, paragraph 3.4.8, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report)

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Text from Figure 3-1 has been moved to 4.5.2. New/amended text (other than editorial changes) is highlighted.

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4.5.2 Packages containing limited quantities of dangerous goods and prepared in accordance with this chapter must bear the marking shown in Figure 3-1 below. The marking must be readily visible, legible and able to withstand open weather exposure without a substantial reduction in effectiveness. **The marking must be in the form of a square set at an angle of 45° (diamond shaped). The top and bottom portions and the surrounding line must be black. The centre area must be white or a suitable contrasting background. The minimum dimension must be 100 mm × 100 mm and the minimum width of line forming the diamond must be 2 mm. The symbol "Y" must be placed in the centre of the mark and must be clearly visible. Where dimensions are not specified, all features must be in approximate proportion to those shown.**

4.5.2.1 **If the size of the package so requires, the minimum outer dimensions shown in Figure 3-1 may be reduced to be not less than 50 mm × 50 mm provided the marking remains clearly visible. The minimum width of the line forming the diamond may be reduced to a minimum of 1 mm. The symbol "Y" must remain in approximate proportion to that shown in Figure 3-1.**

4.5.3 When packages containing dangerous goods in limited quantities are placed in an overpack, the overpack must be marked with the word "OVERPACK" and the marking required by this chapter, unless the markings representative of all dangerous goods in the overpack are visible.

---

Replace Figure 3-1 with the following (text which was below the limited quantity mark is moved to 4.5.2):

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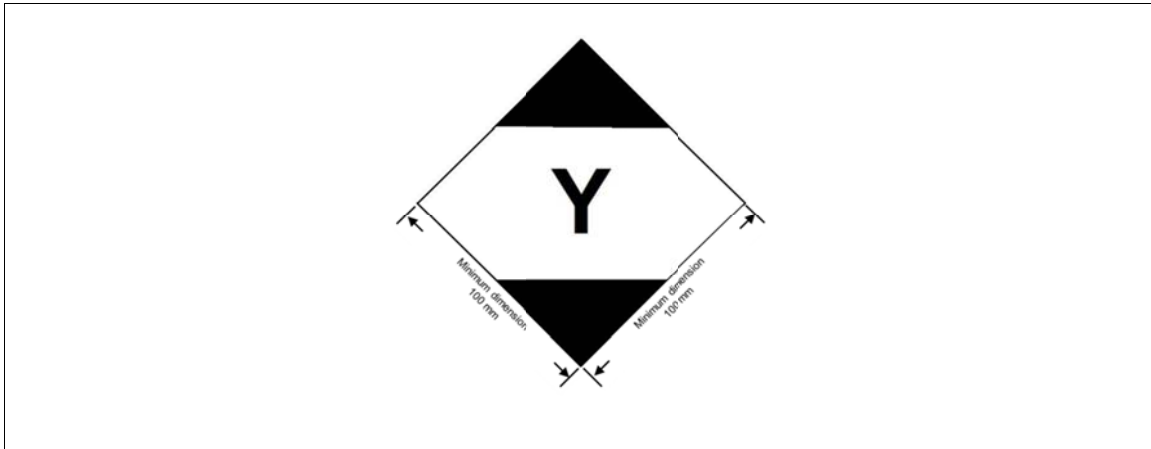


Figure 3-1. Limited quantities mark

## Chapter 5

### DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

*Parts of this Chapter are affected by State Variation JP 23; see Table A-1*

#### 5.1 EXCEPTED QUANTITIES

5.1.1 Excepted quantities of dangerous goods of certain classes, other than articles, meeting the provisions of this chapter are not subject to any other provisions of these Instructions except for:

- a) the prohibition in post in 1;2.3;
- b) the definitions in 1;3;
- c) the training requirements in 1;4;
- d) the classification procedures and packing group criteria in Part 2;

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DGP-WG/12-WP/28 (see paragraph 3.2.15 of DGP-WG/13-WP/1)

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- e) the packaging requirements of 4;1.1.1, 4;1.1.3.1, 4;1.1.3.3, 4;1.1.5, 4;1.1.6, 4;1.1.7 and 4;1.1.8 (4;1.1.6 does not apply to UN 3082);
- f) the loading restriction in 7;2.1;
- g) the reporting requirements of dangerous goods accidents, incidents and other occurrences in 7;4.4 and 7;4.5; and
- h) the prohibition of dangerous goods in baggage in 8;1.1.

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

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#### 5.4 MARKING OF PACKAGES

5.4.1 Packages containing excepted quantities of dangerous goods prepared in accordance with this chapter must be durably and legibly marked with the mark shown in Figure 3-2. 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 shipper or consignee is not shown elsewhere on the package, this information must be included within the mark.

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UN Model Regulations, paragraph 3.5.4.2, ST/SG/AC.10/40/Add.1

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Text from Figure 3-2 has been moved to 5.4.2. New/amended text (other than editorial changes) is highlighted.

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5.4.2 The marking must be in the form of a square. The hatching and symbol must be of the same colour, black or red, on white or suitable contrasting background. The dimensions of the mark must be a minimum of 100 mm × 100 mm. Where dimensions are not specified, all features must be in approximate proportion to those shown.

5.4.3 An overpack containing dangerous goods in excepted quantities must display the markings required by 5.4.1, unless such markings on packages within the overpack are clearly visible.

Replace Figure 3- with the following (text which was below the limited quantity mark (on left hand side) is moved to 5.4.2):

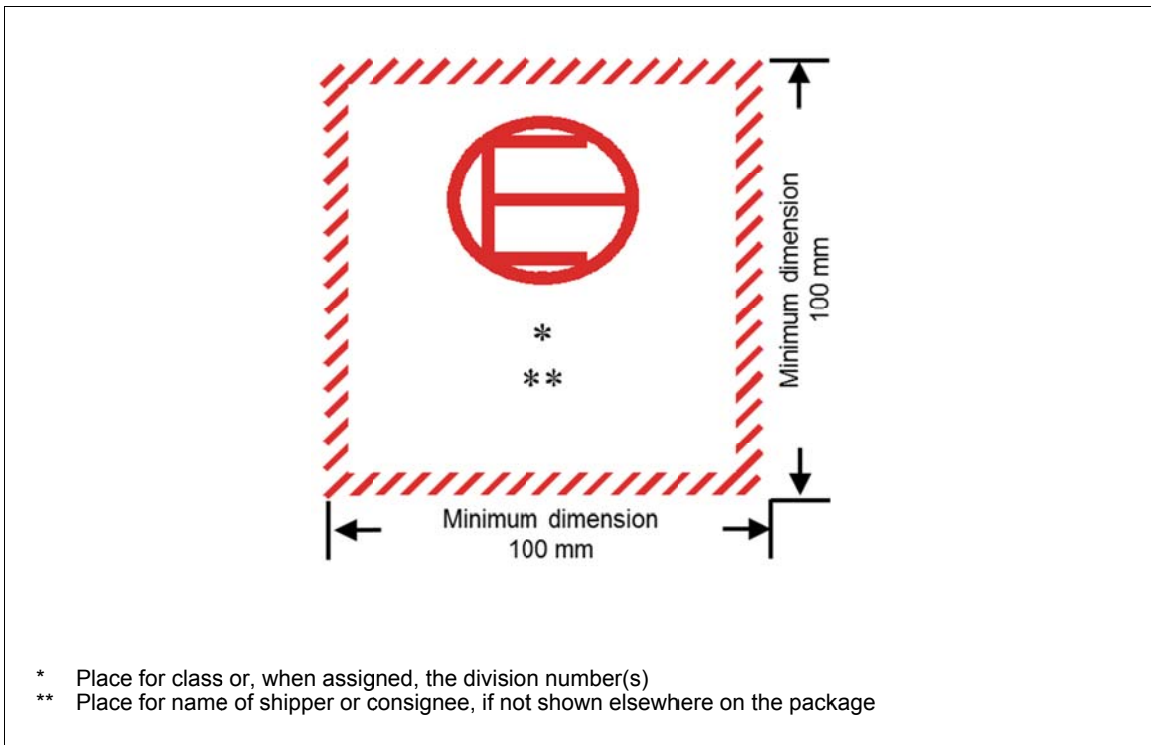


Figure 3-2. Excepted quantities mark

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## Part 4

# PACKING INSTRUCTIONS

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## Chapter 1

### GENERAL PACKING REQUIREMENTS

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#### 1.1 GENERAL REQUIREMENTS APPLICABLE TO ALL CLASSES EXCEPT CLASS 7

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1.1.10 Inner packagings must be so packed, secured or cushioned in an outer packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings containing liquids must be packaged with their closures upward and placed within outer packagings consistent with the orientation markings prescribed in 5.3.2.12 b) of these Instructions. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastic material, must be secured in outer packagings with suitable cushioning material. Any leakage of the contents must not substantially impair the protective properties of the cushioning material or of the outer packaging.

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

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

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UN Model Regulations, 4.1.1.5.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report)

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1.1.10.2 Use of supplementary packagings within an outer packaging (e.g. an intermediate packaging or a receptacle inside a required inner packaging) additional to what is required by the packing instructions is permitted provided all relevant requirements are met, including those of 4.1.1.2, and, if appropriate, suitable cushioning is used to prevent movement within the packaging.



## Chapter 3

## CLASS 1 — EXPLOSIVES

UN Model Regulations, P131, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report)

Packing Instruction 131			1.
<i>Inner packagings</i>	<i>Intermediate packagings</i>	<i>Outer packagings</i>	
Bags paper plastics Receptacles fibreboard metal plastics wood Reels	Not necessary	Boxes aluminium (4B) fibreboard (4G) natural wood, ordinary (4C1) natural wood, with siftproof walls (4C2) other metal (4N) <u>plastics, solid (4H2)</u> plywood (4D) reconstituted wood (4F) steel (4A) Drums ≠ aluminium (1B1, 1B2) fibre (1G) ≠ plastics (1H1, 1H2) + other metal (1N1, 1N2) plywood (1D) ≠ steel (1A1, 1A2)	
<b>PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:</b>			
— For UN 0029, 0267 and 0455, bags and reels must not be used as inner packagings.			

UN Model Regulations, P137, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report)

Packing Instruction 137			2.
<i>Inner packagings</i>	<i>Intermediate packagings</i>	<i>Outer packagings</i>	
Bags plastics Boxes fibreboard wood Tubes fibreboard metal plastics Dividing partitions in the outer packagings	Not necessary	Boxes aluminium (4B) fibreboard (4G) natural wood, ordinary (4C1) natural wood, with siftproof walls (4C2) other metal (4N) <u>plastics, solid (4H2)</u> plywood (4D) reconstituted wood (4F) steel (4A)	
<b>PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:</b>			
— For UN 0059, 0439, 0440 and 0441, when the shaped charges are packed singly, the conical cavity must face downwards and the package marked "THIS SIDE UP". When the shaped charges are packed in pairs, the conical cavities must face inwards to minimize the jetting effect in the event of accidental initiation.			

## Chapter 4

### CLASS 2 — GASES

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#### 4.1 SPECIAL PACKING PROVISIONS FOR DANGEROUS GOODS OF CLASS 2

##### 4.1.1 General requirements

4.1.1.1 This section provides general requirements applicable to the use of cylinders and closed cryogenic receptacles for the transport of Class 2 gases (e.g. UN 1072 **Oxygen, compressed**). Cylinders and closed cryogenic receptacles must be constructed and closed so as to prevent any loss of contents which might be caused under normal conditions of transport, including by vibration, or by changes in temperature, humidity or pressure (resulting from change in altitude, for example).

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UN Model Regulations, paragraph 4.1.6.1.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report)

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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). In addition to the requirements specified in the relevant packing instruction, which take precedence, the applicable provisions of ISO 11114-1:1997~~2012~~ and ISO 11114-2:2000 must be met.

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UN Model Regulations, P003, PP91 for UN 1044, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see also paragraph 3.2.29.1 a) of this report)

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#### Packing Instruction 213

The general packing requirements of 4;1 must be met.

Fire extinguishers with compressed or liquefied gas must be packed in strong outer packagings so that they cannot be accidentally activated.

Fire extinguishers may include installed actuating cartridges (cartridges, power device of Division 1.4C or 1.4S), without changing the classification of Division 2.2, provided the total quantity of deflagrating (propellant) explosives does not exceed 3.2 g per extinguishing unit.

Large fire extinguishers may also be transported unpackaged provided that the requirements of S-4;3.1 a) to e) are met, the valves are protected by one of the methods in accordance with 4;4.1.1.8 a) to c) and and other equipment mounted on the fire extinguisher is protected to prevent accidental activation. For the purpose of this packing instruction, "large fire extinguishers" means fire extinguishers as described in sub-paragraphs c) to e) of Special Provision A19.]

DGP-WG/12-WP/13 and its Addendum (see paragraph 3.2.19 of DGP-WG/13-WP/1)

*Note.— This amendment will be considered by the Council for incorporation in the 2013-2014 Edition of the Technical Instructions by way of an addendum.*

### Packing Instruction 216

Passenger and cargo aircraft for UN 3478 and 3479 (contained in equipment) only

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#### ADDITIONAL PACKING REQUIREMENTS

- Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation.
- Equipment must be securely cushioned in the outer packagings.
- Fuel cell systems must not charge batteries during transport.
- On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, including Amendment 1, or a standard approved by the appropriate authority of the State of Origin.

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UN Model Regulations, P208, ST/SG/AC.10/40/Add.1

DGP-WG/13-WP/14 (see also paragraphs 3.2.29.1 b) and c) of this report)

### Packing Instruction 219

For cylinders, the general packing requirements of 4.1.1 and 4.4.1.1 must be met.

This Instruction applies to Class 2 adsorbed gases.

1) The following packagings are permitted provided the general packing requirements of 4.1.1 are met:

Cylinders specified in 6.5 and in accordance with ISO 11513:2011 or ISO 9809-1:2010.

2) The pressure of each filled cylinder must be less than 101.3 kPa at 20°C and must be less than 300 kPa at 50°C.

3) The minimum test pressure of the cylinder must be 21 bar.

4) The minimum burst pressure of the cylinder must be 94.5 bar.

5) The internal pressure at 65°C of the filled cylinder must not exceed the test pressure of the cylinder.

6) The adsorbent material must be compatible with the cylinder and must not form harmful or dangerous compounds with the gas to be adsorbed. The gas in combination with the adsorbent material must not affect or weaken the cylinder or cause a dangerous reaction (e.g. a catalyzing reaction).

7) The quality of the adsorbent must be verified at the time of each fill to assure the pressure and chemical stability requirements of this packing instruction are met each time an adsorbed gas package is offered for transport.

8) The adsorbent material must not meet the criteria of any of the classes or divisions in these Instructions.

9) Requirements for cylinders and closures containing toxic gases with an LC<sub>50</sub> less than or equal to 200 ml/m<sup>3</sup> (ppm) (see Table 1) must be as follows:

a) Valve outlets must be fitted with pressure retaining gas-tight plugs or caps having threads matching those of the valve outlets.

b) Each valve must either be of the packless type with non-perforated diaphragm, or be of a type which prevents leakage through or past the packing.

c) Each cylinder and closure must be tested for leakage after filling.

d) Each valve must be capable of withstanding the test pressure of the cylinder and be directly connected to the cylinder by either a taper-thread or other means which meets the requirements of ISO 10692-2:2001.

e) Cylinders and valves must not be fitted with a pressure relief device.

10) Valve outlets for cylinders containing pyrophoric gases must be fitted with gas-tight plugs or caps having threads matching those of the valve outlets.

11) The filling procedure must be in accordance with Annex A of ISO 11513:2011.

12) The maximum period for periodic inspections must be five years.

13) Special packing provisions that are specific to a substance (see Table 1):

Material compatibility

~~a: Aluminium alloy cylinders must not be used.~~

~~d: When steel cylinders are used, only those bearing the "H" mark in accordance with 6.5.2.7.4 p) are permitted.~~

Gas specific provisions

~~r: The filling of this gas must be limited such that, if complete decomposition occurs, the pressure does not exceed two thirds of the test pressure of the cylinder.~~

Material compatibility for n.o.s adsorbed gas entries

~~z: The construction materials of the cylinders and their accessories must be compatible with the contents and must not react to form harmful or dangerous compounds therewith.~~

**Table 1. ADSORBED GASES**

<u>UN No.</u>	<u>Name and description</u>	<u>Class or Division</u>	<u>Subsidiary risk</u>	<u>LC<sub>50</sub> ml/m<sup>3</sup></u>	<u>Special packing provisions*</u>
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
<u>3510</u>	<u>Adsorbed gas, flammable, n.o.s.</u>	<u>2.1</u>			<u>Z</u>
<u>3511</u>	<u>Adsorbed gas, n.o.s.*</u>	<u>2.2</u>			<u>Z</u>
<u>3512</u>	<u>Adsorbed gas, toxic, n.o.s.*</u>	<u>2.3</u>		<u>≤ 5000</u>	<u>IN</u>
<u>3513</u>	<u>Adsorbed gas, oxidizing, n.o.s.*</u>	<u>2.2</u>	<u>5.1</u>		<u>Z</u>
<u>3514</u>	<u>Adsorbed gas, toxic, flammable, n.o.s.*</u>	<u>2.3</u>	<u>2.1</u>	<u>≤ 5000</u>	<u>IN</u>
<u>3515</u>	<u>Adsorbed gas, toxic, oxidizing, n.o.s.*</u>	<u>2.3</u>	<u>5.1</u>	<u>≤ 5000</u>	<u>IN</u>
<u>3516</u>	<u>Adsorbed gas, toxic, corrosive, n.o.s.*</u>	<u>2.3</u>	<u>8</u>	<u>≤ 5000</u>	<u>IN</u>
<u>3517</u>	<u>Adsorbed gas, toxic, flammable, corrosive, n.o.s.*</u>	<u>2.3</u>	<u>2.1</u> <u>8</u>	<u>≤ 5000</u>	<u>IN</u>
<u>3518</u>	<u>Adsorbed gas, toxic, oxidizing, corrosive, n.o.s.*</u>	<u>2.3</u>	<u>5.1</u> <u>8</u>	<u>≤ 5000</u>	<u>IN</u>
<u>3519</u>	<u>Boron trifluoride, adsorbed</u>	<u>2.3</u>	<u>8</u>	<u>387</u>	<u>IN</u>
<u>3520</u>	<u>Chlorine, adsorbed</u>	<u>2.3</u>	<u>5.1</u> <u>8</u>	<u>293</u>	<u>IN</u>
<u>3521</u>	<u>Silicon tetrafluoride, adsorbed</u>	<u>2.3</u>	<u>8</u>	<u>450</u>	<u>IN</u>
<u>3522</u>	<u>Arsine, adsorbed</u>	<u>2.3</u>	<u>2.1</u>	<u>20</u>	<u>IN</u>
<u>3523</u>	<u>Germane, adsorbed</u>	<u>2.3</u>	<u>2.1</u>	<u>620</u>	<u>IN</u>
<u>3524</u>	<u>Phosphorus pentafluoride, adsorbed</u>	<u>2.3</u>	<u>8</u>	<u>190</u>	
<u>3525</u>	<u>Phosphine, adsorbed</u>	<u>2.3</u>	<u>2.1</u>	<u>20</u>	<u>IN</u>
<u>3526</u>	<u>Hydrogen selenide, adsorbed</u>	<u>2.3</u>	<u>2.1</u>	<u>2</u>	

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**Chapter 5****CLASS 3 — FLAMMABLE LIQUIDS**

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DGP-WG/12-WP/13 and its Addendum (see paragraph 3.2.19 of DGP-WG/13-WP/1)

*Note.— This amendment will be considered by the Council for incorporation in the 2013-2014 Edition of the Technical Instructions by way of an addendum.*

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**Packing Instruction 375**

Passenger and cargo aircraft for UN 3473 (contained in equipment) only

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**ADDITIONAL PACKING REQUIREMENTS**

- Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation.
- Equipment must be securely cushioned in the outer packagings.
- Fuel cell systems must not charge batteries during transport.
- On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, [including Amendment 1](#), or a standard approved by the appropriate authority of the State of Origin.

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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/12-WP/11 (see paragraph 3.2.18 of DGP-WG/13-WP/1)

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#### Packing Instruction 473

Passenger and cargo aircraft for UN 1378 and UN 2881 only

##### General requirements

Part 4, Chapter 1 requirements must be met, including:

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1) Compatibility requirements

— Substances must be compatible with their packagings as required by 4;1.1.3.

2) Closure requirements

— Closures must meet the requirements of 4;1.1.4.

##### SINGLE PACKAGINGS FOR PACKING GROUP III ONLY

Cylinders

*Drums*

*Jerricans*

See 4:2.7

Steel (1A1, 1A2)

Steel (3A1, 3A2)

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DGP-WG/12-WP/13 and its Addendum (see paragraph 3.2.19 of DGP-WG/13-WP/1)

*Note.— This amendment will be considered by the Council for incorporation in the 2013-2014 Edition of the Technical Instructions by way of an addendum.*

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#### Packing Instruction 496

Passenger and cargo aircraft for UN 3476 (contained in equipment) only

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##### ADDITIONAL PACKING REQUIREMENTS

- Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation.
- Equipment must be securely cushioned in the outer packagings.
- The mass of each fuel cell cartridge must not exceed 1 kg.
- Fuel cell systems must not charge batteries during transport.
- On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, including Amendment 1, or a standard approved by the appropriate authority of the State of Origin.

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## Chapter 7

**CLASS 5 — OXIDIZING SUBSTANCES;  
ORGANIC PEROXIDES**

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DGP-WG/13-WP/59 (See paragraphs 3.2.30 of this report).

**Packing Instruction 570**

Passenger and cargo aircraft

**OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)**

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
Fibreboard (4G)	Fibre (1G)	≠ Plastics (3H1, 3H2)
Natural wood (4C1, 4C2)	≠ Plastics (1H1, 1H2)	
<del>Other metal (4N)</del>	Plywood (1D)	
Plastics (4H1, 4H2)		
Plywood (4D)		
Reconstituted wood (4F)		

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## Chapter 8

### CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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#### Packing Instruction 650

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- 4) For transport, the mark illustrated below must be displayed on the external surface of the outer packaging on a background of a contrasting colour and must be clearly visible and legible. The mark must be in the form of a square set at an angle of 45° (diamond-shaped) with each side having a length of at least 50 mm, the width of the line must be at least 2 mm, and the letters and numbers must be at least 6 mm high. The proper shipping name "Biological substance, Category B" in letters at least 6 mm high must be marked on the outer packaging adjacent to the diamond-shaped mark.

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UN Model Regulations, P650, ST/SG/AC.10/40/Add.1

See also paragraph 3.2.29.1 d) of this report.

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*Replace* mark for Biological substance, Category B with the following:

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## Chapter 9

### CLASS 7 — RADIOACTIVE MATERIAL

*Parts of this Chapter are affected by State Variations CA 1, CA 2, CA 4, IR 4, JP 2, JP 17; see Table A-1*

#### 9.1 GENERAL

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;7.2.4. The types of packages for radioactive materials covered by these Instructions 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.

9.1.2 The non-fixed contamination on the external surfaces of any package must be kept as low as practicable and, under routine conditions of transport, must not exceed the following limits:

- a) 4 Bq/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters; and
- b) 0.4 Bq/cm<sup>2</sup> for all other alpha emitters.

These limits are applicable when averaged over any area of 300 cm<sup>2</sup> of any part of the surface.

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UN Model Regulations, paragraph 4.1.9.1.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report)

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9.1.3 A package, ~~other than an excepted package,~~ must not contain any other items except such articles and documents as are necessary for the use of the radioactive material. This requirement must not preclude the transport of low specific activity material or surface contaminated objects with other items. The transport of such articles and documents in a package, or of low specific activity material or surface contaminated objects with other items may be permitted provided that there is no interaction between them and the packaging or its radioactive contents that would reduce the safety of the package.

9.1.4 Except as provided in 7;3.2.5, the level of non-fixed contamination on the external and internal surfaces of overpacks and freight containers, must not exceed the limits specified in 9.1.2.

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.

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UN Model Regulations, paragraphs 4.1.9.1.6 to 4.1.9.1.11, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report (see paragraph 3.2.29 e) for 9.1.7 below))

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~~9.1.6 Before the first shipment of any package, the following requirements must be fulfilled. Before a packaging is first used to transport radioactive material, it must be confirmed that it has been manufactured in conformity with the design specifications to ensure compliance with the relevant provisions of these Instructions and any applicable certificate of approval. The following requirements must also be fulfilled, if applicable:~~

- ~~a) If the design pressure of the containment system exceeds 35 kPa (gauge), it must be ensured that the containment system of each package~~ing conforms to the approved design requirements relating to the capability of that system to maintain its integrity under that pressure;
- ~~b) For each packaging intended for use as a Type B(U), Type B(M) and Type C package and for each package~~ing ~~intended to~~ 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~~ing ~~intended to~~ containing fissile material, ~~it must be ensured that the effectiveness of the criticality safety features is within the limits applicable to or specified for the design and in particular~~ 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.

~~9.1.7 Before each shipment of any package, it must be ensured that the package does not contain:~~

- ~~a) radionuclides different from those specified for the package design; or~~
- ~~b) contents in a form, or physical or chemical state different from those specified for the package design.~~

~~9.1.7.8 Before each shipment of any package, it must be ensured that all the requirements specified in the relevant provisions of these Instructions and in the applicable certificates of approval have been fulfilled. The following requirements must also be fulfilled, if applicable:~~

- ~~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;~~
- ~~b) 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;~~
- ~~c) 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;7.7.7.7.8 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;7.10.4.5 b) and the tests to demonstrate closure of each package as specified in 6;7.10.7.8 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.~~

~~9.1.8.9~~ 9 The shipper must also have a copy of any instructions with regard to the proper closing of the package and any preparation for shipment before making any shipment under the terms of the certificates.

~~9.1.9.10~~ 10 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.

~~9.1.10.11~~ 11 Except for packages or overpacks transported under exclusive use and special arrangement under the conditions specified in 7;2.10.5.3, the maximum radiation level at any point on any external surface of a package or overpack must not exceed 2 mSv/h.

~~9.1.11.12~~ 12 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

UN Model Regulations, paragraph 4.1.9.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/14 (see paragraph 3.2.29 of this report)

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~~ are or contains fissile material, which is not excepted under 2:7.2.3.5, must meet the applicable requirements in 7:2.10.4.1, and 7:2.10.4.2 ~~and 6:7.10.4~~.

9.2.3 LSA material and SCO which are or contain fissile material must meet the applicable requirements of 6:7.10.1.

~~9.2.3~~ 9.2.4 LSA material and SCO in groups LSA-I and SCO-I must not be transported unpackaged.

9.2.4~~5~~ LSA material and SCO must be packaged in accordance with Table 4-2.

## 9.3 PACKAGES CONTAINING FISSILE MATERIAL

~~Unless not classified as fissile in accordance with 2:7.2.3.5, The contents of~~ packages containing fissile material must not contain:

- ~~— a) a mass of fissile material (or mass of each fissile nuclide for mixtures when appropriate) 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;~~

be as specified for the package design either directly in these Instructions or in their certificates of approval, ~~where appropriate.~~

**Table 4-2. Industrial package requirements for LSA material and SCO**

<i>Radioactive contents</i>	<i>Industrial package type</i>	
	<i>Exclusive use</i>	<i>Not under exclusive use</i>
LSA-I Solid Liquid	Type IP-1 Type IP-1	Type IP-1 Type IP-2
LSA-II Solid Liquid and gas	Type IP-2 Type IP-2	Type IP-2 Type IP-3
LSA-III	Type IP-2	Type IP-3
SCO-I	Type IP-1	Type IP-1
SCO-II	Type IP-2	Type IP-2

## Chapter 10

### CLASS 8 — CORROSIVE SUBSTANCES

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DGP-WG/12-WP/13 and its Addendum (see paragraph 3.2.19 of DGP-WG/13-WP/1)

*Note.— This amendment will be considered by the Council for incorporation in the 2013-2014 Edition of the Technical Instructions by way of an addendum.*

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#### Packing Instruction 874

Passenger and cargo aircraft for UN 3477 (contained in equipment) only

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##### ADDITIONAL PACKING REQUIREMENTS

- Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation.
- Equipment must be securely cushioned in the outer packagings.
- The mass of each fuel cell cartridge must not exceed 1 kg.
- Fuel cell systems must not charge batteries during transport.
- On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, including Amendment 1, or a standard approved by the appropriate authority of the State of Origin.

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UN Model Regulations, P805, ST/SG/AC.10/40/Add.1  
See also paragraph 3.2.29.1 f) of this report.

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#### Packing Instruction 877

Passenger and cargo aircraft for UN 3507 only

##### General requirements

Part 4, Chapter 1 and Part 4:9.1.2, 9.1.4 and 9.1.7 requirements must be met, including:

##### 1) Compatibility requirements

- Substances must be compatible with their packagings as required by 4:1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion.
- Substances of Class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

##### 2) Closure requirements

- Closures must meet the requirements of 4:1.1.4.

<u>UN number and name</u>	<u>Quantity per package</u>	
	<u>Passenger</u>	<u>Cargo</u>
<u>UN 3507 Uranium hexafluoride, radioactive material, excepted package, non-fissile or fissile-excepted</u>	<u>Less than 0.1 kg</u>	<u>Less than 0.1 kg</u>

**ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS**

- Substances must be packed in a metal or plastics primary receptacle in a leakproof rigid secondary packaging in a rigid outer packaging.
- Primary inner receptacles must be packed in secondary packagings in a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packagings must be secured in outer packagings with suitable cushioning material to prevent movement. If multiple primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated so as to prevent contact between them.
- The contents must comply with the provisions of 2:7.2.4.5.2.
- The provisions of 6:7.3 must be met.
- In the case of fissile-excepted material, limits specified in 2:7.2.3.5 and 6:7.10.2

**OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6:3.1)**Boxes

Aluminium (4B)  
Fibreboard (4G)  
Natural wood (4C1, 4C2)  
Plastics (4H1, 4H2)  
Plywood (4D)  
Reconstituted wood (4F)  
Steel (4A)

Drums

Aluminium (1B2)  
Fibre (1G)  
Other metal (1N2)  
Plastics (1H2)  
Plywood (1D)  
Steel (1A2)

Jerricans

Aluminium (3B2)  
Plastics (3H2)  
Steel (3A2)

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DGP-WG/12-WP/45 (see paragraph 3.5.2 of DGP-WG/13-WP/1)

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## Chapter 11

### CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

*Parts of this Chapter are affected by State Variation US 2; see Table A-1*

#### Packing Instruction 950

Passenger and cargo aircraft for UN 3166 only  
(See Packing Instruction 951 for flammable gas-powered vehicles and engines or  
Packing Instruction 952 for battery-powered equipment and vehicles)

...

#### ADDITIONAL PACKING REQUIREMENTS

...

##### *Batteries*

All batteries must be installed and securely fastened in the battery holder of the vehicle, machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

- 1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;
- 2) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the ~~UN Manual of Tests and Criteria, Part III, subsection 38.3~~ meet the provisions of Part 2.9.3.1, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
- 3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

...

### Packing Instruction 951

Cargo aircraft only for UN 3166 only  
(See Packing Instruction 950 for flammable liquid-powered vehicles and engines or  
Packing Instruction 952 for battery-powered equipment and vehicles)

...

#### ADDITIONAL PACKING REQUIREMENTS

...

#### *Batteries*

All batteries must be installed and securely fastened in the battery holder of the vehicle, machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

- 1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;
- 2) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the ~~UN Manual of Tests and Criteria, Part III, subsection 38.3~~ meet the provisions of Part 2.9.3.1, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
- 3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

...

### Packing Instruction 952

Passenger and cargo aircraft for UN 3171 only  
(See Packing Instruction 950 for flammable liquid-powered vehicles and engines or  
Packing Instruction 951 for flammable gas-powered vehicles and engines)

...

#### *Batteries*

All batteries must be installed and securely fastened in the battery holder of the vehicle, machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

- 1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;
- 2) if lithium batteries are installed in a vehicle, they must be of a type that has successfully passed the tests specified in the ~~UN Manual of Tests and Criteria, Part III, subsection 38.3~~ meet the provisions of Part 2.9.3.1, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
- 3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

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...

### Packing Instruction 958

Passenger and cargo aircraft for UN 2071 and UN 2590 only

#### General requirements

Part 4, Chapter 1 requirements must be met, including:

1) **Compatibility requirements**

— Substances must be compatible with their packagings as required by 4;1.1.3.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

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(DGP WG/13 WP/11 (see paragraph 3.2.13.1 d) of this report)

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<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>	<b>SINGLE PACKAGINGS</b>
UN 2071 <b>Ammonium nitrate fertilizers</b> UN 2590 <b>White-<del>a</del>Asbestos, <u>chrysotile</u></b>	200 kg	200 kg	Yes

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**Packing Instruction 959**

Passenger and cargo aircraft for UN 3245 only

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The following packagings are authorized:

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2) Packagings, which need not conform to the packaging test requirements of Part 6, but conforming to the following:

...

For transport, the mark illustrated below must be displayed on the external surface of the outer packaging on a background of a contrasting colour and must be clearly visible and legible. The mark must be in the form of a square set at an angle of 45° (diamond-shaped) with each side having a length of at least 50 mm; the width of the line must be at least 2 mm and the letters and numbers must be at least 6 mm high.

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UN Model Regulations, P904, ST/SG/AC.10/40/Add.1

See also paragraph 3.2.29.1 d) of this report.

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*Replace* mark for GMO/GMMOs with the following:

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DGP-WG/12-WP/22 (see paragraph 3.2.20 of DGP-WG/13-WP/1)

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### Packing Instruction Y963

Passenger and cargo aircraft for ID 8000 only

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

- a) Each packaging must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during air transport.
- b) Inner packagings that are breakable (such as earthenware, glass or brittle plastic) must be packed to prevent breakage and leakage under conditions normally incident to transport. ~~These completed packagings~~ Each package offered for transport must be capable of withstanding a 1.2 m drop on solid concrete in the position most likely to cause damage. The criteria for passing the test is that the outer packaging must not exhibit any damage liable to affect safety during transport and there must be no leakage from the inner packaging(s). Each package offered for transport must be capable of withstanding, without breakage or leakage of any inner packaging and without significant reduction of effectiveness, a force applied to the top surface for a duration of 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 m (including the test sample).

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DGP-WG/13-WP/6 (see paragraph 3.5.3 of this report):

## Packing Instruction 965

Passenger and cargo aircraft for UN 3480

### 1. Introduction

This entry applies to lithium ion or lithium polymer batteries. This packing instruction is structured as follows:

- Section IA applies to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
- Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and
- Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.

### 2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

### IA. SECTION IA

~~Section IA requirements apply to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh that have been determined to meet the criteria for assignment to Class 9.~~

Each cell or battery must **meet all the provisions of 2:9.3.:**

- ~~1) be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3;~~

~~Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3 may continue to be transported.~~

- ~~2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and~~

- ~~3) be manufactured under a quality management programme as described in 2:9.3.1 e).~~

- ~~Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).~~

#### 1A.1 General requirements

Part 4;1 requirements must be met.

## Packing Instruction 965

**Table 965-IA**

<i>UN number and proper shipping name</i>	<i>Net quantity per package</i>	
	<i>Passenger</i>	<i>Cargo</i>
UN 3480 <b>Lithium ion batteries</b>	5 kg	35 kg

### IA.2 Additional requirements

- Lithium ion cells and batteries must be protected against short circuits.
- Lithium ion cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

### IA.3 Outer packagings

*Boxes*

Aluminium (4B)  
Fibreboard (4G)  
Natural wood (4C1, 4C2)  
Other metal (4N)  
Plastics (4H1, 4H2)  
Plywood (4D)  
Reconstituted wood (4F)  
Steel (4A)

*Drums*

Aluminium (1B2)  
Fibre (1G)  
Other metal (1N2)  
Plastics (1H2)  
Plywood (1D)  
Steel (1A2)

*Jerricans*

Aluminium (3B2)  
Plastics (3H2)  
Steel (3A2)

### IB. SECTION IB

~~Section IB requirements apply to lithium ion cells with a Watt hour rating not exceeding 20 Wh and lithium ion batteries with a Watt hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II.~~

Quantities of lithium ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II ~~must be assigned to Class 9~~ and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following:

- the provisions of Part 6; and
- the dangerous goods transport document requirements of 5.4, provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:
  - 1) the name and address of the shipper and consignee;
  - 2) UN 3480;
  - 3) Lithium ion batteries PI 965 IB;

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DGP-WG/13-WP/28 (see paragraph 3.5.4 of this report):

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- 4) the number of packages and the ~~gross mass of~~ **net quantity contained in** each package.

## Packing Instruction 965

DGP-WG/13-WP/6 (see paragraph 3.5.3 of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2.9.3.1 a) and e) and ~~if they meet all of the following:~~

- 1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
- 2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
  - the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
- ~~3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported;~~

- ~~4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).~~

### IB.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

DGP-WG/13-WP/55 (see paragraph 3.5.4 of this report):

**Table 965-IB**

Contents	<u>Net quantity per package quantity</u>	
	<i>Passenger</i>	<i>Cargo</i>
Lithium ion cells and batteries	10 kg-G	10 kg-G

### IB.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.

### IB.3 Outer packagings

Boxes

Drums

Jerricans

Strong outer packagings

## Packing Instruction 965

DGP-WG/13-WP/6 (see paragraph 3.5.3 of this report):

### II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and if they meet all of the following:

- 1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
- 2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
  - the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
- 3) ~~each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~Note 1. — Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~Note 2. — Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- ~~4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).~~

#### II.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

**Table 965-II**

Contents	<i>Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh</i>	<i>Lithium ion cells with a Watt-hour rating more than 2.7 Wh, but not more than 20 Wh</i>	<i>Lithium ion batteries with a Watt-hour rating more than 2.7 Wh, but not more than 100 Wh</i>
1	2	3	4
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

The limits specified in columns 2, 3 and 4 of Table 965-II must not be combined in the same package.

## Packing Instruction 965

### II.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- Where a consignment includes packages bearing the lithium battery handling label, the words “lithium ion batteries, in compliance with Section II of PI965” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

### II.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.

## Packing Instruction 966

Passenger and cargo aircraft for UN 3481 (packed with equipment) only

### 1. Introduction

This entry applies to lithium ion or lithium polymer batteries packed with equipment.

Section I of this packing instruction applies to lithium ion and lithium polymer cells and batteries that are assigned to Class 9. Certain lithium ion and lithium polymer cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

### 2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

### I. SECTION I

~~Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.~~

Each cell or battery must **meet all the provisions of 2;9.3.:**

- ~~1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- ~~2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and~~

- ~~3) be manufactured under a quality management programme as described in 2;9.3.1 e).~~

~~Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).~~

#### I.1 General requirements

Part 4;1 requirements must be met.

UN number and proper shipping name	Package quantity (Section I)	
	Passenger	Cargo
UN 3481 <b>Lithium ion batteries packed with equipment</b>	5 kg of lithium ion cells or batteries	35 kg of lithium ion cells or batteries



## Packing Instruction 966

### I.2 Additional requirements

- Lithium ion cells and batteries must be protected against short circuits.
- Lithium ion cells or batteries must:
  - be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance requirements.
- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- For the purpose of this packing instruction, "equipment" means apparatus requiring the lithium ion batteries with which it is packed for its operation.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

### I.3 Outer packagings

#### Boxes

Aluminium (4B)  
Fibreboard (4G)  
Natural wood (4C1, 4C2)  
Other metal (4N)  
Plastics (4H1, 4H2)  
Plywood (4D)  
Reconstituted wood (4F)  
Steel (4A)

#### Drums

Aluminium (1B2)  
Fibre (1G)  
Other metal (1N2)  
Plastics (1H2)  
Plywood (1D)  
Steel (1A2)

#### Jerricans

Aluminium (3B2)  
Plastics (3H2)  
Steel (3A2)

## II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries packed with equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and if they meet all of the following:

- 1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
- 2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
  - the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
- 3) ~~each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~— Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~— Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- 4) ~~cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).~~

## Packing Instruction 966

### II.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

<i>Contents</i>	<i>Package quantity (Section II)</i>	
	<i>Passenger</i>	<i>Cargo</i>
Net quantity of lithium ion cells or batteries per package	5 kg	5 kg

### II.2 Additional requirements

- Lithium ion cells and batteries must:
  - be placed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong outer packaging.
- 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 equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares.
- Each package of cells or batteries, or the completed package, must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words “lithium ion batteries, in compliance with Section II of PI966” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

### II.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.

## Packing Instruction 967

Passenger and cargo aircraft for UN 3481 (contained in equipment) only

### 1. Introduction

This entry applies to lithium ion or lithium polymer batteries contained in equipment.

Section I of this packing instruction applies to lithium ion and lithium polymer cells and batteries that are assigned to Class 9. Certain lithium ion and lithium polymer cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

### 2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

### I. SECTION I

~~Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.~~

Each cell or battery must **meet all the provisions of 2;9.3;**

- ~~1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and~~

~~Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- ~~2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and~~

- ~~3) be manufactured under a quality management programme as described in 2;9.3.1 e).~~

- ~~Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).~~

### 1.1 General requirements

Equipment must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

UN number and proper shipping name	Package quantity (Section I)	
	Passenger	Cargo
UN 3481 <b>Lithium ion batteries contained in equipment</b>	5 kg of lithium ion cells or batteries	35 kg of lithium ion cells or batteries

### 1.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.
- 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.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

## Packing Instruction 967

### I.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

## II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and ~~if they meet all of the following:~~

- 1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
- 2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
  - the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
- 3) ~~each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~— Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~— Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- 4) ~~cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).~~

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

### II.1 General requirements

Equipment must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

<i>Contents</i>	<i>Package quantity (Section II)</i>	
	<i>Passenger</i>	<i>Cargo</i>
Net quantity of lithium ion cells or batteries per package	5 kg	5 kg

### II.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
- Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31) (except button cell batteries installed in equipment (including circuit boards)).
- Each consignment with packages bearing the lithium battery handling label must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and

### Packing Instruction 967

- repacking if necessary; and
- a telephone number for additional information.
  - Where a consignment includes packages bearing the lithium battery handling label, the words “lithium ion batteries, in compliance with Section II of PI967” must be placed on the air waybill, when an air waybill is used.
  - Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

#### II.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

#### II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.

## Packing Instruction 968

Passenger and cargo aircraft for UN 3090

### 1. Introduction

This entry applies to lithium metal or lithium alloy batteries. This packing instruction is structured as follows:

- Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
- Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
- Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

### 2. Lithium batteries forbidden from transport

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

### IA. SECTION IA

~~Section IA requirements apply to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g that have been determined to meet the criteria for assignment to Class 9.~~

Each cell or battery must **meet all the provisions of 2:9.3**:

- ~~1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~———— Note 1. — Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~———— Note 2. — Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- ~~2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and~~

- ~~3) be manufactured under a quality management programme as described in 2:9.3.1 e).~~

~~Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).~~

#### IA.1 General requirements

Part 4;1 requirements must be met.

**Table 968-IA**

UN number and proper shipping name	Net quantity per package	
	Passenger	Cargo
UN 3090 <b>Lithium metal batteries</b>	2.5 kg	35 kg

## Packing Instruction 968

### IA.2 Additional requirements

- Lithium metal cells and batteries must be protected against short circuits.
- Lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- Lithium metal batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- For lithium metal cells and batteries prepared for transport on passenger aircraft as Class 9:
  - cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging; and
  - cells and batteries must be surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging.

### IA.3 Outer packagings

#### Boxes

Aluminium (4B)  
Fibreboard (4G)  
Natural wood (4C1, 4C2)  
Other metal (4N)  
Plastics (4H1, 4H2)  
Plywood (4D)  
Reconstituted wood (4F)  
Steel (4A)

#### Drums

Aluminium (1B2)  
Fibre (1G)  
Other metal (1N2)  
Plastics (1H2)  
Plywood (1D)  
Steel (1A2)

#### Jerricans

Aluminium (3B2)  
Plastics (3H2)  
Steel (3A2)

### IB. SECTION IB

~~Section IB requirements apply to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II.~~

~~Quantities of lithium metal cells or batteries that exceed the allowance permitted in Section II, Table 968-II, must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following:~~

- the provisions of Part 6; and
- the dangerous goods transport document requirements of 5;4, provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:
  - 1) the name and address of the shipper and consignee;
  - 2) UN 3090;
  - 3) Lithium metal batteries PI 968 IB;

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DGP-WG/13-WP/28 (see paragraph 3.5.4 of this report):

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- 4) the number of packages and the ~~gross mass of~~ **net quantity contained in** each package.

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DGP-WG/13-WP/6 (see paragraph 3.5.3 of this report):

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Lithium metal or lithium alloy cells and batteries may be offered for transport **provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and** ~~if they meet all of the following:~~

- 1) for lithium metal cells, the lithium content is not more than 1 g;
- 2) for lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g;
- ~~3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are~~

**Packing Instruction 968**

~~composed have been so tested.~~

~~————— Note 2. — Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

~~— 4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).~~

**IB.1 General requirements**

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

DGP-WG/13-WP/55 (see paragraph 3.5.4 of this report):

**Table 968-IB**

Contents	Net quantity per <del>P</del> package quantity	
	Passenger	Cargo
Lithium metal cells and batteries	2.5 kg- <del>G</del>	2.5 kg- <del>G</del>

**IB.2 Additional requirements**

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.

**IB.3 Outer packagings**

Boxes

Drums

Jerricans

Strong outer packagings

DGP-WG/13-WP/6 (see paragraph 3.5.3 of this report):

**II. SECTION II**

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal or lithium alloy cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal or lithium alloy cells and batteries may be offered for transport **provided that each cell and battery meets the provisions of 2.9.3.1 a) and e) and if they meet all of the following:**

- 1) for a lithium metal cell, the lithium content is not more than 1 g;
- 2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
- 3) ~~each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~



## Packing Instruction 968

~~Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~Note 2.— Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

~~4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).~~

### II.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

**Table 968-II**

Contents	<i>Lithium metal cells and/or batteries with a lithium content not more than 0.3 g</i>	<i>Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g</i>	<i>Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g</i>
1	2	3	4
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

### II.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words “lithium metal batteries, in compliance with Section II of PI968” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

### II.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.

## Packing Instruction 969

Passenger and cargo aircraft for UN 3091 (packed with equipment) only

### 1. Introduction

This entry applies to lithium metal or lithium alloy batteries packed with equipment.

Section I of this packing instruction applies to lithium metal and lithium alloy cells and batteries that are assigned to Class 9. Certain lithium metal and lithium alloy cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

### 2. Lithium batteries forbidden from transport

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

#### I. SECTION I

~~Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.~~

Each cell or battery must **meet all the provisions of 2;9.3I**:

- ~~1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and~~

~~*Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.*~~

~~*Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.*~~

- ~~2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and~~

- ~~3) be manufactured under a quality management programme as described in 2;9.3.1 e).~~

~~Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).~~

#### I.1 General requirements

Part 4;1 requirements must be met.

UN number and proper shipping name	Package quantity (Section I)	
	Passenger	Cargo
UN 3091 <b>Lithium metal batteries packed with equipment</b>	5 kg of lithium metal cells or batteries	35 kg of lithium metal cells or batteries

## Packing Instruction 969

### I.2 Additional requirements

- Lithium metal cells and batteries must be protected against short circuits.
- Lithium metal cells or batteries must:
  - be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance requirements.
- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- For the purpose of this packing instruction, "equipment" means apparatus requiring the lithium batteries with which it is packed for its operation.
- For lithium metal cells and batteries prepared for transport on passenger aircraft as Class 9:
  - cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging surrounded by cushioning material that is non-combustible and non-conductive and placed inside an outer packaging.

### I.3 Outer packagings

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other metal (1N2)	Steel (3A2)
Other metal (4N)	Plastics (1H2)	
Plastics (4H1, 4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

## II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents);8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal cells and batteries packed with equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) if they meet all of and the following:

- 1) for a lithium metal cell, the lithium content is not more than 1 g;
- 2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
- 3) ~~each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~———— Note 1. — Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~———— Note 2. — Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- 4) ~~cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).~~

**Packing Instruction 969**

**II.1 General requirements**

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

<i>Contents</i>	<i>Package quantity (Section II)</i>	
	<i>Passenger</i>	<i>Cargo</i>
Net quantity of lithium metal cells or batteries per package	5 kg	5 kg

**II.2 Additional requirements**

- Lithium metal cells or batteries must:
  - be placed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong outer packaging.
- 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 equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares.
- Each package of cells or batteries, or the completed package, must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words “lithium metal batteries, in compliance with Section II of PI969” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

**II.3 Outer packagings**

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

**II.4 Overpacks**

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.

## Packing Instruction 970

Passenger and cargo aircraft for UN 3091 (contained in equipment) only

### 1. Introduction

This entry applies to lithium metal or lithium alloy batteries contained in equipment.

Section I of this packing instruction applies to lithium metal and lithium alloy cells and batteries that are assigned to Class 9. Certain lithium metal and lithium alloy cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

### 2. Lithium batteries forbidden from transport

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

### I. SECTION I

~~Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.~~

Each cell or battery must **meet all the provisions of 2;9.3:**

- 1) ~~be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and~~

~~—— Note 1. — Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~—— Note 2. — Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- 2) ~~incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and~~

- 3) ~~be manufactured under a quality management programme as described in 2;9.3.1 e).~~

~~Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).~~

#### I.1 General requirements

Equipment must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

UN number and proper shipping name	Package quantity (Section I)	
	Passenger	Cargo
UN 3091 <b>Lithium metal batteries contained in equipment</b>	5 kg of lithium metal cells or batteries	35 kg of lithium metal cells or batteries

#### I.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- 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.
- The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

## Packing Instruction 970

### I.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

## II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal cells and batteries contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and if they meet all of the following:

- 1) for a lithium metal cell, the lithium content is not more than 1 g;
- 2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g.
- 3) ~~each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;~~

~~— Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.~~

~~— Note 2. Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.~~

- 4) ~~cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).~~

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

### II.1 General requirements

Equipment containing batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

<i>Contents</i>	<i>Package quantity (Section II)</i>	
	<i>Passenger</i>	<i>Cargo</i>
Net quantity of lithium metal cells or batteries per package	5 kg	5 kg

## Packing Instruction 970

### II.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
- Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31) (except button cell batteries installed in equipment (including circuit boards)).
- Each consignment with packages bearing the lithium battery handling label must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- Where a consignment includes packages bearing the lithium battery handling label, the words "lithium metal batteries, in compliance with Section II of PI970" must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

### II.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word "Overpack".

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See paragraph 3.5.2 of this report for UN Model Regulations, P908 and P909 (in addition to SP 376 and SP377), ST/SG/AC.10/40/Add.1

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## Part 5

# SHIPPER'S RESPONSIBILITIES

## Chapter 1

### GENERAL

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#### 1.1 GENERAL REQUIREMENTS

Before a person offers any package or overpack of dangerous goods for transport by air, that person must ensure that:

- a) the articles or substances are not forbidden for transport by air (see Part 1, Chapter 2);

...

- d) the dangerous goods transport document has been properly executed and the declaration signed;

- ~~e) an overpack is used for packages bearing the "Cargo aircraft only" label only if:~~

- ~~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;~~

- f) the overpack does not contain packages of dangerous goods which require segregation according to Table 7-1;

- g) when an overpack is used, packages must be secured within the overpack;

- h) 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 Y963 or dry ice used as a refrigerant for other than dangerous goods when prepared according to Packing Instruction 954 or magnetized material when prepared according to Packing Instruction 953);

- i) before a package or overpack is reused, all inappropriate dangerous goods labels and markings are removed or completely obliterated;

- j) 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 2.4.10 is an indication of compliance with this requirement. The intended function of each package must not be impaired by the overpack; and

- k) packages and overpacks containing dangerous goods are offered to the operator separately from cargo which is not subject to these Instructions, except as provided for in 7.1.4.1.

*Note 1.— Packages and overpacks containing dangerous goods may be included on the same air waybill as cargo which is not subject to these Instructions.*

*Note 2.— The requirement in 1.1 k) also applies to consolidated shipments offered to the operator.*

*Note 3.— For cooling purposes, an overpack may contain dry ice, provided that the overpack meets the requirements of Packing Instruction 954.*



**1.2 GENERAL PROVISIONS FOR CLASS 7****1.2.1 Approval of shipments and notification**


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UN Model Regulations, paragraph 5.1.5.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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**1.2.1.1 General**

In addition to the approval ~~for~~ of package designs described in Part 6, Chapter 4, multilateral shipment approval is also required in certain circumstances (1.2.1.2 and 1.2.1.3). In some circumstances it is also necessary to notify competent authorities of a shipment (1.2.1.4).

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**1.2.1.4 Notifications**

Notification to competent authorities is required as follows:

- a) Before the first shipment of any package requiring competent authority approval, the shipper must ensure that copies of each applicable competent authority certificate applying to that package design have been submitted to the competent authority of the country of origin of the shipment and to the competent authority of each country through or into which the consignment is to be transported. The shipper is not required to await an acknowledgement from the competent authority, nor is the competent authority required to make such acknowledgement of receipt of the certificate;
- b) For each of the following types of shipments:
  - i) Type C packages containing radioactive material with an activity greater than 3000 A<sub>1</sub> or 3000 A<sub>2</sub>, as appropriate, or 1000 TBq, whichever is the lower;
  - ii) Type B(U) packages containing radioactive material with an activity greater than 3000 A<sub>1</sub> or 3000 A<sub>2</sub>, as appropriate, or 1000 TBq, whichever is the lower;
  - iii) Type B(M) packages;
  - iv) Shipment under special arrangement;

the shipper must notify the competent authority of the country of origin of the shipment and the competent authority of each country through or into which the consignment is to be transported. This notification must be in the hands of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance;

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UN Model Regulations, paragraph 5.1.5.1.4 c), ST/SG/AC.10/40/Add.1

The UN text referenced does not currently exist in the Instructions. DGP/24 will consider whether to add it. It is currently reproduced as 6;7.22.

DGP-WG/13-WP/15 (see paragraph 3.2.31.1 a)

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- c) The shipper is not required to send a separate notification if the required information has been included in the application for ~~shipment~~ approval of shipment (see 6;7.22.3);
- d) The consignment notification must include:
  - i) sufficient information to enable the identification of the package or packages including all applicable certificate numbers and identification marks;
  - ii) information on the date of shipment, the expected date of arrival and proposed routing;
  - iii) the names of the radioactive material or nuclides;
  - iv) descriptions of the physical and chemical forms of the radioactive material, or whether it is special form radioactive material or low dispersible radioactive material; and
  - v) the maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix symbol (see 1;3.2). For fissile material, the mass of fissile material (or of each fissile nuclide for mixtures when appropriate) in units of grams (g), or multiples thereof, may be used in place of activity.

## 1.2.2 Certificates issued by the competent authority

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UN Model Regulations, paragraph 5.1.5.2.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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1.2.2.1 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) fissile material excepted under 2;7.2.3.5.1 f)~~
  - ~~iii) packages containing 0.1 kg or more of uranium hexafluoride;~~
  - iv) ~~all~~ packages containing fissile material unless excepted by [2;7.2.3.5](#), 6;7.10.2 ~~or 6;7.10.3~~;
  - vi) Type B(U) packages and Type B(M) packages;
  - vii) Type C packages;
- b) Special arrangements;
- c) Certain shipments (1.2.1.2);
- ~~d) Determination of the basic radionuclide values referred to in 2;7.2.2.1 for individual radionuclides which are not listed in Table 2-12 (see 2;7.2.2.2 a));~~
- ~~e) Alternative activity limits for an exempt consignment of instruments or articles (see 2;7.2.2.2 b));~~

The certificates must confirm that the applicable requirements are met, and for design approvals, must attribute to the design an identification mark.

The ~~certificates of approval for 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.

1.2.2.2 The shipper must be in possession of a copy of each applicable certificate.

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UN Model Regulations, paragraph 5.1.5.2.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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1.2.2.3 For package designs where ~~it is not required that~~ a competent authority issued ~~a certificate is not required of~~ approval, the shipper must, on request, make available for inspection by the relevant competent authority, documentary evidence of the compliance of the package design with all the applicable requirements.

## 1.2.3 Determination of transport index (TI) and criticality safety index (CSI)

### 1.2.3.1 Determination of transport index

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 5-1;
- c) The value obtained in steps a) and b) above must be rounded up to the first decimal place (e.g. 1.13 becomes 1.2), except that a value of 0.05 or less may be considered as zero.

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.

**Table 5-1. Multiplication factors for freight containers**

<i>Size of load*</i>	<i>Multiplication factor</i>
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.	

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.

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UN Model Regulations, paragraph 5.1.5.3.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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1.2.3.1.4 Packages ~~and~~ overpacks and freight containers must be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table 5-2 and with the following requirements:

- a) for a package ~~or~~ overpack or freight container, 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 or freight container 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 1.2.3.1.1 and 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 7.2.10.5.3, as appropriate;
- d) a package transported under a special arrangement must be assigned to category III-YELLOW except under the provisions of 1.2.3.1.5;
- e) an overpack or freight container which contains packages transported under special arrangement must be assigned to category III-YELLOW except under the provisions of 1.2.3.1.5.

UN Model Regulations, Table 5.1.5.3.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

**Table 5-2. Categories of packages and overpacks and freight containers**

<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 1.2.3.1.1 c). ** Must be transported under exclusive use and special arrangement <u>except for freight containers (see Table 7-6).</u>		

UN Model Regulations, paragraph 5.1.5.3.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

1.2.3.1.5 In all cases of international transport of packages requiring competent authority approval of design or shipment ~~approval~~, for which different approval types apply in the different countries concerned by the shipment, the categorization must be in accordance with the certificate of the country of origin of design.

UN Model Regulations, paragraph 5.1.5.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

**1.2.4 Specific provisions for excepted packages of radioactive material of Class 7**

1.2.4.1 Excepted packages of radioactive material of Class 7 must be legibly and durably marked on the outside of the packaging with:

- a) the UN number preceded by the letters "UN";
- b) an identification of either the shipper or consignee, or both; and
- c) the permissible gross mass if this exceeds 50 kg.

UN Model Regulations, paragraph 5.1.5.4.2, ST/SG/AC.10/40/Add.1  
See also paragraph 3.2.31.1 b) of this report.

[ 1.2.4.2 The documentation requirements of 5:4 do not apply to excepted packages of radioactive material of Class 7, ~~except that information must be shown on a transport document such as an air waybill or other similar document. The information required is as follows and should be shown in the following order:~~

- a) the UN number preceded by the letters "UN" and the name and address of the shipper and the consignee and, if relevant, the identification mark for each competent authority certificate of approval (see 5:4.1.5.7.1 g)) must be shown on a transport document such as an air waybill or other similar document complying with the requirements of 5:4.1.2.1 to 5:4.1.2.4; and
- b) ~~the proper shipping name~~ the requirements of 5:4.1.6.2 and, if relevant, those of 5:4.1.5.7.1 g), 5:4.1.5.7.3 and 5:4.1.5.7.4 must apply; and
- c) the requirements of 5:4.4 must apply.

Where an agreement exists with the operator, the shipper may provide the information by EDP or EDI techniques.]

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UN Model Regulations, paragraph 5.1.5.4.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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1.2.4.3 The requirements of 5;2.4.5.2 and 5;3.5.1.1 k) must apply if relevant.

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### 1.5 SALVAGE PACKAGINGS

Before a person offers any salvage packaging for transport by air, that person must ensure that:

- it is marked with the proper shipping name and UN number of, and bear all the labels appropriate for, the dangerous goods contained therein;

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UN Model Regulations, paragraph 5.2.1.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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- it is marked with the word “Salvage” and the lettering of the “Salvage” marking must be at least 12 mm high;
- the words “Salvage package” are added after the description of the goods in the dangerous goods transport document required by 4.1; and
- where the package contains dangerous goods restricted to transport on cargo aircraft only, it bears a “Cargo aircraft only” label and the dangerous goods transport document contains the necessary statement according to 4.1.5.7.1 b).

In addition, that person must ensure that all other applicable requirements are met.

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UN Model Regulations, paragraph 5.2.1.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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Note.— The size requirement for the “Salvage” marking must apply as from 1 January 2016.

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### 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 disinfected or sterilized to nullify any hazard, and any label or marking indicating that it had contained an infectious substance must be removed or obliterated.

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UN Model Regulations, paragraph 5.1.3.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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1.6.3 Freight containers as well as other P-packagings and overpacks 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/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters and 0.04 Bq/cm<sup>2</sup> for all other alpha emitters.

## Chapter 2

### PACKAGE MARKINGS

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#### 2.4 MARKING SPECIFICATIONS AND REQUIREMENTS

##### 2.4.1 Marking with proper shipping name and UN or ID number

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UN Model Regulations, paragraph 5.2.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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2.4.1.1 Unless otherwise provided in these Instructions, the proper shipping name of the dangerous goods (supplemented with the technical name(s) if appropriate, see Part 3, Chapter 1) and, when assigned, the corresponding UN number preceded by the letters “UN” or “ID”, as appropriate, must be displayed on each package. The UN number and the letters “UN” or “ID” must be at least 12 mm high, except for packagings of 30 litres capacity or less or of 30 kg maximum net mass and for cylinders of 60 litres water capacity or less, when they must be at least 6 mm in height and except for packagings of 5 litres or 5 kg or less when they must be of an appropriate size. In the case of unpackaged articles, the marking must be displayed on the article, on its cradle or on its handling, storage or launching device. A typical package marking would be:

“Corrosive liquid, acidic, organic, n.o.s. (caprylyl chloride) UN 3265”.

*Note.— The size requirements for the UN number marking will become mandatory from 1 January 2014.*

2.4.1.2 For solid substances, unless the word “molten” is already included in the proper shipping name, it must be added to the proper shipping name on the package when a substance is offered for air transport in the molten state (see Part 3, Chapter 1).

*Note.— Additional descriptive text in the entries in column 1 of the Dangerous Goods List (Table 3-1) are not part of the proper shipping name but may be used in addition to the proper shipping name.*

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##### 2.4.5 Special marking requirements for radioactive material

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UN Model Regulations, paragraph 5.2.1.5.1, ST/SG/AC.10/40/Add.1  
See also paragraph 3.2.31.1 c) of this report

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~~2.4.5.1 Each package must be legibly and durably marked on the outside of the packaging with an identification of either the shipper or consignee, or both. Each overpack must be legibly and durably marked on the outside of the overpack with an identification of either the shipper or consignee or both unless these markings of all packages within the overpack are clearly visible.~~

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UN Model Regulations, paragraph 5.2.1.5.2, ST/SG/AC.10/40/Add.1  
Moved from current 5;2.4.5.1 e):

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2.4.5.1 The marking of excepted packages of radioactive material of Class 7 must be as required by 5.1.2.4.1.

a) 2.4.5.2 ~~e~~ Each package of gross mass exceeding 50 kg must have its permissible gross mass legibly and durably marked on the outside of the packaging;

b) 2.4.5.3 ~~e~~ Each package which conforms to:

i) a Type IP-1 package, a Type IP-2 package or a Type IP-3 package design must be legibly and durably marked on the outside of the packaging with “TYPE IP-1”, “TYPE IP-2” or “TYPE IP-3” as appropriate;

ii) a Type A package design must be legibly and durably marked on the outside of the packaging with “TYPE A”;

iii) a Type IP-2 package, a Type IP-3 package or a Type A package design must be legibly and durably marked on the outside of the packaging with the international vehicle registration code (VRI Code) of the country of origin of design and either the name of the manufacturer, or other identification of the packaging specified by the competent authority of the country of origin of design.

UN Model Regulations, paragraph 5.2.1.5.5, ST/SG/AC.10/40/Add.1

Changes in addition to those introduced into the 18th Revised Edition of the Model Regulations are proposed for current paragraph 2.4.5.1 of the Instructions for the sake of alignment with the UN text. The additional changes are highlighted in green.

DGP-WG/13-WP/15 (see paragraph 3.2.31.1 a) of this report)

~~e) 2.4.5.4~~ ~~e~~ Each package which conforms to a design approved by the competent authority under one or more of paragraphs 5:1.2.2.1, 6:7.21 to 6:7.21.4, [6:7.22.4 to 6:7.22.7] and 6:7.23.2.1 must be legibly and durably marked on the outside of the packaging with the following information:

~~ia)~~ the identification mark allocated to that design by the competent authority;

~~ii b)~~ a serial number to uniquely identify each packaging which conforms to that design; and

~~iii c)~~ "Type B(U)", "Type B(M)" or "Type C" in the case of a Type B(U) ~~or~~ Type B(M) or Type C package design, ~~with "TYPE B(U)" or "TYPE B(M)"; and~~

~~iv)~~ ~~in the case of a Type C package design, with "TYPE C".~~

DGP-WG/13-WP/58 (see paragraph 3.2.16 of this report)

Note.— Empty Type B(U) or Type B(M) packages as specified in the note to 2:7.2.4.1.1.7 shipped as industrial packages Type IP-1 must bear the appropriate specification marking for a Type IP-1 in which case the appropriate specification markings specified in 2.4.5.4 must be obliterated.

UN Model Regulations, paragraph 5.2.1.5.5, ST/SG/AC.10/40/Add.1

DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

~~e) 2.4.5.5~~ ~~e~~ Each package which conforms to a Type B(U), Type B(M) or Type C package design must have the outside of the outermost receptacle which is resistant to the effects of fire and water plainly marked by embossing, stamping or other means resistant to the effects of fire and water with the trefoil symbol, as shown in Figure 5-1 below:

Moved above (5;2.4.5.2):

~~e) The marking of excepted packages must be as required by 1.2.4.~~

2.4.5.2.6 In all cases of international transport of packages requiring competent authority approval of design or shipment ~~approval~~, for which different approval types apply in the different countries concerned by the shipment, the marking must be in accordance with the certificate of the country of origin of the design.

...

UN Model Regulations, paragraph 5.2.1.5.1, ST/SG/AC.10/40/Add.1

DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

#### 2.4.9 Special marking provisions for environmentally hazardous substances

2.4.9.1 Unless otherwise specified in these Instructions, ~~p~~ Packages containing environmentally hazardous substances meeting the criteria of 2:9.2.1 a) (UN Nos. 3077 and 3082) must be durably marked with the environmentally hazardous substance mark, ~~with the exception of single packagings and combination packagings where such single packagings or inner packagings of such combination packagings have:~~

~~— a net quantity of 5 L or less for liquids; or~~

~~— a net mass of 5 kg or less for solids.~~

2.4.9.2 The environmentally hazardous substance mark must be located adjacent to the markings required by 2.4.1.1. The requirements of 2.2.2 must be met.

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UN Model Regulations, paragraph 5.2.1.6.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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2.4.9.3 The environmentally hazardous substance mark must be as shown in Figure 5-2. The marking must be in the form of a square set at an angle of 45° (diamond-shaped). The symbol (fish and tree) must be black on white or suitable contrasting background. For packagings, the minimum dimensions must be 100 mm × 100 mm and the minimum width of line forming the diamond must be 2 mm, except in the case of packages of such dimensions that they can only bear smaller marks. If the size of the package so requires, the dimensions/line thickness may be reduced, provided the marking remains clearly visible. Where dimensions are not specified, all features must be in approximate proportion to those shown.

Note.— The labelling provisions of 5:3 apply in addition to any requirement for packages to bear the environmentally hazardous substance mark.

Note 2.— The provisions of 5:2.4.9.3 from the 2013-2014 Edition of these Instructions may continue to be applied until 31 December 2016.

2.4.9.4 Regardless of the application of 2.4.9.1, all packages containing environmentally hazardous substances (UN Nos. 3077 and 3082) must bear a Class 9 hazard label.

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UN Model Regulations, Figure 5.2.2 and paragraph 5.1.2.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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Replace mark for environmentally hazardous substances with the following:

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Figure 5-2. Symbol (fish and tree): black on white or suitable contrasting background

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#### 2.4.10 Marking of overpacks

An overpack must be marked with the word "Overpack", with the proper shipping name, UN number, and special handling instructions appearing on interior packages for each item of dangerous goods contained in the overpack unless markings and labels representative of all dangerous goods in the overpack are visible, except as required in 3.2.6 and 3.5.1.1 h) to i). Packaging specification markings must not be reproduced on the overpack. When packages containing dangerous goods in limited quantities are placed in an overpack, the overpack must also be marked with the limited quantity marking shown in Figure 3-1 unless the markings representative of all dangerous goods in the overpack are visible. The lettering of the "Overpack" marking must be at least 12 mm high.

Note.— The size requirement for the "Overpack" marking must apply as from 1 January 2016.

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## Chapter 3

## LABELLING

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UN Model Regulations, paragraph 5.2.2.1.12.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 of this report)

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3.2.6 Except when enlarged labels are used in accordance with 3.6, each package, overpack and freight container containing radioactive material must bear ~~at least the two labels which conforming to Figures 5-189, 5-1920 and 5-201 as according to the~~ appropriate ~~according to the~~ category (see 5.1.2.3.1.4) of that package, overpack or freight container. Labels must be affixed to two opposite sides on the outside of the package or **overpack or** on the outside of all four sides of the ~~a~~ 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 6.7.40.2 **2.7.2.3.5** must bear labels which conforming to the model shown in Figure 5-21; such labels, where applicable, must be affixed adjacent to the labels ~~for radioactive material conforming to Figure 5-19, 5-20, or 5-21, as applicable~~. 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 Labels must satisfy the provisions of this section and conform, in terms of colour, symbols and general format, to the specimen labels shown in Figures 5-3 to 5-24.

Note.— Where appropriate, labels in Figures 5-3 to 5-24 are shown with a dotted outer boundary as provided for in 3.5.1.1 a) i). This is not required when the label is applied on a background of contrasting colour.

Class hazard labels must conform to the following specifications:

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UN Model Regulations, paragraph 5.2.2.2.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/15 (see paragraph 3.2.31 d) of this report)

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- a) Labels must be configured as shown in Figure 5-3.

---

UN Model Regulations, paragraph 5.2.2.2.1.1.1, ST/SG/AC.10/40/Add.1

---

- i) Labels must be displayed on a background of contrasting colour, or must have either a dotted or solid outer boundary line.

---

UN Model Regulations, paragraph 5.2.2.2.1.1.2, ST/SG/AC.10/40/Add.1

---

- ii) ~~They~~ The label must be in the form of a square set at an angle of 45° (diamond shaped). ~~The~~ with minimum dimensions of must be 100 mm × 100 mm and the minimum width of the line inside the edge forming the diamond must be 2 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. They.~~ The line inside the edge must be parallel and must have a line 5 mm inside the edge and running parallel with it from the outside of that line to the edge of the label. The line inside the edge on in the upper half of ~~a~~ the label the line must have be the same colour as the symbol, and the line inside the edge on in the lower half of the label it must have be the same colour as the figure in the bottom corner class or division number 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 must contain the pictorial symbol and the lower half must contain the class or division number (and for goods of Class 1, 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. Where dimensions are not specified, all features must be in approximate proportion to those shown.
- iii) 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 line inside the edge must remain 5 mm to the

edge of the label. The minimum width of the line inside the edge must remain 2 mm. Dimensions for cylinders must comply with 5.3.5.1.1 b)

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UN Model Regulations, paragraph 5.2.2.2.1.1.3, ST/SG/AC.10/40/Add.1

---

Note.— The provisions of 3.5.1.1 a) from the 2013-2014 Edition of these Instructions may continue to be applied until 31 December 2016. When so applied, 3.5.1.1 a) i, ii, and iii need not apply until 31 December 2016.

Reorder the following paragraphs as shown. 5;3.5.1.1 b) = UN 5.2.2.2.1.2, 5;3.5.1.1 c) = UN 5.2.2.2.1.3, 5;3.5.1.1 d) ≈ UN 5.2.2.2.1.4, 5;3.5.1.1 e) ≈ UN 5.2.2.2.1.5, 5;3.5.1.1 f) ≈ UN 5.2.2.2.1.6, 5;3.5.1.1 g) not in UN, 5;3.5.1.1 h) = UN 5.2.2.1.12.2

**bf)** 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; ~~and~~
- 4) the Division 2.1 label displayed on cylinders and gas cartridges for liquefied petroleum gases, where they may be shown in the background colour of the receptacle if adequate contrast is provided.

**ed)** In addition, Eexcept for Divisions 1.4, 1.5 and 1.6; labels for Class 1 must show in the lower half above the class number, 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 class number and the compatibility group letter.

**eb)** 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 7225:2005, for display on the non-cylindrical part (shoulder) of such cylinders. Labels may overlap to the extent provided for by ISO 7225:2005 “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.

**ec)** With the exception of labels for Divisions 1.4, 1.5 and 1.6 of Class 1, the upper half of the label must contain the pictorial symbol and the lower half must contain the class or, in the case of labels for Class 5, the division number of the substance must be shown in the bottom corner of the label, as appropriate. For all other labels, the class number must be shown in the bottom corner of the label. The label may include such text as the UN number, or words describing the hazard class (e.g. “flammable”) in accordance with 3.5.1.1 e) provided that the text does not obscure or detract from the other required label elements.

**fe)** Unless otherwise provided for in these Instructions, only text indicating the nature of the risk may be inserted in the lower half of the label (in addition to the class or division number or compatibility group).

**g)** A label may contain form identification information, including the name of its maker, provided that information is printed outside of the solid line border in no larger than 10-point type.

Labelling of radioactive material

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UN Model Regulations, paragraph 5.2.2.1.12.2, ST/SG/AC.10/40/Add.1

---

**h)** Each label conforming to the applicable Figures ~~5-18~~ 19, ~~5-19~~ 20 ~~and or~~ 5-20 21 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 total mass of fissile material ~~(or mass of each fissile nuclide for mixtures when appropriate)~~ 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 h) 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: 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.)

---

UN Model Regulations, paragraph 5.2.2.1.12.3, ST/SG/AC.10/40/Add.1

---

- i) Each label conforming to the Figure 5-24~~22~~ must be completed with the criticality safety index (CSI) as stated in the certificate of approval for special arrangement or the certificate of approval for the package design applicable in the countries through or into which the consignment is transported and issued by the competent authority.

---

UN Model Regulations, paragraph 5.2.2.1.12.4, ST/SG/AC.10/40/Add.1

---

- j) For overpacks and freight containers, the label conforming to Figure 5-22 must bear the sum of the criticality safety indexes (CSI) on the label must bear the information required in h) above totalled together for the fissile contents of the overpack or freight container of all the packages contained therein.

---

UN Model Regulations, paragraph 5.2.2.1.12.5, ST/SG/AC.10/40/Add.1

---

- k) In all cases of international transport of packages requiring competent authority approval of design or shipment approval, for which different approval types apply in the different countries concerned by the shipment, the labelling must be in accordance with the certificate of the country of origin of design.

3.5.1.2 Illustrations of the class hazard labels, showing the approved symbols and colours, are given in Figures 5-3 to 5-23. The label descriptions used in column 5 of Table 3-1 are indicated in parentheses.

*Note 1.— The asterisk appearing in the bottom corner of the label indicates the location of the class or division number when the label is used to show the primary risk. See Figures 5-3 to 5-6 concerning the location of information on explosives labels.*

*Note 2.— Minor variations in the design of the symbol on labels or other differences such as the width of vertical lines on labels as shown in these Instructions or in regulations of other modes, which do not affect the obvious meaning of the label, are acceptable. For example the hand shown on the Class 8 label may be shown with or without shading, the extreme right and left vertical lines on the Division 4.1 and Class 9 label may extend to the edge of the label or there may be some white space at the edge, etc.*

...

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DGP-WG/12-WP/5 (see paragraph 3.2.22 of DGP-WG/13-WP/1)

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### 3.5.2 Handling labels

#### 3.5.2.1 Handling label specifications

An illustration of each of the handling labels showing the approved design and colour is given in Figures 5-24~~25~~ to 5-26~~27~~ and Figures 5-28~~29~~ to 5-34~~32~~. The minimum label dimensions are shown in the figures, Where dimensions or features are not specified, these must be in approximate proportion to those shown; however:

- a) labels having dimensions not smaller than half of those indicated may be used on packages containing infectious substances when the packages are of dimensions such that they can only bear smaller labels; and
- b) orientation labels may meet the specification of either Figure 5-26 or ISO Standard 780:1997.

#### 3.5.2.2 Lithium battery handling label

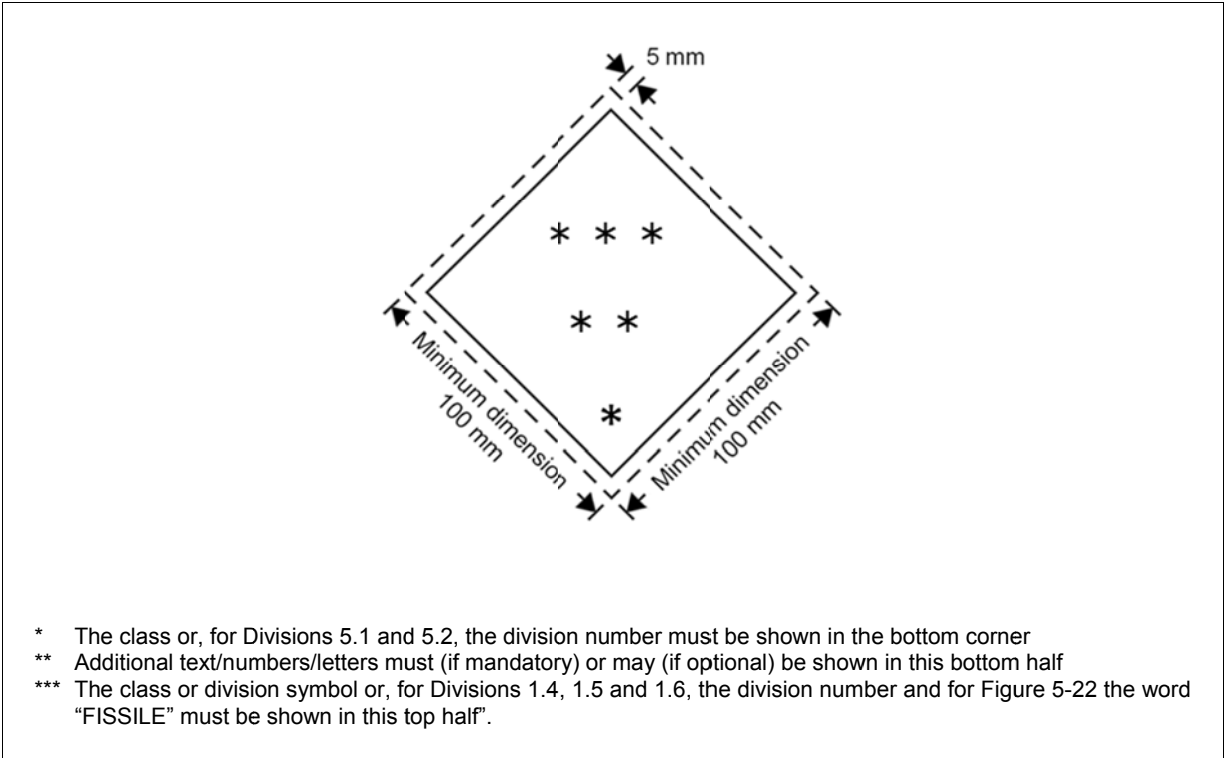
Packages containing lithium batteries that meet the requirements of Section II of Packing Instructions 965 to 970 must bear a "Lithium battery" handling label shown in Figure 5-34~~32~~, as required by the applicable packing instruction. The label must be a minimum dimension of 120 mm wide × 110 mm high except labels of 74~~105~~ mm wide × 40~~57~~ mm high may be used on packages containing lithium batteries where the packages are of dimensions such that they can only bear smaller labels. When the reduced size label is used, the label features must be in approximate proportion to those shown on the full-size label (Figure 5-32). The label must show "Lithium metal batteries" or "Lithium ion batteries", as applicable. Where the package contains both types of batteries, the label must show "Lithium metal and lithium ion batteries". Packages containing lithium batteries that meet the requirements of Section IB of Packing Instructions 965 and 968 must bear both a "Lithium battery" handling label shown in Figure 5-34~~32~~ and a Class 9 hazard label (Figure 5-23~~24~~).

...

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Insert the following new Figure 5-3:

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- \* The class or, for Divisions 5.1 and 5.2, the division number must be shown in the bottom corner
- \*\* Additional text/numbers/letters must (if mandatory) or may (if optional) be shown in this bottom half
- \*\*\* The class or division symbol or, for Divisions 1.4, 1.5 and 1.6, the division number and for Figure 5-22 the word "FISSILE" must be shown in this top half".

**Figure 5-3. Class/division label**

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**Renumber subsequent figures accordingly**

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---

UN Model Regulations, paragraph 5.2.1.7.1 (Figures 5.2.3 and 5.2.4), ST/SG/AC.10/40/Add.1

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Replace Figure 5-26 with the following:

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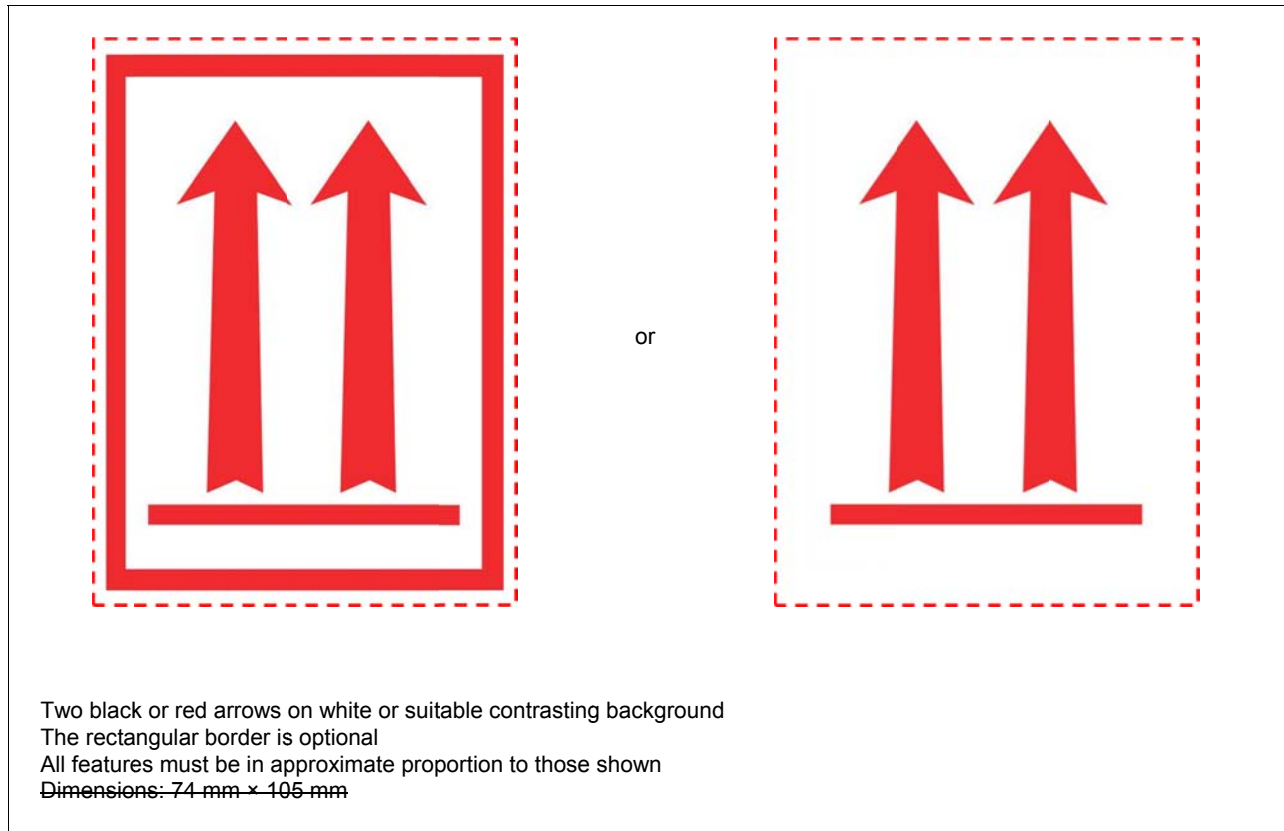


Figure 5-26~~26~~<sup>27</sup>. Package orientation

DGP-WG/12-WP/5 (see paragraph 3.2.22 of DGP-WG/13-WP/1)

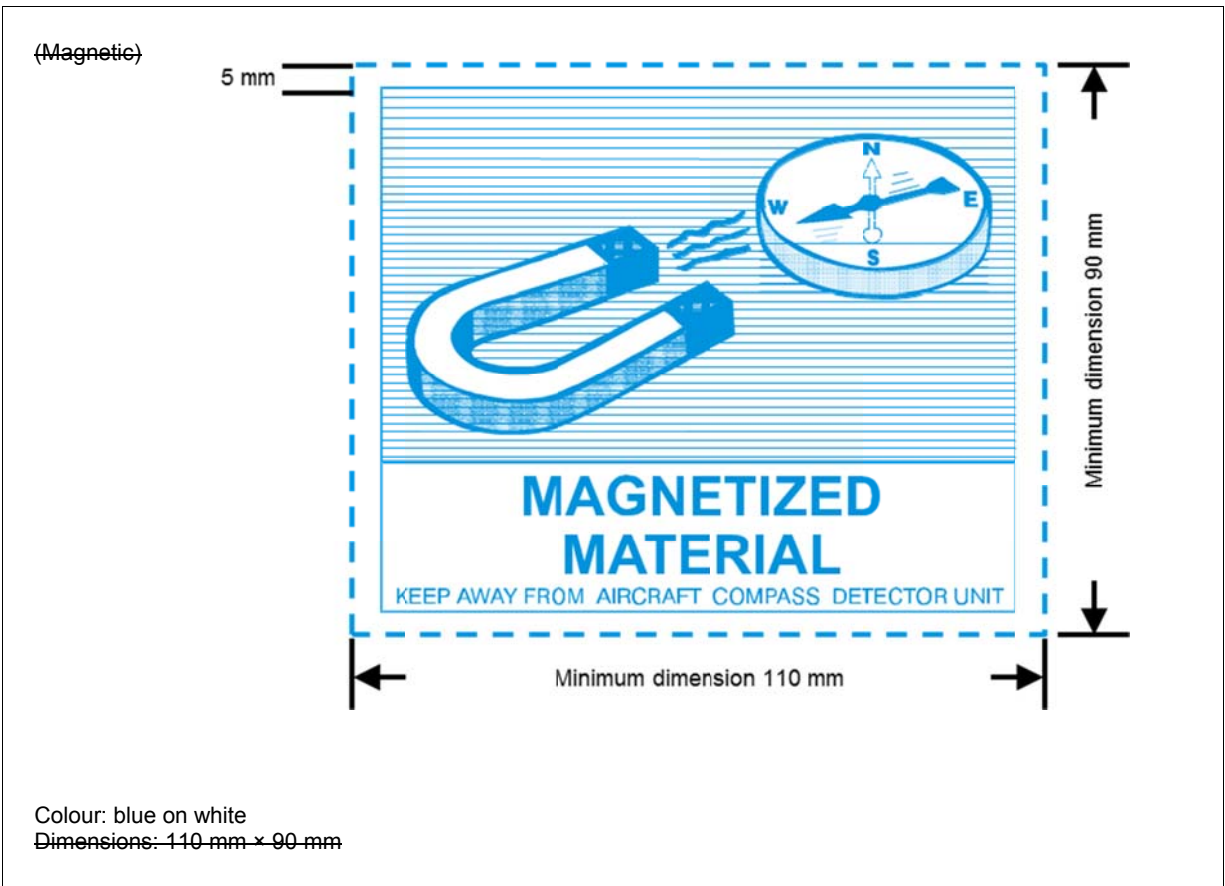


Figure 5-2425. Magnetized material



Figure 5-2526. Cargo aircraft only

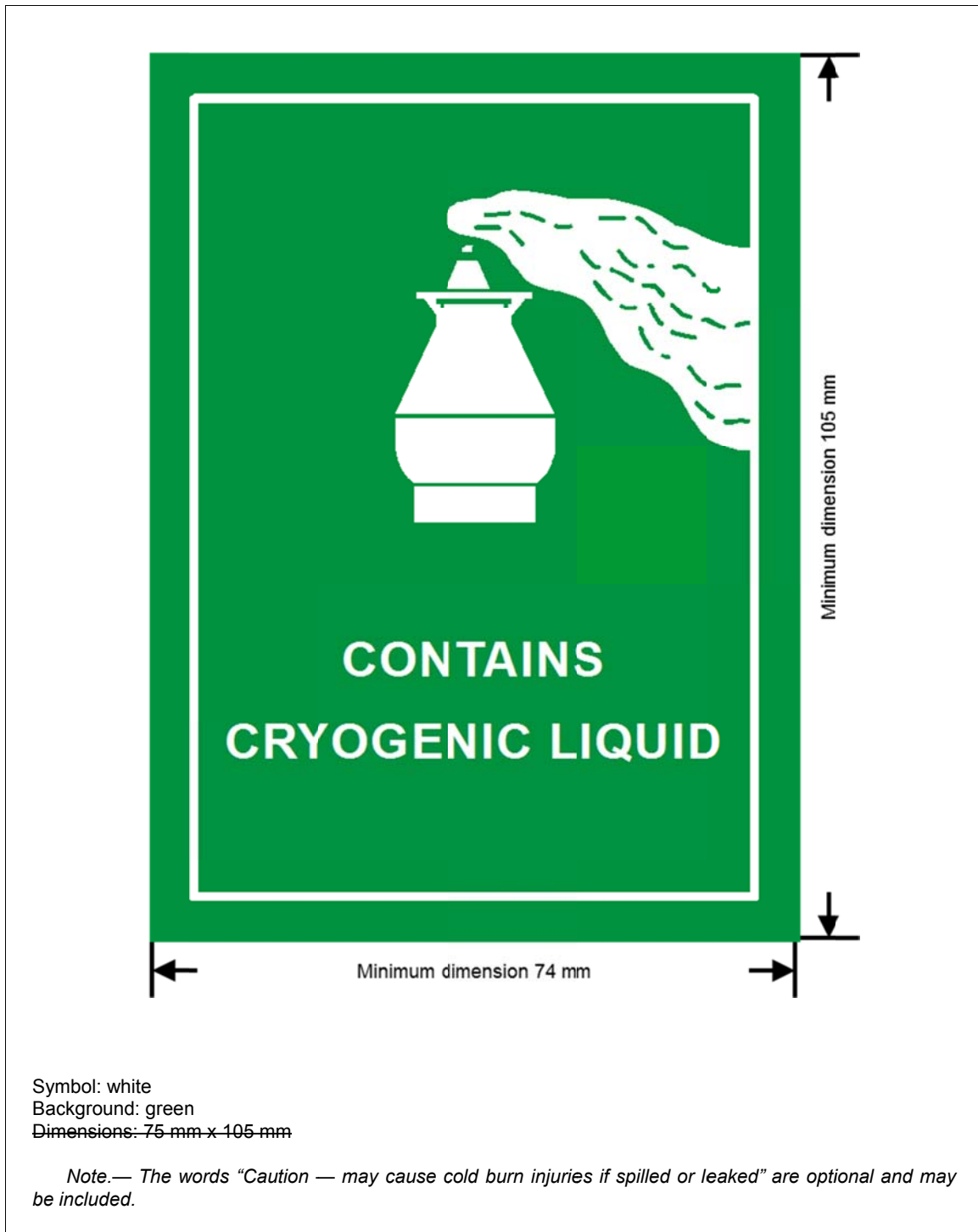


Figure 5-28~~28~~<sup>29</sup>. Cryogenic liquid label



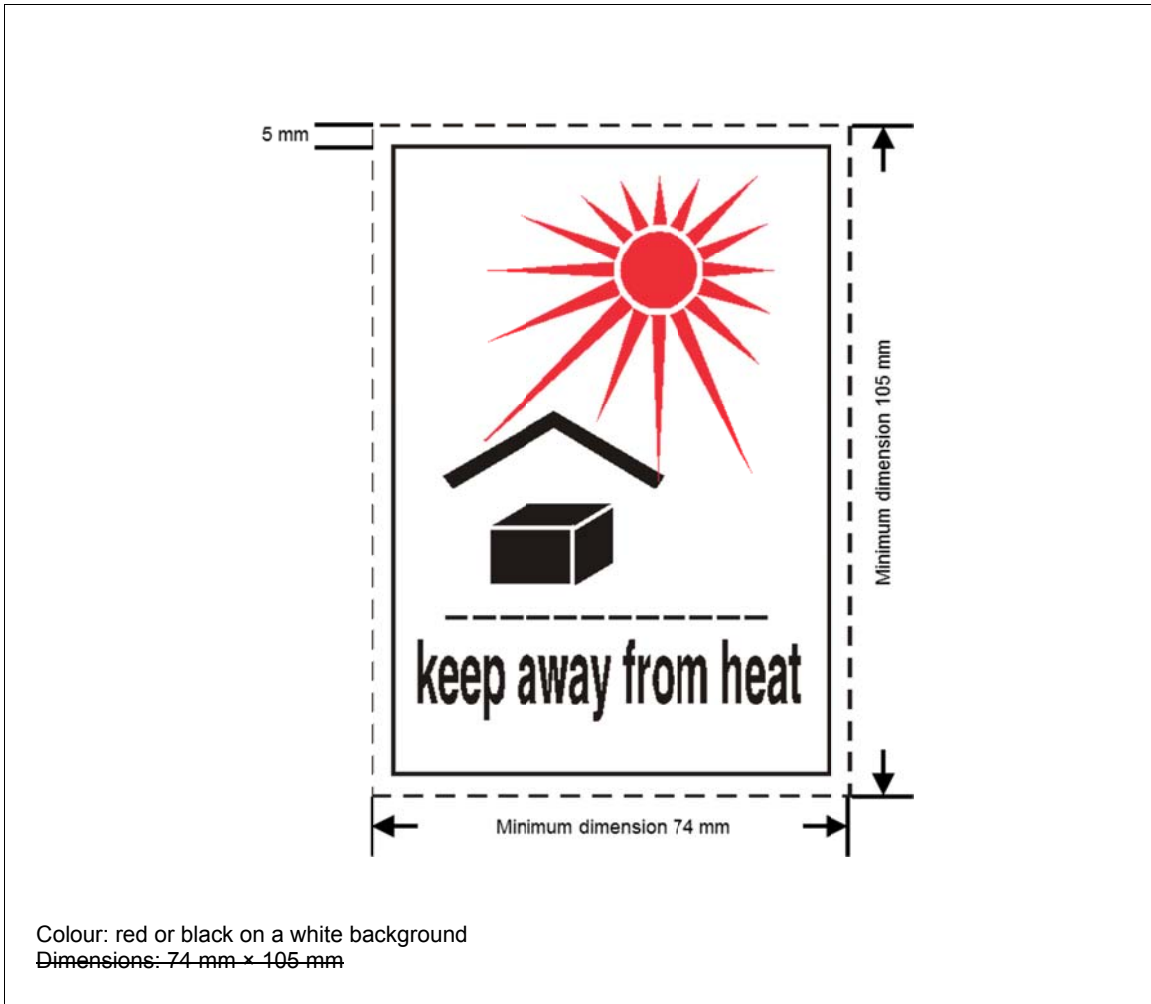


Figure 5-2930. Keep away from heat

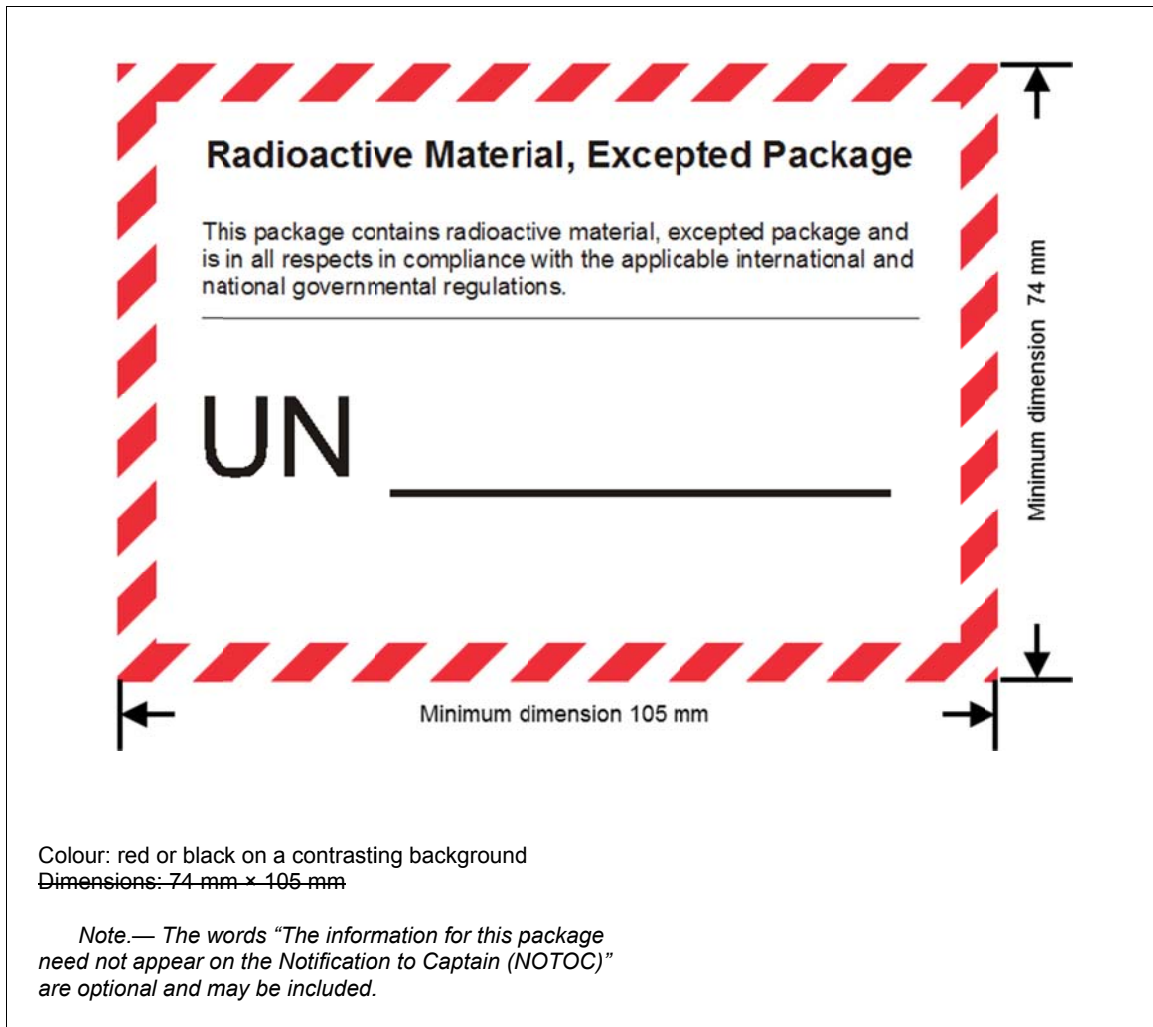


Figure 5-3031. Radioactive material, excepted package



Figure 5-3432. Lithium battery handling label

## Chapter 4

### DOCUMENTATION

...

#### 4.1.5.7 Radioactive material

4.1.5.7.1 The following information must be included for each consignment of Class 7 material, as applicable, in the order given:

- a) The name or symbol of each radionuclide or, for mixtures of radionuclides, an appropriate general description or a list of the most restrictive nuclides;
- b) A description of the physical and chemical form of the material, or a notation that the material is special form radioactive material or low dispersible radioactive material. A generic chemical description is acceptable for chemical form;

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DGP-WG/13-WP/58 (see paragraph 3.2.16 of this report)

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Note.— For empty Type B(U) or Type B(M) packages as specified in the note to 2:7.2.4.1.1.7, the name or symbol of the radionuclide of the shielding material followed by the physical and chemical form must be included (e.g. U-dep., solid, metal oxide) in which case the indicated radionuclide may differ from the radionuclide(s) authorized in the package design certificate.

- c) The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix symbol (see 1:3.2). For fissile material, the mass of fissile material (or mass of each fissile nuclide for mixtures when appropriate) in units of grams (g), or appropriate multiples thereof, may be used in place of activity;
- d) The category of the package, i.e. I-WHITE, II-YELLOW, III-YELLOW;
- e) The transport index (categories II-YELLOW and III-YELLOW only);

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UN Model Regulations, paragraph 5.4.1.5.7.1, ST/SG/AC.10/40/Add.1

---

- f) ~~For consignments including fissile material other than consignments excepted under 6:7.10.2, the criticality safety index;~~
  - 1) shipped under one exception of 2:7.2.3.5.1 a) to f), reference to that paragraph;
  - 2) shipped under 2:7.2.3.5.1 c) to e), the total mass of fissile nuclides;
  - 3) contained in a package for which one of 6:7.10.2 a) to c) or 6:7.10.3 is applied, reference to that paragraph; and
  - 4) the criticality safety index, where applicable.
- g) The identification mark for each competent authority certificate of approval ~~certificate~~ (special form radioactive material, low dispersible radioactive material, fissile material excepted under 2:7.2.3.5.1 f), special arrangement, package design, or shipment) applicable to the consignment;
- h) For consignments of more than one package, the information contained in 4.1.4.1 a) to c) and 4.1.5.7.1 a) to g) must be given for each package. For packages in an overpack or freight container, a detailed statement of the contents of each package within the overpack or freight container and, where appropriate, of each overpack or freight container must be included. If packages are to be removed from the overpack or freight container at a point of intermediate unloading, appropriate transport documents must be made available;
- i) Where a consignment is required to be shipped under exclusive use, the statement "EXCLUSIVE USE SHIPMENT"; and
- j) For LSA-II, LSA-III, SCO-I and SCO-II, the total activity of the consignment as a multiple of  $A_2$ . For radioactive material for which the  $A_2$  value is unlimited, the multiple of  $A_2$  must be zero.

4.1.5.7.2 The shipper must provide a statement regarding actions, if any, that are required to be taken by the carrier. The statement must be in the languages deemed necessary by the carrier or the authorities concerned, and must include at least the following points:

- a) Supplementary requirements for loading, stowage, carriage, handling and unloading of the package, overpack or freight container including any special stowage provisions for the safe dissipation of heat (see 7;2.10.3.2), or a statement that no such requirements are necessary;
- b) Restrictions on the type of aircraft and any necessary routing instructions;
- c) Emergency arrangements appropriate to the consignment.

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UN Model Regulations, paragraph 5.4.1.5.7.3, ST/SG/AC.10/40/Add.1

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4.1.5.7.3 In all cases of international transport of packages requiring competent authorities by approval of design or shipment approval, for which different approval types apply in the different countries concerned by the shipment, the UN number and proper shipping name required in 4.1.4.1 must be in accordance with the certificate of the country of origin of design.

...

#### 4.1.6 Certification

4.1.6.1 The dangerous goods transport document must include a certification or declaration that the consignment is acceptable for transport and that the goods are properly packaged, marked and labelled, and in proper condition for transport in accordance with the applicable regulations and including additional air transport requirements of these Instructions (examples of additional air transport requirements are indicated in 5;1.1).

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UN Model Regulations, paragraph 5.4.1.5.1, ST/SG/AC.10/40/Add.1

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The text for this certification is:

"I hereby declare that the contents of this consignment are fully and accurately described above<sup>2</sup> by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations."

<sup>2</sup> or below

For air transport the following additional statement is required:

"I declare that all of the applicable air transport requirements have been met."

The certification must be signed and dated by the shipper. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

*Note.— The word "placarded" is not essential for shipments by air.*

4.1.6.2 If the dangerous goods documentation is presented to the operator by means of EDP or EDI transmission techniques, the signature(s) may be electronic signature(s) or may be replaced by the name(s) (in capitals) of the person authorized to sign. Where the original consignment details are provided to an operator, by EDP or EDI techniques, and subsequently the consignment is transhipped to an operator that requires a paper dangerous goods transport document, the operator must ensure the paper document indicates "Original Received Electronically" and the name of the signatory must be shown in capital letters.

4.1.6.3 In addition to the languages which may be required by the State of Origin, English should be used for the dangerous goods transport document.

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## Part 6

# PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

...


## 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 1 to 6. For embossed metal packagings the capital letters "UN" may be applied as the symbol;

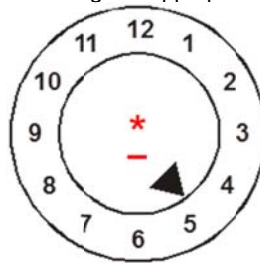
...

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UN Model Regulations, paragraph 6.1.3.1 e), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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- e) the last two digits of the year during which the packaging was manufactured. Packagings of types 1H1, 1H2, 3H1 and 3H2 must also be appropriately marked with the month of manufacture; this may be marked on the packaging in a different place from the remainder of the marking. An appropriate method is:



\* The last two digits of the year of manufacture may be displayed at that place. In such a case, the two digits of the year in the type approval marking and in the inner circle of the clock must be identical.

Note.— Other methods that provide the minimum required information in a durable, visible and legible form are also acceptable.

- f) the State authorizing the allocation of the mark, indicated by the distinguishing sign for motor vehicles in international traffic;
- g) the name of the manufacturer or other identification of the packaging specified by the appropriate national authority.

...

2.4 PACKAGING MARKINGS FOR INTERMEDIATE BULK CONTAINERS

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UN Model Regulations, paragraph 6.5.2.2.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

---

2.4.3 The maximum permitted stacking load applicable when the IBC is in use must be displayed on a symbol as follows shown in Figure 6-1 or Figure 6-2. The symbol must be durable and clearly visible.

---

Replace the symbols with the following:

---

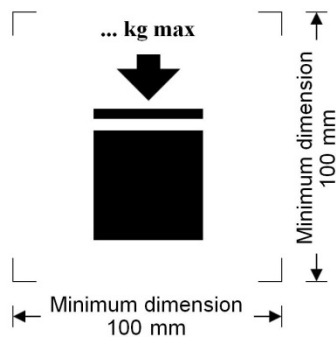


Figure 6-1. IBCs capable of being stacked

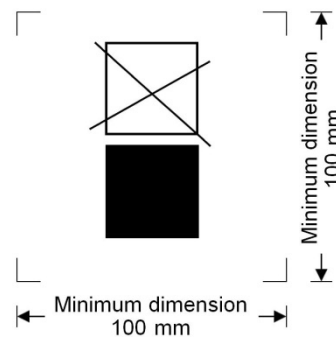


Figure 6-2. IBCs NOT capable of being stacked

The minimum dimensions must be 100 mm x 100 mm. The letters and numbers indicating the mass must be at least 12 mm high. The area within the printer's marks indicated by the dimensional arrows must be square. Where dimensions are not specified, all features must be in approximate proportion to those shown. The mass marked above the symbol must not exceed the load imposed during the design type test (see 6.5.6.6.4 of the UN Model Regulations) divided by 1.8.

Note.— The provisions of 2.4.3 must apply to all IBCs manufactured, repaired or remanufactured as from 1 January 2011. The provisions of 2.4.3 of the 2013-2014 Edition of these Instructions may continue to be applied to all IBCs manufactured, repaired or remanufactured between 1 January 2011 and 31 December 2016.

2.4.4 Example of a marking is:



13H3/Z/03 01  
F/Meunier1713/0/1000

as in as in 2.4.2 a), b),c), and d)  
as in 2.4.2 e), f), g) and h)

## 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

#### 5.1.1 Design and construction

5.1.1.1 Cylinders and closed cryogenic receptacles and their closures must be designed, manufactured, tested and equipped in such a way as to withstand all conditions, including fatigue, to which they will be subjected during normal conditions of transport.

5.1.1.2 In recognition of scientific and technological advances, and recognizing that cylinders and closed cryogenic receptacles other than those that are marked with a UN certification marking may be used on a national or regional basis, cylinders and closed cryogenic receptacles conforming to requirements other than those specified in these Instructions may be used if approved by the appropriate national authorities in the countries of transport and use.

5.1.1.3 In no case must the minimum wall thickness be less than that specified in the design and construction technical standards.

5.1.1.4 For welded cylinders and closed cryogenic receptacles, only metals of weldable quality must be used.

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UN Model Regulations, paragraph 5.1.1.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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5.1.1.5 The test pressure of cylinders must be in accordance with Packing Instruction 200 or, for a chemical under pressure, with Packing Instruction 218. The test pressure for closed cryogenic receptacles must be in accordance with Packing Instruction 202. The test pressure of a metal hydride storage system must be in accordance with Packing Instruction 214. [The test pressure of a cylinder for an adsorbed gas must be in accordance with Packing Instruction 219.](#)

...

### 5.2 REQUIREMENTS FOR UN CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES

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UN Model Regulations, paragraph 6.2.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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In addition to the general requirements of 5.1, UN cylinders and closed cryogenic receptacles must comply with the requirements of this section, including the standards, as applicable. [Manufacture of new UN cylinders and closed cryogenic receptacles or service equipment according to any particular standard in 5.2.1 and 5.2.3 is not permitted after the date shown in the right hand column of the tables.](#)

*Note 1.— With the agreement of the appropriate national authority, more recently published versions of the standards, if available, may be used.*

[Note 2.— UN cylinders and closed cryogenic receptacles and service equipment constructed according to standards applicable at the date of manufacture may continue in use subject to the periodic inspection provisions of these Instructions.](#)



### 5.2.1 Design, construction and initial inspection and testing

5.2.1.1 The following standards apply for the design, construction and initial inspection and test of UN cylinders, except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5:

UN Model Regulations, paragraph 6.2.2.1.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

<u>Reference</u>	<u>Title</u>	<u>Applicable for manufacture</u>
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.  <i>Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.</i>	<u>Until 31 December 2018</u>
<u>ISO 9809-1:2010</u>	<u>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</u>	<u>Until further notice</u>
ISO 9809-2:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.	<u>Until 31 December 2018</u>
<u>ISO 9809-2:2010</u>	<u>Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa</u>	<u>Until further notice</u>
ISO 9809-3:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	<u>Until 31 December 2018</u>
<u>ISO 9809-3:2010</u>	<u>Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders</u>	<u>Until further notice</u>
ISO 7866:1999	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing.  <i>Note.— The note concerning the F factor in section 7.2 of this standard must not be applied for UN cylinders. Aluminium alloy 6351A — T6 or equivalent must not be authorized.</i>	<u>Until further notice</u>
ISO 4706:2008	Gas cylinders — Refillable welded steel cylinders — Test pressure 60 bar and below.	<u>Until further notice</u>
ISO 18172-1:2007	Gas cylinders — Refillable welded stainless steel cylinders — Part 1: Test pressure 6 MPa and below.	<u>Until further notice</u>
ISO 20703:2006	Gas cylinders — Refillable welded aluminium-alloy cylinders — Design, construction and testing.	<u>Until further notice</u>
ISO 11118:1999	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	<u>Until further notice</u>
ISO 11119-1:2002	Gas cylinders of composite construction — Specification and test methods — Part 1: Hoop wrapped composite gas cylinders.	<u>Until further notice</u>
ISO 11119-2:2002	Gas cylinders of composite construction — Specification and test methods — Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners.	<u>Until further notice</u>
ISO 11119-3:2002	Gas cylinders of composite construction — Specification and test methods — Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners.	<u>Until further notice</u>

*Note 1.— In the above-referenced standards, composite cylinders must be designed for unlimited service life.*

*Note 2.— After the first 15 years of service, composite cylinders manufactured according to these standards, may be approved for extended service by the appropriate national authority which was responsible for the original approval of the cylinders and which will base its decision on the test information supplied by the manufacturer or owner or user.*

5.2.1.2 Not used.

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:

UN Model Regulations, paragraph 6.2.2.1.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
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.  <i>Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.</i>	<u>Until 31 December 2018</u>
<u>ISO 9809-1:2010</u>	<u>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</u>	<u>Until further notice</u>
ISO 9809-3:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	<u>Until 31 December 2018</u>
<u>ISO 9809-3:2010</u>	<u>Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders</u>	<u>Until further notice</u>

For the porous mass in the cylinder:

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 3807-1:2000	Cylinders for acetylene — Basic requirements — Part 1: Cylinders without fusible plugs.	<u>Until further notice</u>
ISO 3807-2:2000	Cylinders for acetylene — Basic requirements — Part 2: Cylinders with fusible plugs.	<u>Until further notice</u>

5.2.1.4 The following standard applies for the design, construction and initial inspection and test of UN closed cryogenic receptacles, except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5:

UN Model Regulations, paragraph 6.2.2.1.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 21029-1:2004	Cryogenic vessels — Transportable vacuum insulated vessels of not more than 1 000 L volume — Part 1: Design, fabrication, inspection and tests.	<u>Until further notice</u>

5.2.1.5 The following standards apply for the design, construction, and initial inspection and test of UN metal hydride storage systems, except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5:

UN Model Regulations, paragraph 6.2.2.1.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	<u>Until further notice</u>

5.2.1.6 Not used.

UN Model Regulations, paragraph 6.2.2.1.7, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

5.2.1.7 The following standards apply for the design, construction and initial inspection and test of UN cylinders for adsorbed gases except that the inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5.

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
<u>ISO 11513:2011</u>	<u>Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection</u>	<u>Until further notice</u>
<u>ISO 9809-1:2010</u>	<u>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</u>	<u>Until further notice</u>

## 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, Packing Instruction 202 or Packing Instruction 214), the following standards apply to material compatibility:

UN Model Regulations, paragraph 6.2.2.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 11114-1: <del>1997</del> <u>2012</u>	<del>Transportable gas</del> Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials.	<u>Until further notice</u>
ISO 11114-2:2000	Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials.	<u>Until further notice</u>

— *Note.* — *The limitations imposed in ISO 11114-1 on high strength steel alloys at ultimate tensile strength levels up to 1 400 MPa do not apply to Silane (UN 2203).*

### 5.2.3 Service equipment

The following standards apply to closures and their protection:

UN Model Regulations, paragraph 6.2.2.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

Reference	Title	Applicable for manufacture
<a href="#">ISO 11117:1998</a>	<a href="#">Gas cylinders — Valve protection caps and valve guards for industrial and medical gas cylinders — Design, construction and tests</a>	<a href="#">Until 31 December 2014</a>
ISO 11117:2008+ Cor 1:2009	Gas cylinders — Valve protection caps and valve guards — Design, construction and tests.  <i>— Note. — Construction according to ISO 11117:1998 may continue until 31 December 2014.</i>	<a href="#">Until further notice</a>
<a href="#">ISO 10297:1999</a>	<a href="#">Gas cylinders – Refillable gas cylinder valves – Specification and type testing</a>	<a href="#">Until 31 December 2008</a>
ISO 10297:2006	Gas cylinders — Refillable gas cylinder valves — Specification and type testing.	<a href="#">Until further notice</a>
ISO 13340:2001	Transportable gas cylinders — Cylinder valves for non-refillable cylinders — Specification and prototype testing	<a href="#">Until further notice</a>

For UN metal hydride storage systems, the requirements specified in the following standard apply to closures and their protection:

Reference	Title	Applicable for manufacture
ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	<a href="#">Until further notice</a>

### 5.2.4 Periodic inspection and test

The following standards apply to the periodic inspection and testing of UN cylinders and UN metal hydride storage systems:

UN Model Regulations, paragraph 6.2.2.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

References to ISO standards are reformatted into tables with three columns, the last being new information for applicable for manufacture date.

ISO 10460:2005 was moved from last row to second.

Reference	Title	Applicable for manufacture
ISO 6406:2005	Seamless steel gas cylinders — Periodic inspection and testing.	<a href="#">Until further notice</a>
ISO 10460:2005	Gas cylinders – Welded carbon-steel gas cylinders – Periodic inspection and testing.  <i>Note.— The repair of welds described in clause 12.1 of this standard must not be permitted. Repairs described in clause 12.2 require the approval of the appropriate national authority which approved the periodic inspection and test body in accordance with 5.2.6.</i>	<a href="#">Until further notice</a>
ISO 10461:2005/A1:2006	Seamless aluminium-alloy gas cylinders — Periodic inspection and testing.	<a href="#">Until further notice</a>
ISO 10462:2005	Transportable cylinders for dissolved acetylene — Periodic inspection and maintenance.	<a href="#">Until further notice</a>

<a href="#">ISO 11513:2011</a>	<a href="#">Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection</a>	<a href="#">Until further notice</a>
ISO 11623:2002	Transportable gas cylinders — Periodic inspection and testing of composite gas cylinders.	<a href="#">Until further notice</a>
ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	<a href="#">Until further notice</a>

### 5.2.7 Marking of UN refillable cylinders and closed cryogenic receptacles

*Note.*— Marking requirements for UN metal hydride storage systems are given in 5.2.9.

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5.2.7.4 The following manufacturing marks must be applied:

- m) Identification of the cylinder thread (e.g. 25E). (This mark is not required for closed cryogenic receptacles);
- n) The manufacturer's mark registered by the appropriate national authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark must be preceded by the character(s) identifying the country of manufacture, as indicated by the distinguishing signs of motor vehicles in international traffic. The country mark and the manufacturer's mark must be separated by a space or slash;
- o) The serial number assigned by the manufacturer;

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UN Model Regulations, paragraph 6.2.2.7.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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- p) In the case of steel cylinders and closed cryogenic receptacles and composite cylinders and closed cryogenic receptacles with steel liner intended for the transport of gases with a risk of hydrogen embrittlement, the letter "H" showing compatibility of the steel (see ISO 11114-1:49972012).

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### 5.2.9 Marking of UN metal hydride storage systems

5.2.9.1 UN metal hydride storage systems must be marked clearly and legibly with the marks listed in 5.2.9.2. These marks must be permanently affixed (e.g. stamped, engraved, or etched) on the metal hydride storage system. The marks must be on the shoulder, top end or neck of the metal hydride storage system or on a permanently affixed component of the metal hydride storage system. Except for the United Nations packaging symbol, the minimum size of the marks must be:

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5.2.9.2 The following marks must be applied:

- a) The UN packaging symbol 

This symbol must not be used for any purpose other than for certifying that a packaging complies with the relevant requirements in Chapters 1 to 6;

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UN Model Regulations, paragraph 6.2.2.9.2 j), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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- j) In the case of steel cylinders and composite cylinders with steel liner, the letter "H" showing compatibility of the steel (see ISO 11114-1:49972012); and
- k) In the case of metal hydride storage systems having limited life, the date of expiry, denoted by the letters "FINAL" followed by the year (four digits), followed by the month (two digits) and separated by a slash (i.e. "///").

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UN Model Regulations, paragraph 6.2.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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**5.4 REQUIREMENTS FOR AEROSOL DISPENSERS, 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**

Each filled aerosol dispenser or gas cartridge or fuel cell cartridge must be subjected to a test in a hot water bath in accordance with 5.4.1 or an approved water bath alternative in accordance with 5.4.2.

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UN Model Regulations, paragraph 6.2.4.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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**~~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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UN Model Regulations, paragraph 6.2.4.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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**5.4.2 Aerosol dispensers**

~~5.4.2.1 Each filled aerosol dispenser must be subjected to a test performed in a hot water bath or an approved water bath alternative.~~

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UN Model Regulations, paragraph 6.2.4.1 (previous 6.2.4.2), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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**~~5.4.2.2~~5.4.1 Hot water bath test**

~~5.4.2.2~~5.4.1.1 The temperature of the water 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 percent of the capacity of the aerosol dispenser, gas cartridge or fuel cell cartridge at 50°C). If the contents are sensitive to heat or if the aerosol dispensers, gas cartridges or 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 aerosol dispenser, gas cartridge or fuel cell cartridge in 2 000 must be tested at the higher temperature.

~~5.4.2.2~~5.4.1.2 No leakage or permanent deformation of an aerosol dispenser, receptacle or fuel cell cartridge may occur, except that a plastic aerosol dispenser, gas cartridge or fuel cell cartridge may be deformed through softening provided that it does not leak.

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UN Model Regulations, paragraph 6.2.4.2 (previous 6.2.4.2.2), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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#### **5.4.2.35.4.2 Alternative methods**

~~5.4.2.3.1~~—With the approval of the appropriate national authority, alternative methods which provide an equivalent level of safety may be used provided that the requirements of ~~5.4.2.2.1, 5.4.2.2.2 and 5.4.2.3~~ 5.4.2.1 and, as appropriate, 5.4.2.2 or 5.4.2.3 are met.

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UN Model Regulations, paragraph 6.2.4.2.1 (previous 6.2.4.2.2.1), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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#### ~~5.4.2.3.25.4.2.1~~ 5.4.2.1 Quality system

~~5.4.2.3.2.15.4.2.1.1~~ 5.4.2.1.1 Aerosol dispenser, gas cartridge or fuel cell cartridge fillers and component manufacturers must have a quality system. The quality system must implement procedures to ensure that all aerosol dispensers, gas cartridges or fuel cell cartridges that leak or that are deformed are rejected and not offered for transport.

~~5.4.2.3.2.25.4.2.1.1.1~~ 5.4.2.1.1.1 The quality system must include:

- a) a description of the organizational structure and responsibilities;
- b) the relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;
- c) quality records, such as inspection reports, test data, calibration data and certificates;
- d) management reviews to ensure the effective operation of the quality system;
- e) a process for control of documents and their revision;
- f) a means for control of non-conforming aerosol dispensers, gas cartridges or fuel cell cartridges;
- g) training programmes and qualification procedures for relevant personnel; and
- h) procedures to ensure that there is no damage to the final product.

~~5.4.2.3.2.35.4.2.1.1.2~~ 5.4.2.1.1.2 An initial audit and periodic audits must be conducted to the satisfaction of the appropriate national authority. These audits must ensure the approved system is and remains adequate and efficient. Any proposed changes to the approved system must be notified to the appropriate national authority in advance.

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UN Model Regulations, paragraph 6.2.4.2.2 (before previous 6.2.4.2.2.2.2), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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#### 5.4.2.2 Aerosol dispensers

##### ~~5.4.2.3.35.4.2.2.1~~ 5.4.2.2.1 Pressure and leak testing of aerosol dispensers before filling

~~Every~~ Each empty aerosol dispenser must be subjected to a pressure equal to or in excess of the maximum expected in the filled aerosol dispensers at 55°C (50°C if the liquid phase does not exceed 95 percent of the capacity of the receptacle at 50°C). This must be at least two-thirds of the design pressure of the aerosol dispenser. If any aerosol dispenser shows evidence of leakage at a rate equal to or greater than  $3.3 \times 10^{-2}$  mbar.l.s<sup>-1</sup> at the test pressure, distortion or other defect, it must be rejected.

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UN Model Regulations, paragraph 6.2.2.2.2 (previous 6.2.4.2.2.3), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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~~5.4.2.3.4~~ 5.4.2.2.2 *Testing of the aerosol dispensers after filling*

~~5.4.2.3.4.1~~ 5.4.2.2.2.1 Prior to filling, the filler must ensure that the crimping equipment is set appropriately and the specified propellant is used.

~~5.4.2.3.4.2~~ 5.4.2.2.2.2 Each filled aerosol dispenser must be weighed and leak tested. The leak detection equipment must be sufficiently sensitive to detect at least a leak rate of  $2.0 \times 10^{-3}$  mbar.l.s<sup>-1</sup> at 20°C.

~~5.4.2.3.4.3~~ 5.4.2.2.2.3 Any filled aerosol dispenser which shows evidence of leakage, deformation or excessive mass must be rejected.

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UN Model Regulations, paragraph 6.2.4.2.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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5.4.2.3 Gas cartridges and fuel cell cartridges

5.4.2.3.1 Pressure testing of gas cartridges and fuel cell cartridges

5.4.2.3.1.1 Each gas cartridge or fuel cell cartridge must be subjected to a test pressure equal to or in excess of the maximum expected in the filled receptacle at 55°C (50°C if the liquid phase does not exceed 95 per cent of the capacity of the receptacle at 50°C). This test pressure must be that specified for the gas cartridge or fuel cell cartridge and must not be less than two thirds the design pressure of the gas cartridge or fuel cell cartridge. If any gas cartridge or fuel cell cartridge shows evidence of leakage at a rate equal to or greater than  $3.3 \times 10^{-2}$  mbar.l.s<sup>-1</sup> at the test pressure or distortion or any other defect, it must be rejected.

5.4.2.3.2 Leak testing gas cartridges and fuel cell cartridges

5.4.2.3.2.1 Prior to filling and sealing, the filler must ensure that the closures (if any) and the associated sealing equipment are closed appropriately and the specified gas is used.

5.4.2.3.2.2 Each filled gas cartridge or fuel cell cartridge must be checked for the correct weight of gas and must be leak tested. The leak detection equipment must be sufficiently sensitive to detect at least a leak rate of  $2.0 \times 10^{-3}$  mbar.l.s<sup>-1</sup> at 20°C.

5.4.2.3.2.3 Any gas cartridge or fuel cell cartridge that has gas weights not in conformity with the declared weight limits or shows evidence of leakage or deformation, must be rejected.

5.4.3 With the approval of the appropriate national authority, aerosols and receptacles, small, are not subject to 5.4.1 and 5.4.2 if they are required to be sterile, but may be adversely affected by water bath testing, provided:

- a) they contain a non-flammable gas and either:
  - i) contain other substances that are constituent parts of pharmaceutical products for medical, veterinary or similar purposes; or
  - ii) contain other substances used in the production process for pharmaceutical products; or
  - iii) are used in medical, veterinary or similar applications;
- b) an equivalent level of safety is achieved by the manufacturer's use of alternative methods for leak detection and pressure resistance, such as helium detection and water bathing using a statistical sample of at least 1 in 2 000 from each production batch; and
- c) for pharmaceutical products according to a) i) and iii) above, they are manufactured under the authority of a national health administration. If required by the appropriate national authority, the principles of Good Manufacturing Practice (GMP) established by the World Health Organization (WHO)<sup>1</sup> must be followed.

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<sup>1</sup>. WHO Publication: Quality assurance of pharmaceuticals. A compendium of guidelines and related materials. Volume 2: Good manufacturing practices and inspection.



## Chapter 7

# REQUIREMENTS FOR THE CONSTRUCTION, TESTING AND APPROVAL OF PACKAGES AND MATERIAL OF CLASS 7 RADIOACTIVE MATERIAL

*Parts of this Chapter are affected by State Variations CA 1, CA 3, CA 4, DE 2, IR 4, JP 8, JP 26, US 10; see Table A-1*

### 7.1 GENERAL REQUIREMENTS

7.1.1 The package must be so designed in relation to its mass, volume and shape that it can be easily and safely transported. In addition, the package ~~shall~~ **must** be so designed that it can be properly secured in the aircraft during transport.

7.1.2 The design must be such that any lifting attachments on the package will not fail when used in the intended manner and that, if failure of the attachments should occur, the ability of the package to meet other requirements of these Instructions would not be impaired. The design must take account of appropriate safety factors to cover snatch lifting.

7.1.3 Attachments and any other features on the outer surface of the package which could be used to lift it must be designed either to support its mass in accordance with the requirements of 7.1.2 or must be removable or otherwise rendered incapable of being used during transport.

7.1.4 As far as practicable, the packaging must be designed and finished so that the external surfaces are free from protruding features and can be easily decontaminated.

7.1.5 As far as practicable, the outer layer of the package must be designed so as to prevent the collection and the retention of water.

7.1.6 Any features added to the package at the time of transport which are not part of the package must not reduce its safety.

7.1.7 The package must be capable of withstanding the effects of any acceleration, vibration or vibration resonance, which may arise under routine conditions of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole. In particular, nuts, bolts and other securing devices must be designed so as to prevent them from becoming loose or being released unintentionally, even after repeated use.

7.1.8 The materials of the packaging and any components or structures must be physically and chemically compatible with each other and with the radioactive contents. Account must be taken of their behaviour under irradiation.

7.1.9 All valves through which the radioactive contents could escape must be protected against unauthorized operation.

7.1.10 The design of the package must take into account ambient temperatures and pressures that are likely to be encountered in routine conditions of transport.

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UN Model Regulations, paragraph 6.4.2.11, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.1.11 A package must be so designed that it provides sufficient shielding to ensure that, under routine conditions of transport and with the maximum radioactive contents that the package is designed to contain, the radiation level at any point on the external surface of the package would not exceed the values specified in 2.7.2.4.1.1.2, 4.9.1.10 and 4.9.1.11, as applicable, with account taken of 7.2.10.3.3 c) and [7.2.3.1.2 of the UN Model Regulations].

~~7.1.11~~ **7.1.12** For radioactive material having other dangerous properties, the package design must take into account those properties (see Part 2, Introductory Chapter, 3.1, 3.2 and 4.9.1.5).

### 7.2 ADDITIONAL REQUIREMENTS FOR PACKAGES TRANSPORTED BY AIR

7.2.1 The temperature of the accessible surfaces must not exceed 50°C at an ambient temperature of 38°C with no account taken of insolation.

7.2.2 Packages must be designed so that, if they were exposed to ambient temperatures ranging from  $-40^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ , the integrity of the containment would not be impaired.

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UN Model Regulations, paragraph 6.4.3.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.2.3 Packages containing radioactive material must be capable of withstanding, without leakage loss or dispersal of radioactive contents from the containment system, an internal pressure that produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa.

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UN Model Regulations, paragraph 6.4.6.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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## 7.5 REQUIREMENTS FOR PACKAGES CONTAINING URANIUM HEXAFLUORIDE

7.5.1 Packages designed to contain uranium hexafluoride must meet the requirements ~~prescribed elsewhere in these Instructions~~ which pertain to the radioactive and fissile properties of the material prescribed elsewhere in these Instructions. Except as allowed in 7.5.4, uranium hexafluoride in quantities of 0.1 kg or more must also be packaged and transported in accordance with the provisions of ISO 7195:2005: "Nuclear Energy — Packaging of uranium hexafluoride ( $\text{UF}_6$ ) for transport", and the requirements of 7.5.2 and 7.5.3. The package must also meet the requirements prescribed elsewhere in these Instructions, which pertain to the radioactive and fissile properties of the material.

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UN Model Regulations, paragraph 6.4.6.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.5.2 Each package designed to contain 0.1 kg or more of uranium hexafluoride must be designed so that it would meet the following requirements:

- a) withstand, without leakage and without unacceptable stress, as specified in ISO 7195:2005, the structural test as specified in 7.20 except as allowed in 7.5.4;
- b) withstand, without loss or dispersal of the uranium hexafluoride, the free drop test specified in 7.14.4; and
- c) withstand, without rupture of the containment system, the thermal test specified in 7.16.3 except as allowed in 7.5.4.

7.5.3 Packages designed to contain 0.1 kg or more of uranium hexafluoride must not be provided with pressure relief devices.

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UN Model Regulations, paragraph 6.4.6.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.5.4 Subject to the multilateral approval of the competent authority, packages designed to contain 0.1 kg or more of uranium hexafluoride may be transported if the packages are designed:

- a) ~~the packages are designed~~ to international or national standards other than ISO 7195:2005 provided an equivalent level of safety is maintained; and/or
- b) ~~the packages are designed~~ to withstand, without leakage and without unacceptable stress, a test pressure of less than 2.76 MPa, as specified in 7.20; and/or
- c) ~~for packages designed to contain 9 000 kg or more of uranium hexafluoride, the packages~~ hexafluoride and the packages do not meet the requirement of 7.5.2 c).

In all other respects, the requirements specified in 7.5.1 to 7.5.3 must be satisfied.

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## 7.7 REQUIREMENTS FOR TYPE B(U) PACKAGES

7.7.1 Type B(U) packages must be designed to meet the requirements specified in 7.1, 7.2 and 7.6.2 to 7.6.15, except 7.6.14 a), and, in addition, to the requirements specified in 7.7.2 to 7.7.15.

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UN Model Regulations, paragraph 6.4.8.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.7.2 A package must be designed so that, under the ambient conditions specified in 7.7.5 and 7.7.6, heat generated within the package by the radioactive contents ~~shall~~ **must** not, under normal conditions of transport, as demonstrated by the tests in 7.14, adversely affect the package in such a way that it would fail to meet the applicable requirements for containment and shielding if left unattended for a period of one week. Particular attention ~~shall~~ **must** be paid to the effects of heat, which may **cause one or more of the following**:

- a) alter the arrangement, the geometrical form or the physical state of the radioactive contents or, if the radioactive material is enclosed in a can or receptacle (for example, clad fuel elements), cause the can, receptacle or radioactive material to deform or melt;~~or~~
- b) lessen the efficiency of the packaging through differential thermal expansion or cracking or melting of the radiation shielding material;~~or~~
- c) in combination with moisture, accelerate corrosion.

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UN Model Regulations, paragraph 6.4.8.8, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.7.8 A package must be so designed that, if it were subjected to:

- a) the tests specified in 7.14, it would restrict the loss of radioactive contents to not more than  $10^{-6}$  A<sub>2</sub> per hour; and
- b) the tests specified in 7.16.1, 7.16.2 b), 7.16.3 and 7.16.4 and **either** the tests in:
  - i) 7.16.2 c), when the package has a mass not greater than 500 kg, an overall density not greater than 1 000 kg/m<sup>3</sup> based on the external dimensions, and radioactive contents greater than 1 000 A<sub>2</sub> not as special form radioactive material; or
  - ii) 7.16.2 a), for all other packages,

it would meet the following requirements:

- retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents which the package is designed to contain; and
- restrict the accumulated loss of radioactive contents in a period of one week to not more than 10 A<sub>2</sub> for krypton-85 and not more than A<sub>2</sub> for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of 2;7.2.2.4 to 2;7.2.2.6 must apply except that for krypton-85, an effective A<sub>2</sub>(i) value equal to 10 A<sub>2</sub> may be used. For case a) above, the assessment must take into account the external contamination limits of 4;9.1.2.

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UN Model Regulations, paragraph 6.4.9.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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## 7.8 REQUIREMENTS FOR TYPE B(M) PACKAGES

Type B(M) packages must meet the requirements for Type B(U) packages specified in 7.7.1, except that for packages to be transported solely within a specified country or solely between specified countries, conditions other than those given in 7.6.5, ~~7.7.5~~ **7.7.4**, to 7.7.6 and 7.7.9 to 7.7.15 may be assumed with the approval of the competent authorities of these countries. Notwithstanding, the requirements for Type B(U) packages specified in **7.7.4 and** 7.7.9 to 7.7.15 must be met as far as practicable.

### 7.9 REQUIREMENTS FOR TYPE C PACKAGES

7.9.1 Type C packages must be designed to meet the requirements specified in 7.1, 7.2 and 7.6.2 to 7.6.15, except as specified in 7.6.14 a), and the requirements specified in 7.7.2 to 7.7.6, 7.7.10 to 7.7.15 and 7.9.2 to 7.9.4.

7.9.2 A package must be capable of meeting the assessment criteria prescribed for tests in 7.7.8 b) and 7.7.12 after burial in an environment defined by a thermal conductivity of 0.33 W/(m.K) and a temperature of 38°C in the steady state. Initial conditions for the assessment must assume that any thermal insulation of the package remains intact, the package is at the maximum normal operating pressure and the ambient temperature is 38°C.

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UN Model Regulations, paragraph 6.4.10.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.9.3 A package must be designed so that, if it were at the maximum normal operating pressure and subjected to:

- a) the tests specified in 7.14, it would restrict the loss of radioactive contents to not more than  $10^{-6}$  A<sub>2</sub> per hour; and
- b) the test sequences in 7.19.1,

it would meet the following requirements:

- i) retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h with the maximum radioactive contents which the package is designed to contain; and
- ii) restrict the accumulated loss of radioactive contents in a period of one week to not more than 10 A<sub>2</sub> for krypton-85 and not more than A<sub>2</sub> for all other radionuclides.

Where mixtures of different radionuclides are present, the provisions of 2;7.2.2.4 to 2;7.2.2.6 must apply, except that for krypton-85 an effective A<sub>2</sub>(i) value equal to 10 A<sub>2</sub> may be used. For case a) above, the assessment must take into account the external contamination limits of 4;9.1.2.

7.9.4 A package must be so designed that there will be no rupture of the containment system following performance of the enhanced water immersion test specified in 7.17.

### 7.10 REQUIREMENTS FOR PACKAGES CONTAINING FISSILE MATERIAL

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UN Model Regulations, paragraph 6.4.11.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.10.1 Fissile material must be transported so as to:

- a) maintain subcriticality during routine, normal and accident conditions of transport; in particular, the following contingencies must be considered:
  - i) water leaking into or out of packages;
  - ii) the loss of efficiency of built-in neutron absorbers or moderators;
  - iii) rearrangement of the contents either within the package or as a result of loss from the package;
  - iv) reduction of spaces within or between packages;
  - v) packages becoming immersed in water or buried in snow; and
  - vi) temperature changes; and
- b) meet the requirements:
  - i) of 7.6.2 ~~for packages containing fissile material~~ except for unpackaged material when specifically allowed by 2;7.2.3.5.1 e);
  - ii) prescribed elsewhere in these Instructions and which pertain to the radioactive properties of the material; ~~and~~
  - iii) ~~specified in 7.10.3 to 7.10.12~~ of 7.6.3, unless the material is excepted by 7.10.2 2;7.2.3.5; and
  - iv) of 7.10.4 to 7.10.14, unless the material is excepted by 2;7.2.3.5, 7.10.2 or 7.10.3.

UN Model Regulations, paragraph 6.4.11.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

7.10.2 Packages containing fissile material that meeting one of the provisions in of subparagraph d) and one of the provisions of a) to c) below ~~a) to d) of 2.7.2.3.5 is~~ are excepted from the requirements of 7.10.4 to 7.10.14 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.

a) Packages containing fissile material in any form provided that:

i) the smallest external dimension of the package is not less than 10 cm;

ii) the criticality safety index of the package is calculated using the following formula:

$$CSI=50 \times 5 \times \left( \frac{\text{Mass of U-235 in package (g)}}{Z} \right) + \left( \frac{\text{Mass of other fissile nuclides* in package (g)}}{280} \right)$$

\* Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package

where the values of Z are taken from Table 6-6.

iii) the CSI of any package does not exceed 10;

b) packages containing fissile material in any form provided that:

i) the smallest external dimension of the package is not less than 30 cm;

ii) the package, after being subjected to the tests specified in 7.14.1 to 7.14.6;

— retains its fissile material contents;

— preserves the minimum overall outside dimensions of the package to at least 30 cm;

— prevents the entry of a 10 cm cube.

iii) the criticality safety index of the package is calculated using the following formula:

$$CSI=50 \times 2 \times \left( \frac{\text{Mass of U-235 in package (g)}}{Z} \right) + \left( \frac{\text{Mass of other fissile nuclides* in package (g)}}{280} \right)$$

\* Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package

where the values of Z are taken from Table 6-6.

(iv) the criticality safety index of any package does not exceed 10;

c) packages containing fissile material in any form provided that:

i) the smallest external dimension of the package is not less than 10 cm;

ii) the package, after being subjected to the tests specified in 7.14.1 to 7.14.6;

— retains its fissile material contents;

— preserves the minimum overall outside dimensions of the package to at least 10 cm;

— prevents the entry of a 10 cm cube.

iii) the CSI of the package is calculated using the following formula:

$$CSI=50 \times 2 \times \left( \frac{\text{Mass of U-235 in package (g)}}{450} \right) + \left( \frac{\text{Mass of other fissile nuclides* in package (g)}}{280} \right)$$

\* Plutonium may be of any isotopic composition provided that the amount of Pu-241 is less than that of Pu-240 in the package

iv) the maximum mass of fissile nuclides in any package does not exceed 15 g;

d) the total mass of beryllium, hydrogenous material enriched in deuterium, graphite and other allotropic forms of carbon in an individual package must not be greater than the mass of fissile nuclides in the package except where their total concentration does not exceed 1 g in any 1 000 g of material. Beryllium incorporated in copper alloys up to 4 per cent in weight of the alloy does not need to be considered.

UN Model Regulations, paragraph Table 6.4.11.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

**Table 6-6. Values of Z for calculation of criticality safety index in accordance with 7.10.2**

<u>Enrichment<sup>a</sup></u>	<u>Z</u>
<u>Uranium enriched up to 1.5%</u>	<u>2200</u>
<u>Uranium enriched up to 5%</u>	<u>850</u>
<u>Uranium enriched up to 10%</u>	<u>660</u>
<u>Uranium enriched up to 20%</u>	<u>580</u>
<u>Uranium enriched up to 100%</u>	<u>450</u>

<sup>a</sup> If a package contains uranium with varying enrichments of U-235, then the value corresponding to the highest enrichment must be used for Z.

UN Model Regulations, paragraph 6.4.11.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

7.10.3 Packages containing not more than 1 000 g of plutonium are exempted from the application of 7.10.4 to 7.4.14 provided that:

a) not more than 20 per cent of the plutonium by mass is fissile nuclides;

b) the criticality safety index of the package is calculated using the following formula:

$$CSI=50 \times 2 \times \left( \frac{\text{Mass of plutonium (g)}}{1000} \right)$$

c) if uranium is present with the plutonium, the mass of uranium must be no more than 1 per cent of the mass of the plutonium.

UN Model Regulations, paragraphs 6.4.11.4 to 6.4.11.14, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

~~7.10.3~~ 7.10.4 Where the chemical or physical form, isotopic composition, mass or concentration, moderation ratio or density, or geometric configuration is not known, the assessments of ~~7.10.7~~ 7.10.8 to ~~7.10.12~~ 7.10.13 must be performed assuming that each parameter that is not known has the value which gives the maximum neutron multiplication consistent with the known conditions and parameters in these assessments.

~~7.10.4~~ 7.10.5 For irradiated nuclear fuel the assessments of ~~7.10.7~~ 7.10.8 to ~~7.10.12~~ 7.10.13 must be based on an isotopic composition demonstrated to provide:

a) the maximum neutron multiplication during the irradiation history; or

b) a conservative estimate of the neutron multiplication for the package assessments. After irradiation but prior to shipment, a measurement must be performed to confirm the conservatism of the isotopic composition.

~~7.10.5~~ 7.10.6 The package, after being subjected to the tests specified in 7.14, must:

a) preserve the minimum overall outside dimensions of the package to at least 10 cm; and

b) prevent the entry of a 10-cm cube.

~~7.10.6~~ 7.10.7 The package must be designed for an ambient temperature range of -40°C to +38°C unless the competent authority specifies otherwise in the certificate of approval for the package design.

~~7.10.7~~**7.10.8** For a package in isolation, it must be assumed that water can leak into or out of all void spaces of the package, including those within the containment system. However, if the design incorporates special features to prevent such leakage of water into or out of certain void spaces, even as a result of error, absence of leakage may be assumed in respect of those void spaces. Special features must include either of the following:

- a) multiple high standard water barriers not less than two of which would remain watertight if the package were subject to the tests prescribed in 7.10.42**13** b), a high degree of quality control in the manufacture, maintenance and repair of packagings and tests to demonstrate the closure of each package before each shipment; or
- b) for packages containing uranium hexafluoride only, with maximum enrichment of 5 mass per cent uranium-235:
  - i) packages where, following the tests prescribed in 7.10.42**13** b), there is no physical contact between the valve and any other component of the packaging other than at its original point of attachment and where, in addition, following the test prescribed in 7.16.3, the valves remain leaktight; and
  - ii) a high degree of quality control in the manufacture, maintenance and repair of packagings coupled with tests to demonstrate closure of each package before each shipment.

~~7.10.8~~**7.10.9** It must be assumed that the confinement system ~~must be~~ is closely reflected by at least 20 cm of water or such greater reflection as may additionally be provided by the surrounding material of the packaging. However, when it can be demonstrated that the confinement system remains within the packaging following the tests prescribed in 7.10.42**13** b), close reflection of the package by at least 20 cm of water may be assumed in 7.10.9**10** c).

~~7.10.9~~**7.10.10** The package must be subcritical under the conditions of 7.10.7**8** and 7.10.8**9**, with the package conditions that result in the maximum neutron multiplication consistent with:

- a) routine conditions of transport (incident free);
- b) the tests specified in 7.10.44**12** b);
- c) the tests specified in 7.10.42**13** b).

~~7.10.10~~**7.10.11**:

- a) The package must be subcritical under conditions consistent with the Type C package tests specified in 7.19.1 assuming reflection by at least 20 cm of water but no water-in leakage.
- b) In the assessment of 7.10.9**10**, allowance must not be made for special features of 7.10.7**8** unless, following the Type C package tests specified in 7.19.1 and, subsequently, the water-in leakage test of 7.18.3, leakage of water into or out of the void spaces is prevented.

~~7.10.11~~**7.10.12** A number "N" must be derived, such that five times "N" must be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:

- a) There must not be anything between the packages, and the package arrangement must be reflected on all sides by at least 20 cm of water; and
- b) The state of the packages must be their assessed or demonstrated condition if they had been subjected to the tests specified in 7.14.

~~7.10.12~~**7.10.13** A number "N" must be derived, such that two times "N" must be subcritical for the arrangement and package conditions that provide the maximum neutron multiplication consistent with the following:

- a) hydrogenous moderation between packages, and the package arrangement reflected on all sides by at least 20 cm of water; and
- b) the tests specified in 7.14 followed by whichever of the following is the more limiting:
  - i) the tests specified in 7.16.2 b) and, either 7.16.2 c) for packages having a mass not greater than 500 kg and an overall density not greater than 1 000 kg/m<sup>3</sup> 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 7.10.42**13** 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~~**7.10.14** 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 7.10.44**12** and 7.10.42**13** (i.e. CSI = 50/N). The value of the

CSI may be zero, provided that an unlimited number of packages is subcritical (i.e. N is effectively equal to infinity in both cases).

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#### 7.12 TESTING THE INTEGRITY OF THE CONTAINMENT SYSTEM AND SHIELDING AND EVALUATING CRITICALITY SAFETY

After each of the applicable tests specified in 7.14 to 7.20:

- a) faults and damages must be identified and recorded;
- b) it must be determined whether the integrity of the containment system and shielding has been retained to the extent required in 7.1 to 7.10 for the package under test; and

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UN Model Regulations, paragraph 6.4.13 c), ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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- c) it must be determined, for packages containing fissile material, whether the assumptions and conditions used in the assessments required by 7.10.1 to 7.10.13.14 for one or more packages are valid.

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#### 7.14 TESTS FOR DEMONSTRATING ABILITY TO WITHSTAND NORMAL CONDITIONS OF TRANSPORT

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7.14.4 Free drop test: the specimen must drop onto the target so as to suffer maximum damage in respect of the safety features to be tested.

- a) The height of the drop measured from the lowest point of the specimen to the upper surface of the target must be not less than the distance specified in Table 6-6 for the applicable mass. The target must be as defined in 7.13;
- b) For rectangular fibreboard or wood packages not exceeding a mass of 50 kg, a separate specimen must be subjected to a free drop onto each corner from a height of 0.3 m;
- c) For cylindrical fibreboard packages not exceeding a mass of 100 kg, a separate specimen must be subjected to a free drop onto each of the quarters of each rim from a height of 0.3 m.

**Table 6-6 6-7. Free drop distance for testing packages to normal conditions of transport**

<i>Package mass (kg)</i>	<i>Free drop distance (m)</i>
Package mass < 5 000	1.2
5 000 ≤ Package mass < 10 000	0.9
10 000 ≤ Package mass < 15 000	0.6
15 000 ≤ Package mass	0.3

7.14.5 Stacking test: unless the shape of the packaging effectively prevents stacking, the specimen must be subjected, for a period of 24 hours, to a compressive load equal to the greater of the following:

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UN Model Regulations, paragraph 6.4.15.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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- a) **the equivalent of five times** a total weight equal to five times the maximum weight of the package; and
- b) the equivalent of 13 kPa multiplied by the vertically projected area of the package.

The load must be applied uniformly to two opposite sides of the specimen, one of which must be the base on which the package would typically rest.



7.14.6 Penetration test: the specimen must be placed on a rigid, flat, horizontal surface which will not move significantly while the test is being carried out.

- a) A bar of 3.2 cm in diameter with a hemispherical end and a mass of 6 kg must be dropped and directed to fall, with its longitudinal axis vertical, onto the centre of the weakest part of the specimen so that, if it penetrates sufficiently far, it will hit the containment system. The bar must not be significantly deformed by the test performance;
- b) The height of the drop of the bar measured from its lower end to the intended point of impact on the upper surface of the specimen must be 1 m.

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#### 7.16 TESTS FOR DEMONSTRATING THE ABILITY TO WITHSTAND ACCIDENT CONDITIONS IN TRANSPORT

7.16.1 The specimen must be subjected to the cumulative effects of the tests specified in 7.16.2 and 7.16.3, in that order. Following these tests, either this specimen or a separate specimen must be subjected to the effect(s) of the water immersion test(s) as specified in 7.16.4 and, if applicable, 7.17.

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UN Model Regulations, paragraph 6.4.17.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.16.2 Mechanical test: the mechanical test consists of three different drop tests. Each specimen must be subjected to the applicable drops as specified in 7.7.8 or 7.10.42.13. The order in which the specimen is subjected to the drops must be such that, on completion of the mechanical test, the specimen must have suffered such damage as will lead to the maximum damage in the thermal test which follows:

- a) For drop I, the specimen must drop onto the target so as to suffer the maximum damage, and the height of the drop measured from the lowest point of the specimen to the upper surface of the target must be 9 m. The target must be as defined in 7.13;
- b) For drop II, the specimen must drop, ~~so as to suffer the maximum damage~~, onto a bar rigidly mounted perpendicularly on the target so as to suffer the maximum damage. The height of the drop measured from the intended point of impact of the specimen to the upper surface of the bar must be 1 m. The bar must be of solid mild steel of circular section, (15.0 ± 0.5 cm) in diameter and 20 cm long unless a longer bar would cause greater damage, in which case a bar of sufficient length to cause maximum damage must be used. The upper end of the bar ~~shall~~ must be flat and horizontal with its edge rounded off to a radius of not more than 6 mm. The target on which the bar is mounted ~~shall~~ must be as described in 7.13;
- c) For drop III, the specimen must be subjected to a dynamic crush test by positioning the specimen on the target so as to suffer maximum damage by the drop of a 500 kg mass from 9 m onto the specimen. The mass must consist of a solid mild steel plate 1 m by 1 m and must fall in a horizontal attitude. The lower face of the steel plate must have its edges and corners rounded off to a radius of not more than 6 mm. The height of the drop must be measured from the underside of the plate to the highest point of the specimen. The target on which the specimen rests must be as defined in 7.13.

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UN Model Regulations, paragraph 6.4.19, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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#### 7.18 WATER LEAKAGE TEST FOR PACKAGES CONTAINING FISSILE MATERIAL

7.18.1 Packages for which water-in leakage or out-leakage to the extent which results in the greatest reactivity has been assumed, for purposes of assessment under 7.10.7.8 to 7.10.42.13, must be excepted from the test.

7.18.2 Before the specimen is subjected to the water leakage test specified below, it must be subjected to the tests in 7.16.2 b) and either 7.16.2 a) or c) as required by 7.10.42.13 and the test specified in 7.16.3.

7.18.3 The specimen must be immersed under a head of water of at least 0.9 m for a period of not less than eight hours and in the attitude for which maximum leakage is expected.

#### 7.19 TESTS FOR TYPE C PACKAGES

7.19.1 Specimens must be subjected to the effects of each of the following test sequences in the orders specified:

- a) the tests specified in 7.16.2 a), 7.16.2 c), 7.19.2 and 7.19.3; and

- b) the test specified in 7.19.4.

Separate specimens are allowed to be used for each of the sequences in a) and b).

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UN Model Regulations, paragraph 6.4.20.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.19.2 Puncture/tearing test: the specimen must be subjected to the damaging effects of a **vertical** solid probe made of mild steel. The orientation of the probe to the surface of the specimen must be positioned so **the package specimen and the impact point on the package surface must be such** as to cause maximum damage at the conclusion of the test sequence specified in 7.19.1 a).

- a) The specimen, representing a package having a mass less than 250 kg, must be placed on a target and subjected to a probe having a mass of 250 kg and falling from a height of 3 m above the intended impact point. For this test, the probe must be a 20 cm in diameter cylindrical bar with the striking end forming a frustum of a right circular cone with the following dimensions: 30 cm in height and 2.5 cm in diameter at the top with its edge rounded off to a radius of not more than 6 mm. The target on which the specimen is placed must be as specified in 7.13;
- b) For packages having a mass of 250 kg or more, the base of the probe must be placed on a target and the specimen dropped onto the probe. The height of the drop, measured from the point of impact with the specimen to the upper surface of the probe must be 3 m. For this test, the probe must have the same properties and dimensions as specified in a) above, except that the length and mass of the probe must be such as to incur maximum damage to the specimen. The target on which the base of the probe is placed must be as specified in 7.13.

7.19.3 Enhanced thermal test: the conditions for this test must be as specified in 7.16.3, except that the exposure to the thermal environment must be for a period of 60 minutes.

7.19.4 Impact test: the specimen must be subject to an impact on a target at a velocity of not less than 90 m/s, at such an orientation as to suffer maximum damage. The target must be as defined in 7.13, except that the target surface may be at any orientation as long as the surface is normal to the specimen path.

## 7.20 TESTS FOR PACKAGINGS DESIGNED TO CONTAIN URANIUM HEXAFLUORIDE

Specimens that comprise or simulate packagings designed to contain 0.1 kg or more of uranium hexafluoride must be tested hydraulically at an internal pressure of at least 1.38 MPa but, when the test pressure is less than 2.76 MPa, the design must require multilateral approval. For re-testing packagings, any other equivalent non-destructive testing may be applied subject to multilateral approval.

## 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;1.2.2.1 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;1.2.2.1 and 7.21.4 and those for low dispersible radioactive material, must require multilateral approval.

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UN Model Regulations, paragraph 6.4.22.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.21.4 Each package design for fissile material that **which** is not excepted, according to 7.10.2, from the requirements which apply specifically to packages containing fissile material must require multilateral approval **by any of the paragraphs 2;7.2.3.5.1 a) to f), 7.10.2 and 7.10.3 must require multilateral approval.**

7.21.5 The design for special form radioactive material must require unilateral approval. The design for low dispersible radioactive material must require multilateral approval (see also 6.4.23.8 of the UN Recommendations).

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UN Model Regulations, paragraph 6.4.22.6 and 6.4.22.7, ST/SG/AC.10/40/Add.1

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7.21.6 The design for a fissile material excepted from fissile classification in accordance with 2:7.2.3.5.1 f) must require multilateral approval.

7.21.7 Alternative activity limits for an exempt consignment of instruments or articles in accordance with 2:7.2.2.2 b) must require multilateral approval.

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UN Model Regulations, paragraph 6.4.23, ST/SG/AC.10/40/Add.1

UN 6.4.23 is not included in the Technical Instructions. DGP-WG/13 agreed to consider it for inclusion in the TIs, either whole or in part. It is reproduced below as new paragraph 7.22. If it is agreed to include this text, references throughout the Instructions will be updated and current paragraphs 7.22 and 7.23 will be renumbered.

See also paragraph 3.2.3.1.1 a) of this report.

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### **7.22 Applications and approvals for radioactive material transport**

7.22.1 (Reserved)

7.22.2 An application for approval of shipment must include:

- a) The period of time, related to the shipment, for which the approval is sought;
- b) The actual radioactive contents, the expected modes of transport, the type of conveyance, and the probable or proposed route; and
- c) The details of how the precautions and administrative or operational controls, referred to in the certificate of approval for the package design, if applicable, issued under 5:1.2.2.1 a) iii), vi) or vii), are to be put into effect.

7.22.3 An application for approval of shipments under special arrangement must include all the information necessary to satisfy the competent authority that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of these Instructions had been met.

The application must also include:

- a) A statement of the respects in which, and of the reasons why, the shipment cannot be made in full accordance with the applicable requirements; and
- b) A statement of any special precautions or special administrative or operational controls which are to be employed during transport to compensate for the failure to meet the applicable requirements.

7.22.4 An application for approval of Type B(U) or Type C package design must include:

- a) A detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted;
- b) A detailed statement of the design, including complete engineering drawings and schedules of materials and methods of manufacture;
- c) A statement of the tests which have been done and their results, or evidence based on calculative methods or other evidence that the design is adequate to meet the applicable requirements;
- d) The proposed operating and maintenance instructions for the use of the packaging;
- e) If the package is designed to have a maximum normal operating pressure in excess of 100 kPa gauge, a specification of the materials of manufacture of the containment system, the samples to be taken, and the tests to be made;

- f) Where the proposed radioactive contents are irradiated nuclear fuel, a statement and a justification of any assumption in the safety analysis relating to the characteristics of the fuel and a description of any pre-shipment measurement as required by 6:7.10.5 b);
- g) Any special stowage provisions necessary to ensure the safe dissipation of heat from the package considering the various modes of transport to be used and type of conveyance or freight container;
- h) A reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package; and
- i) A specification of the applicable management system as required by 1:6.3.

7.22.5 An application for approval of a Type B(M) package design must include, in addition to the general information required in 7.22.4 for Type B(U) packages:

- a) A list of the requirements specified in 7.6.5, 7.2.1, 7.7.4 to 7.7.6, and 7.7.9 to 7.7.15 with which the package does not conform;
- b) Any proposed supplementary operational controls to be applied during transport not regularly provided for in these Instructions, but which are necessary to ensure the safety of the package or to compensate for the deficiencies listed in (a) above;
- c) A statement relative to any restrictions on the mode of transport and to any special loading, carriage, unloading or handling procedures; and
- d) A statement of the range of ambient conditions (temperature, solar radiation) which are expected to be encountered during transport and which have been taken into account in the design.

7.22.6 The application for approval of designs for packages containing 0.1 kg or more of uranium hexafluoride must include all information necessary to satisfy the competent authority that the design meets the applicable requirements 7.5.1, and a specification of the applicable management system as required in 1:6.3.

7.22.7 An application for a fissile package approval must include all information necessary to satisfy the competent authority that the design meets the applicable requirements of 7.10.1, and a specification of the applicable management system as required by 1:6.3.

7.22.8 An application for approval of design for special form radioactive material and design for low dispersible radioactive material must include:

- a) A detailed description of the radioactive material or, if a capsule, the contents; particular reference must be made to both physical and chemical states;
- b) A detailed statement of the design of any capsule to be used;
- c) A statement of the tests which have been done and their results, or evidence based on calculative methods to show that the radioactive material is capable of meeting the performance standards, or other evidence that the special form radioactive material or low dispersible radioactive material meets the applicable requirements of these Regulations;
- d) A specification of the applicable management system as required in 1:6.3; and
- e) Any proposed pre-shipment actions for use in the consignment of special form radioactive material or low dispersible radioactive material.

7.22.9 An application for approval of design for fissile material excepted from "FISSILE" classification in accordance with Table 2-11, under 2:7.2.3.5.1 f) must include:

- a) A detailed description of the material; particular reference must be made to both physical and chemical states;
- b) A statement of the tests that have been carried out and their results, or evidence based on calculation methods to show that the material is capable of meeting the requirements specified in 2:7.2.3.6;
- c) A specification of the applicable management system as required in 1:6.3;
- d) A statement of specific actions to be taken prior to shipment."

7.22.10 An application for approval of alternative activity limits for an exempt consignment of instruments or articles must include:

- a) An identification and detailed description of the instrument or article, its intended uses and the radionuclide(s) incorporated;

- b) The maximum activity of the radionuclide(s) in the instrument or article;
- c) Maximum external radiation levels arising from the instrument or article;
- d) The chemical and physical forms of the radionuclide(s) contained in the instrument or article;
- e) Details of the construction and design of the instrument or article, particularly as related to the containment and shielding of the radionuclide in routine, normal and accident conditions of transport;
- f) The applicable management system, including the quality testing and verification procedures to be applied to radioactive sources, components and finished products to ensure that the maximum specified activity of radioactive material or the maximum radiation levels specified for the instrument or article are not exceeded, and that the instruments or articles are constructed according to the design specifications;
- g) The maximum number of instruments or articles expected to be shipped per consignment and annually;
- h) Dose assessments in accordance with the principles and methodologies set out in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No.115, IAEA, Vienna (1996), including individual doses to transport workers and members of the public and, if appropriate, collective doses arising from routine, normal and accident conditions of transport, based on representative transport scenarios the consignments are subject to.

7.22.11 Each certificate of approval issued by a competent authority must be assigned an identification mark. The mark must be of the following generalized type:

VRI/Number/Type Code

- a) Except as provided in 7.22.12 b), VRI represents the international vehicle registration identification code of the country issuing the certificate<sup>2</sup>;
- b) The number must be assigned by the competent authority, and must be unique and specific with regard to the particular design or shipment or alternative activity limit for exempt consignment<sup>2</sup>. The identification mark of the approval of shipment must be clearly related to the identification mark of the approval of design;
- c) The following type codes must be used in the order listed to indicate the types of certificate of approval issued:
  - AF Type A package design for fissile material
  - B(U) Type B(U) package design (B(U)F if for fissile material)
  - B(M) Type B(M) package design (B(M)F if for fissile material)
  - C Type C package design (CF if for fissile material)
  - IF Industrial package design for fissile material
  - S Special form radioactive material
  - LD Low dispersible radioactive material
  - FE Fissile material complying with the requirements of 2;7.2.3.6
  - T Shipment
  - X Special arrangement
  - AL Alternative activity limits for an exempt consignment of instruments or articles

In the case of package designs for non-fissile or fissile excepted uranium hexafluoride, where none of the above codes apply, then the following type codes must be used:

H(U) Unilateral approval  
H(M) Multilateral approval;

- d) For certificates of approval of package design and special form radioactive material, other than those issued under transitional packaging the provisions of 7.23.2, and for low dispersible radioactive material, the symbols "-96" must be added to the type code.

7.22.12 These identification marks must be applied as follows:

- a) Each certificate and each package must bear the appropriate identification mark, comprising the symbols prescribed in 7.22.11 a), b), c) and d) above, except that, for packages, only the applicable design type codes including, if applicable, the symbols "-96", must appear following the second stroke, that is, the "T" or "X" must not appear in the identification marking on the package. Where the approval of design and the approval of the shipment are combined, the applicable type codes do not need to be repeated. For example:

<sup>2</sup> See Vienna Convention on Road Traffic (1968).

- A/132/B(M)F-96: A Type B(M) package design approved for fissile material, requiring multilateral approval, for which the competent authority of Austria has assigned the design number 132 (to be marked on both the package and on the certificate of approval for the package design);
- A/132/B(M)F-96T: The approval of shipment issued for a package bearing the identification mark elaborated above (to be marked on the certificate only);
- A/137/X: An approval of special arrangement issued by the competent authority of Austria, to which the number 137 has been assigned (to be marked on the certificate only);
- A/139/IF-96: An Industrial package design for fissile material approved by the competent authority of Austria, to which package design number 139 has been assigned (to be marked on both the package and on the certificate of approval for the package design); and
- A/145/H(U)-96: A package design for fissile excepted uranium hexafluoride approved by the competent authority of Austria, to which package design number 145 has been assigned (to be marked on both the package and on the certificate of approval for the package design);

b) Where multilateral approval is effected by validation according to 7.22.20, only the identification mark issued by the country of origin of the design or shipment must be used. Where multilateral approval is effected by issue of certificates by successive countries, each certificate must bear the appropriate identification mark and the package whose design was so approved must bear all appropriate identification marks.

For example:

A/132/B(M)F-96  
CH/28/B(M)F-96

would be the identification mark of a package which was originally approved by Austria and was subsequently approved, by separate certificate, by Switzerland. Additional identification marks would be tabulated in a similar manner on the package;

c) The revision of a certificate must be indicated by a parenthetical expression following the identification mark on the certificate. For example, A/132/B(M)F-96 (Rev.2) would indicate revision 2 of the Austrian certificate of approval for the package design; or

A/132/B(M)F-96(Rev.0) would indicate the original issuance of the Austrian certificate of approval for the package design. For original issuances, the parenthetical entry is optional and other words such as "original issuance" may also be used in place of "Rev.0". Certificate revision numbers may only be issued by the country issuing the original certificate of approval;

d) Additional symbols (as may be necessitated by national requirements) may be added in brackets to the end of the identification mark; for example, A/132/B(M)F to 96(SP503);

e) It is not necessary to alter the identification mark on the packaging each time that a revision to the design certificate is made. Such re-marking must be required only in those cases where the revision to the package design certificate involves a change in the letter type codes for the package design following the second stroke.

7.22.13 Each certificate of approval issued by a competent authority for special form radioactive material or low dispersible radioactive material must include the following information:

- a) Type of certificate;
- b) The competent authority identification mark;
- c) The issue date and an expiry date;
- d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special form radioactive material or low dispersible radioactive material is approved;
- e) The identification of the special form radioactive material or low dispersible radioactive material;
- f) A description of the special form radioactive material or low dispersible radioactive material;
- g) Design specifications for the special form radioactive material or low dispersible radioactive material which may include references to drawings;
- h) A specification of the radioactive contents which includes the activities involved and which may include the physical and chemical form;
- i) A specification of the applicable management system as required in 1;6.3;

j) Reference to information provided by the applicant relating to specific actions to be taken prior to shipment;

k) If deemed appropriate by the competent authority, reference to the identity of the applicant;

l) Signature and identification of the certifying official.

7.22.14 Each certificate of approval issued by a competent authority for material excepted from classification as "FISSILE" must include the following information:

a) Type of certificate;

b) The competent authority identification mark;

c) The issue date and an expiry date;

d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the exception is approved;

e) A description of the excepted material;

f) Limiting specifications for the excepted material;

g) A specification of the applicable management system as required in 1;6.3;

h) Reference to information provided by the applicant relating to specific actions to be taken prior to shipment;

i) If deemed appropriate by the competent authority, reference to the identity of the applicant;

j) Signature and identification of the certifying official;

k) Reference to documentation that demonstrates compliance with 2;7.2.3.6.

7.22.15 Each certificate of approval issued by a competent authority for a special arrangement must include the following information:

a) Type of certificate;

b) The competent authority identification mark;

c) The issue date and an expiry date;

d) Mode(s) of transport;

e) Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routing instructions;

f) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the special arrangement is approved;

g) The following statement: "This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.";

h) References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority;

i) Description of the packaging by a reference to the drawings or a specification of the design. If deemed appropriate by the competent authority, a reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package must also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general outside dimensions and appearance;

j) A specification of the authorized radioactive contents, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This must include the physical and chemical forms, the activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material or for each fissile nuclide when appropriate), and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under 2;7.2.3.5.1 f) if applicable;

k) Additionally, for packages containing fissile material:

i) a detailed description of the authorized radioactive contents;

- ii) the value of the criticality safety index;
  - iii) reference to the documentation that demonstrates the criticality safety of the contents;
  - iv) any special features, on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;
  - v) any allowance (based on 7.10.5 b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and
  - vi) the ambient temperature range for which the special arrangement has been approved;
  - l) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat;
  - m) If deemed appropriate by the competent authority, reasons for the special arrangement;
  - n) Description of the compensatory measures to be applied as a result of the shipment being under special arrangement;
  - o) Reference to information provided by the applicant relating to the use of the packaging or specific actions to be taken prior to the shipment;
  - p) A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in 7.7.5, 7.7.6, and 7.7.15, as applicable;
  - q) Any emergency arrangements deemed necessary by the competent authority;
  - r) A specification of the applicable management system as required in 1;6.3;
  - s) If deemed appropriate by the competent authority, reference to the identity of the applicant and to the identity of the carrier;
  - t) Signature and identification of the certifying official.
- 7.22.16 Each certificate of approval for a shipment issued by a competent authority must include the following information:
- a) Type of certificate;
  - b) The competent authority identification mark(s);
  - c) The issue date and an expiry date;
  - d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the shipment is approved;
  - e) Any restrictions on the modes of transport, type of conveyance, freight container, and any necessary routing instructions;
  - f) The following statement: "This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.";
  - g) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat or maintenance of criticality safety;
  - h) Reference to information provided by the applicant relating to specific actions to be taken prior to the shipment;
  - i) Reference to the applicable certificate(s) of approval of design;
  - j) A specification of the actual radioactive contents, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This must include the physical and chemical forms, the total activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material or for each fissile nuclide when appropriate), and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under 2;7.2.3.5 (f) if applicable;
  - k) Any emergency arrangements deemed necessary by the competent authority;
  - l) A specification of the applicable management system as required in 1;6.3;
  - m) If deemed appropriate by the competent authority, reference to the identity of the applicant;



n) Signature and identification of the certifying official.

7.22.17 Each certificate of approval of the design of a package issued by a competent authority must include the following information:

a) Type of certificate;

b) The competent authority identification mark;

c) The issue date and an expiry date;

d) Any restriction on the modes of transport, if appropriate;

e) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the design is approved;

f) The following statement: "This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.";

g) References to certificates for alternative radioactive contents, other competent authority validation, or additional technical data or information, as deemed appropriate by the competent authority;

h) A statement authorizing shipment where approval of shipment is required under 5;1.2.1.2, if deemed appropriate;

i) Identification of the packaging;

j) Description of the packaging by a reference to the drawings or specification of the design. If deemed appropriate by the competent authority, a reproducible illustration, not larger than 21 cm by 30 cm, showing the make-up of the package must also be provided, accompanied by a brief description of the packaging, including materials of manufacture, gross mass, general outside dimensions and appearance;

k) Specification of the design by reference to the drawings;

l) A specification of the authorized radioactive content, including any restrictions on the radioactive contents which might not be obvious from the nature of the packaging. This must include the physical and chemical forms, the activities involved (including those of the various isotopes, if appropriate), mass in grams (for fissile material the total mass of fissile nuclides or the mass for each fissile nuclide, when appropriate) and whether special form radioactive material, low dispersible radioactive material or fissile material excepted under 2;7.2.3.5 f), if applicable;

m) A description of the containment system;

n) For package designs containing fissile material which require multilateral approval of the package design in accordance with 7.21.4:

i) a detailed description of the authorized radioactive contents;

ii) a description of the confinement system;

iii) the value of the criticality safety index;

iv) reference to the documentation that demonstrates the criticality safety of the contents;

v) any special features, on the basis of which the absence of water from certain void spaces has been assumed in the criticality assessment;

vi) any allowance (based on 6;7.10.5 b)) for a change in neutron multiplication assumed in the criticality assessment as a result of actual irradiation experience; and

vii) the ambient temperature range for which the package design has been approved;

o) For Type B(M) packages, a statement specifying those prescriptions of 7.6.5, 7.2.1, 7.7.4 to 7.7.6, and 7.7.9 to 7.7.15 with which the package does not conform and any amplifying information which may be useful to other competent authorities;

p) For packages containing more than 0.1 kg of uranium hexafluoride, a statement specifying those prescriptions of 7.5.4 which apply if any and any amplifying information which may be useful to other competent authorities;

q) A detailed listing of any supplementary operational controls required for preparation, loading, carriage, unloading and handling of the consignment, including any special stowage provisions for the safe dissipation of heat;

r) Reference to information provided by the applicant relating to the use of the packaging or specific actions to be taken prior to shipment;

s) A statement regarding the ambient conditions assumed for purposes of design if these are not in accordance with those specified in 7.7.5, 7.7.6 and 7.7.15, as applicable;

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UN reference in t) below is 1.1.2.3.1. Error?

t) A specification of the applicable management system as required in 1;6.3;

u) Any emergency arrangements deemed necessary by the competent authority;

v) If deemed appropriate by the competent authority, reference to the identity of the applicant;

w) Signature and identification of the certifying official.

7.22.18 Each certificate issued by a competent authority for alternative activity limits for an exempt consignment of instruments or articles according to 5;1.2.2.1 d) must include the following information:

a) Type of certificate;

b) The competent authority identification mark;

c) The issue date and an expiry date;

d) List of applicable national and international regulations, including the edition of the IAEA Regulations for the Safe Transport of Radioactive Material under which the exemption is approved;

e) The identification of the instrument or article;

f) A description of the instrument or article;

g) Design specifications for the instrument or article;

h) A specification of the radionuclide(s), the approved alternative activity limit(s) for the exempt consignment(s) of the instrument(s) or article(s);

i) Reference to documentation that demonstrates compliance with 2;7.2.2.2 b);

j) If deemed appropriate by the competent authority, reference to the identity of the applicant;

k) Signature and identification of the certifying official.”.

7.22.19 The competent authority must be informed of the serial number of each packaging manufactured to a design approved by them under 7.21.2, 7.21.3, 7.21.4, and 7.23.2.

7.22.20 Multilateral approval may be by validation of the original certificate issued by the competent authority of the country of origin of the design or shipment. Such validation may take the form of an endorsement on the original certificate or the issuance of a separate endorsement, annex, supplement, etc., by the competent authority of the country through or into which the shipment is made. ]

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*Renumber subsequent paragraphs accordingly*

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End of UN text to be considered for inclusion in the Instructions.

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**7.23 TRANSITIONAL MEASURES FOR CLASS 7****7.23.1 Packages not requiring competent authority approval of design under the 1985 and 1985 (As Amended 1990) editions of IAEA Safety Series No. 6**


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UN Model Regulations, paragraph 6.4.24.1, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.23.1.1 ~~Excepted packages, Industrial packages Type IP-1, Type IP-2 and Type IP-3 and Type A packages that did not require approval of design by the competent authority and which meet the requirements of the 1985 or 1985 (As Amended 1990) editions of the IAEA Regulations for the Safe Transport of Radioactive Material (IAEA Safety Series No. 6) may continue to be used subject to the mandatory programme of quality assurance in accordance with the requirements of 1:6.3 and the activity limits and material restrictions of 2:7.2.4. Packages not requiring competent authority approval of design (excepted packages, Type IP-1, Type IP-2, Type IP-3 and Type A packages) must meet these Instructions in full, except that packages that meet the requirements of the 1985 or 1985 (As Amended 1990) Editions of IAEA Regulations for the Safe Transport of Radioactive Material (IAEA Safety Series No.6):~~

- ~~a) may continue in transport provided that they were prepared for transport prior to 31 December 2003, and subject to the requirements of 7.23.4, if applicable;~~
- ~~b) may continue to be used provided that:~~
  - ~~i) they were not designed to contain uranium hexafluoride;~~
  - ~~ii) the applicable requirements of 1:6.3 of these Instructions are applied;~~
  - ~~iii) the activity limits and classification in Part 2:7 of these Instructions are applied;~~
  - ~~iv) the requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Instructions are applied;~~
  - ~~v) the packaging was not manufactured or modified after 31 December 2003.~~

7.23.1.2 Any packaging modified, unless to improve safety, or manufactured after 31 December 2003, must meet the requirements of these Instructions in full. Packages prepared for transport not later than 31 December 2003 under the 1985 or 1985 (As Amended 1990) editions of IAEA Safety Series No. 6 may continue in transport. Packages prepared for transport after this date must meet the requirements of these Instructions in full.

**7.23.2 Packages approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 1990) editions of IAEA Safety Series No. 6**


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UN Model Regulations, paragraph 6.4.24.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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7.23.2.1 ~~Packagings manufactured to a package design approved by the competent authority under the provisions of the 1973 or 1973 (As Amended) editions of IAEA Safety Series No. 6 may continue to be used subject to: multilateral approval of package design; the mandatory programme of quality assurance in accordance with the applicable requirements of 1:6.3; the activity limits and material restrictions of 2:7.2.4; and, for a package containing fissile material and transported by air, the requirements of 7.10.10. No new manufacture of such packaging must be permitted to commence. Changes in the design of the packaging or in the nature or quantity of the authorized radioactive contents which, as determined by the competent authority, would significantly affect safety, must meet the requirements of these Instructions in full. A serial number according to the provision of 5:2.4.5.1 c) must be assigned to and marked on the outside of each packaging. Packages requiring competent authority approval of the design must meet these Instructions in full unless the following conditions are met:~~

- ~~a) the packagings were manufactured to a package design approved by the competent authority under the provisions of the 1973 or 1973 (As Amended) or the 1985 or 1985 (As Amended 1990) Editions of IAEA Safety Series No.6);~~
- ~~b) the package design is subject to multilateral approval;~~
- ~~c) the applicable requirements of 1:6.3 of these Instructions are applied;~~
- ~~d) the activity limits and classification in Part 2:7 of these Instructions are applied;~~
- ~~e) the requirements and controls for transport in in Parts 1, 3, 4, 5 and 7 of these Instructions are applied;~~

- f) for a package containing fissile material and transported by air, the requirement of 7.10.11 is met;
- g) for packages that meet the requirements of the 1973 or 1973 (As Amended) Editions of these Instructions:
  - i) the packages retain sufficient shielding to ensure that the radiation level at 1 m from the surface of the package would not exceed 10 mSv/h in the accident conditions of transport defined in the 1973 Revised or 1973 Revised (As Amended) Editions of IAEA Safety Series No. 6 with the maximum radioactive contents which the package is authorized to contain;
  - ii) the packages do not utilize continuous venting;
  - iii) a serial number in accordance with the provision of 5:2.4.5.1 c) is assigned to and marked on the outside of each packaging.

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UN Model Regulations, paragraph 6.4.24.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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~~7.23.2.2 Packagings manufactured to a package design approved by the competent authority under the provisions of the 1985 or 1985 (As Amended 1990) editions of IAEA Safety Series No. 6 may continue to be used subject to the multilateral approval of package design; the mandatory programme of quality assurance in accordance with the requirements of 1;6.3; the activity limits and material restrictions of 2;7.2.4; and, for a package containing fissile material and transported by air, the requirements of 7.10.10. Changes in the design of the packaging or in the nature or quantity of the authorized radioactive contents which, as determined by the competent authority, would significantly affect safety must meet the requirements of these Instructions in full. All packagings for which manufacture begins after 31 December 2006 must meet the requirements of these Instructions in full. No new manufacture of packagings to a package design meeting the provisions of the 1973, 1973 (As Amended), 1985, and 1985 (As Amended 1990) Editions of IAEA Safety Series No.6 must be permitted to commence.~~

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UN Model Regulations, paragraph 6.4.24.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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**7.23.4 Packages excepted from the requirements for fissile materials under the 2011-2012 or 2013-2014 Edition of these Instructions (2009 Edition of IAEA Safety Standard Series No.TS-R-1)**

Packages containing fissile material that is excepted from classification as FISSILE according to 2.7.2.3.5.1 a) i) or iii) of the 2011-2012 or 2013-2014 Edition of these Instructions (paras. 417 (a) (i) or (iii) of the 2009 Edition of IAEA Regulations for the Safe Transport of Radioactive Material) prepared for transport before 31 December 2014 may continue in transport and may continue to be classified as non-fissile or fissile-excepted except that the consignment limits in Table 2-14 of these editions must apply to the conveyance. The consignment must be transported under exclusive use.]

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UN Model Regulations, paragraph 6.4.24.5, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/16 (see paragraph 3.2.34 of this report)

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**7.23-4<sup>5</sup> Special form radioactive material approved under the 1973, 1973 (As Amended), 1985 and 1985 (As Amended 1990) editions of IAEA Safety Series No. 6**

Special form radioactive material manufactured to a design which had received unilateral approval by the competent authority under the 1973, 1973 (As Amended), 1985 or 1985 (As Amended 1990) editions of IAEA Safety Series No. 6 may continue to be used when in compliance with the mandatory programme of quality assurance management system in accordance with the applicable requirements of 1;6.3. All special form radioactive material manufactured after 31 December 2003 must meet the requirements of these Instructions in full. No new manufacture of such special form radioactive material must be permitted to commence

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DGP-WG/12-WP/31 (see paragraph 3.2.26 of DGP-WG/13-WP/1)

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## Part 7

### OPERATOR'S RESPONSIBILITIES

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#### Chapter 1

#### ACCEPTANCE PROCEDURES

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##### 1.3 THE ACCEPTANCE CHECK

1.3.1 An operator must not accept for transport aboard an aircraft Before a consignment consisting of 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 1.4 unless is first accepted for carriage by air the operator ~~has~~ must, by use of a checklist, ~~verified~~ verify the following:

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DGP-WG/12-WP/32 (see paragraph 3.2.24 of DGP-WG/13-WP/1)

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~~— 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;~~

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DGP-WG/12-WP/31 (see paragraph 3.2.26 of DGP-WG/13-WP/1)

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*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 1.4, the checklist should establish the correct marking and labelling of such an 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 1.4.1, 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.*

*Note 4.— Although the acceptance check required in 1.3.1 is only required to be conducted when a consignment of dangerous goods is first accepted for carriage by air, the operator of any subsequent aircraft used as part of the same journey should verify that packages, overpacks, freight containers and unit load devices continue to meet the requirements of these Instructions in respect of marking, labelling and inspection for damage.*

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## Chapter 2

### STORAGE AND LOADING

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DGP-WG/13-WP/57 (see paragraph 3.2.44 of this report)

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#### **2.9—STOWAGE OF TOXIC AND INFECTIOUS SUBSTANCES**

~~Substances of Class 6 (toxic and category A infectious substances) and substances requiring a subsidiary risk “Toxic” label must not be carried in the same compartment of an aircraft with animals, substances marked as or known to be foodstuffs, feeds or other edible substances intended for consumption by humans or by animals, unless either the toxic or category A infectious substances and the foodstuffs or animals are loaded in separate unit load devices and when stowed aboard the aircraft the unit load devices are not adjacent to each other, or the toxic or category A infectious substances are loaded in one closed unit load device and the foodstuffs or animals are loaded in another closed unit load device.~~

#### **2.409 SPECIAL PROVISIONS APPLICABLE TO THE CARRIAGE OF RADIOACTIVE MATERIAL**

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UN Model Regulations, paragraph 7.1.8.3.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/17 (see paragraph 3.2.35 of this report)

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#### **2.409.3 Stowage during transport and storage in transit**

2.409.3.1 Consignments must be securely stowed.

2.409.3.2 Provided that its average surface heat flux does not exceed  $15 \text{ W/m}^2$  and that the immediately surrounding cargo is not in sacks or bags, a package or overpack may be carried or stored among packaged general cargo without any special stowage provisions except as may be specifically required by the competent authority in an applicable ~~approval~~ certificate of approval.

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UN Model Regulations, paragraph 7.1.8.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/17 (see paragraph 3.2.35 of this report)

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#### **2.109.4 Segregation of packages containing Additional requirements relating to transport and storage during transit of fissile material during transport and storage in transit**

2.409.4.1 Any group of packages, overpacks and freight containers containing fissile material stored in transit in any one storage area must be so limited that the total sum of the criticality safety indexes in the group does not exceed 50. Each group must be stored so as to maintain a spacing of at least 6 m from other such groups.

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*Renumber subsequent paragraphs accordingly.*

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UN Model Regulations, Table 7.1.8.3.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/17 (see paragraph 3.2.35 of this report)

**Table 7-6. Transport index limits for freight containers and aircraft not under exclusive use**

Type of freight container or aircraft	Limit on total sum of transport indexes in a freight container or aboard an aircraft	
	Not under exclusive use	Under exclusive use
Freight container—small	50	n.a.
Freight container—large	50	400
<u>Small freight container</u>	<u>50</u>	<u>n.a.</u>
<u>Large freight container</u>	<u>50</u>	<u>100</u>
Aircraft		
Passenger	50	n.a.
Cargo	200	100

UN Model Regulations, Table 7.1.8.4.2, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/17 (see paragraph 3.2.35 of this report)

**Table 7-7. Critical safety indexes limits for freight containers and aircraft containing fissile material**

Type of freight container or aircraft	Limit on total sum of criticality safety indexes in a freight container or aboard an aircraft	
	Not under exclusive use	Under exclusive use
Freight container—small	50	n.a.
Freight container—large	50	400
<u>Small freight container</u>	<u>50</u>	<u>n.a.</u>
<u>Large freight container</u>	<u>50</u>	<u>100</u>
Aircraft		
Passenger	50	n.a.
Cargo	50	100

2.40.9.4.2 Where the total sum of the criticality safety indexes on board an aircraft or in a freight container exceeds 50, as permitted in Table 7-7, storage must be such as to maintain a spacing of at least 6 m from other groups of packages, overpacks or freight containers containing fissile material or other conveyances carrying radioactive material.

UN Model Regulations, paragraph 7.1.8.4.3, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/17 (see paragraph 3.2.35 of this report)

2.9.4.3 Fissile material meeting one of the provisions a) to f) of 2;7.2.3.5.1 must meet the following requirements:

a) only one of the provisions a) to f) of 2;7.2.3.5.1 is allowed per consignment;

b) only one approved fissile material in packages classified in accordance with 2;7.2.3.5.1 f) is allowed per consignment unless multiple materials are authorized in the certificate of approval;

c) fissile material in packages classified in accordance with 2;7.2.3.5.1 c) must be transported in a consignment with no more than 45 g of fissile nuclides;

d) fissile material in packages classified in accordance with 2;7.2.3.5.1 d) must be transported in a consignment with no more than 15 g of fissile nuclides;

e) unpackaged or packaged fissile material classified in accordance with 2;7.2.3.5.1 e) must be transported under exclusive use on a conveyance with no more than 45 g of fissile nuclides.

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## Chapter 3

### INSPECTION AND DECONTAMINATION

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#### 3.2 DAMAGED OR LEAKING PACKAGES OF RADIOACTIVE MATERIAL, CONTAMINATED PACKAGINGS

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UN Model Regulations, paragraph 7.1.8.5.4, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/17 (see paragraph 3.2.35 of this report)

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3.2.4 Except as provided in 3.2.5, any aircraft or equipment or part thereof which has become contaminated above the limits specified in 4;9.1.2 in the course of the transport of radioactive material, or which shows a radiation level in excess of 5 µSv/h at the surface, must be decontaminated as soon as possible by a qualified person and must not be re-used unless the following conditions are met:

- a) the non-fixed contamination does **must** not exceed the limits specified in 4;9.1.2; and
- b) the radiation level resulting from the fixed contamination on surfaces after decontamination is less than **must not exceed** 5 µSv/h at the surface.

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DGP-WG/12-WP/50 (see paragraph 3.2.27 of DGP-WG/13-WP/1)

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## Chapter 4

### PROVISION OF INFORMATION

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#### 4.1 INFORMATION TO THE PILOT-IN-COMMAND

4.1.1 As early as practicable before departure of the aircraft, but in no case later than when the aircraft moves under its own power, the operator of an aircraft in which dangerous goods are to be carried must:

- a) provide the pilot-in-command with accurate and legible written or printed information concerning dangerous goods that are to be carried as cargo; and
- b) ~~from 1 January 2014, provide personnel with responsibilities for operational control of the aircraft (e.g. the flight operations officer, flight dispatcher, or designated ground personnel responsible for flight operations) with the same information that is required to be provided to the pilot-in-command (e.g. a copy of the written information provided to the pilot-in-command). Each operator must specify the personnel (job title or function) to be provided this information in their operations manual and/or other appropriate manuals.~~

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Except as otherwise provided, 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)~~ (the technical name(s) shown on the dangerous goods transport document is not required) (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".

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DGP-WG/13-WP/63 (see paragraph 3.2.45 of this report)

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4.1.2 For UN 1845 — **Carbon dioxide, solid** (dry ice), ~~only the information required by 4.1.1 may be replaced by~~ the UN number, proper shipping name, class, total quantity in each hold on the aircraft and the aerodrome at which the package(s) is to be unloaded ~~need to be provided~~.

4.1.3 For UN 3480 (**Lithium ion batteries**) and UN 3090 (**Lithium metal batteries**), ~~only the information required by 4.1.1 may be replaced by~~ the UN number, proper shipping name, class, total quantity at each specific loading location, and whether the package must be carried on a cargo aircraft ~~only aircraft need be provided~~. UN 3480 (**Lithium ion batteries**) and UN 3090 (**Lithium metal batteries**) carried under a State exemption must meet all of the requirements of 4.1.

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DGP-WG/13-WP/8 (see paragraph 3.2.6 of this report)

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#### 4.10 TRAINING

An operator must ensure training is provided in accordance with the detailed requirements of 1.4 to all relevant employees, including those of agencies employed to act on the operator's behalf, to enable them to carry out their responsibilities with regard to the transport of dangerous goods, passengers and their baggage, cargo and ~~mail and stores~~.

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Part 8

PROVISIONS CONCERNING  
PASSENGERS AND CREW

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Table 8-1. Provisions for dangerous goods carried by passengers or crew

Items or articles	Location			Approval of the operator(s) is required	The pilot-in-command must be informed	Restrictions
	Checked baggage	Carry-on baggage	On the person			

Medical necessities

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DGP-WG/13-WP/19

See also paragraph 3.2.47 of this report

8) Portable medical electronic devices (automated external defibrillators (AED), nebulizer, continuous positive airway pressure (CPAP), etc.) containing lithium metal or lithium ion cells or batteries	No	Yes	Yes	Yes	No	Text moved below
	Portable medical electronic devices containing lithium metal cells or batteries not exceeding 2 grams or lithium ion cells or batteries not exceeding 100 Wh	Yes	Yes	Yes	No	
Spare batteries for portable medical electronic devices containing lithium metal cells or batteries not exceeding 2 grams or lithium ion cells or batteries not exceeding 100 Wh	No	Yes	Yes	No	No	e) each installed or spare battery: ———must be of a type which meets the requirements of each test in the UN <i>Manual of Tests and Criteria</i> , Part III, subsection 38.3; and ———must not exceed the following: ——— for lithium metal batteries, a lithium content of not more than 8 grams; or ——— for lithium ion batteries, a Watt-hour rating of not more than 160 Wh.
Portable medical electronic devices containing lithium metal batteries exceeding 2 grams but not exceeding 8 grams or lithium ion batteries exceeding 100 Wh but not exceeding 160 Wh	Yes	Yes	Yes	Yes	No	

Items or articles	Location			Approval of the operator(s) is required	The pilot-in-command must be informed	Restrictions
	Checked baggage	Carry-on baggage	On the person			
<u>Spare batteries for portable medical electronic devices containing lithium metal batteries exceeding 2 grams but not exceeding 8 grams or lithium ion batteries exceeding 100 Wh but not exceeding 160 Wh</u>	No	Yes	Yes	Yes	No	

...

## Consumer articles

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≠ 17) Avalanche rescue backpack containing a cylinder of compressed gas of Division 2.2	Yes	Yes	No	Yes	No	<ul style="list-style-type: none"> <li>a) no more than one per person;</li> <li>b) may contain a pyrotechnic trigger mechanism which must not contain more than 200 mg net of Division 1.4S;</li> <li>c) the backpack must be packed in such a manner that it cannot be accidentally activated; and</li> <li>d) the airbags within the backpack must be fitted with pressure relief valves.</li> </ul>
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## DGP-WG/13-WP/21

See also paragraph 3.2.48 of this report

DGP-WG/12-WP/33 (see paragraph 3.2.29 of DGP-WG/13-WP/1)

*Note.— The amendment in the second row of Item 18) restricting the gas to Division 2.2 without a subsidiary risk will be considered by the Council for incorporation in the 2013-2014 Edition of the Technical Instructions by way of an addendum to the 2013-2014 Edition of the Technical Instructions.*

18) Small cartridges fitted into a <del>self-inflating life-jacket</del> <u>self-inflating personal safety device such as a life-jacket or vest</u>	Yes	Yes	Yes	Yes	No	<ul style="list-style-type: none"> <li>a) <u>no more than one personal safety device per person;</u></li> <li>b) <u>the personal safety device must be packed in such a manner that it cannot be accidentally activated;</u></li> <li><del>c)</del> limited to carbon dioxide or another suitable gas in Division 2.2;</li> <li><del>d)</del> must be for inflation purposes;</li> <li>e) <u>the device must be fitted with</u> no more than two small <del>cylinders</del> <u>cartridges</u> of carbon dioxide or another suitable gas in Division 2.2 fitted in the life jacket, per person <u>cartridges</u>; and</li> <li><del>e)</del> no more than two spare cartridges.</li> </ul>
+ Small cartridges for other devices	Yes	Yes	Yes	Yes	No	<ul style="list-style-type: none"> <li>a) no more than four small <del>cylinders</del> <u>cartridges</u> of carbon dioxide or other suitable gas in Division 2.2, <u>without subsidiary risk</u>, per person; and</li> <li>b) the water capacity of each cylinder must not exceed 50 mL.</li> </ul> <p><i>Note.— For carbon dioxide, a gas cylinder with a water capacity of 50 mL is equivalent to a 28 g cartridge.</i></p>

Items or articles	Location			Approval of the operator(s) is required	The pilot-in-command must be informed	Restrictions
	Checked baggage	Carry-on baggage	On the person			
<p><b>DGP-WG/13-WP/56</b> See also paragraph 3.5.6 of this report</p>						
<p>≠ 19) Portable electronic devices (such as watches, calculating machines, cameras, cellular phones, laptop computers, camcorders)</p>						
<p>Portable electronic devices containing lithium metal or lithium ion cells or batteries <u>(articles containing lithium metal or lithium ion cells or batteries the primary purpose of which is to provide power to another device must be carried as spare batteries in accordance with the item below)</u></p>	Yes	Yes	Yes	No	No	<p>a) carried by passengers or crew for personal use;</p> <p>b) should be carried as carry-on baggage;</p> <p>c) each battery must not exceed the following:</p> <ul style="list-style-type: none"> <li>— for lithium metal batteries, a lithium content of not more than 2 grams; or</li> <li>— for lithium ion batteries, a Watt-hour rating of not more than 100 Wh;</li> </ul> <p>d) if devices are carried in checked baggage, measures must be taken to prevent unintentional activation; and</p> <p>e) batteries and cells must be of a type which meets the requirements of each test in the <i>UN Manual of Tests and Criteria</i>, Part III, subsection 38.3.</p>
<p>Spare batteries for portable electronic devices containing lithium metal or lithium ion cells or batteries</p>	No	Yes	Yes	No	No	<p>a) carried by passengers or crew for personal use;</p> <p>b) must be individually protected so as to prevent short circuits (by placement in original retail packaging or by otherwise insulating terminals, e.g. by taping over exposed terminals or placing each battery in a separate plastic bag or protective pouch);</p> <p>c) each battery must not exceed the following:</p> <ul style="list-style-type: none"> <li>— for lithium metal batteries, a lithium content of not more than 2 grams; or</li> <li>— for lithium ion batteries, a Watt-hour rating of not more than 100 Wh; and</li> </ul> <p>d) batteries and cells must be of a type which meets the requirements of each test in the <i>UN Manual of Tests and Criteria</i>, Part III, subsection 38.3.</p>
<p>+ Portable electronic devices containing lithium ion batteries exceeding a Watt-hour rating of 100 Wh but not exceeding 160 Wh</p>	Yes	Yes	Yes	Yes	No	<p>a) carried by passengers or crew for personal use;</p> <p>b) should be carried as carry-on baggage; and</p> <p>c) batteries and cells must be of a type which meets the requirements of each test in the <i>UN Manual of Tests and Criteria</i>, Part III, subsection 38.3.</p>

Items or articles	Location			Approval of the operator(s) is required	The pilot-in-command must be informed	Restrictions
	Checked baggage	Carry-on baggage	On the person			
Spare batteries for portable electronic devices containing lithium ion batteries exceeding a Watt-hour rating of 100 Wh but not exceeding 160 Wh	No	Yes	Yes	Yes	No	a) carried by passengers or crew for personal use; b) no more than two individually protected spare batteries per person; c) must be individually protected so as to prevent short circuits (by placement in original retail packaging or by otherwise insulating terminals, e.g. by taping over exposed terminals or placing each battery in a separate plastic bag or protective pouch); and d) batteries and cells must be of a type which meets the requirements of each test in the UN <i>Manual of Tests and Criteria</i> , Part III, subsection 38.3.

DGP-WG/12-WP/13 and its Addendum (see paragraph 3.2.19 of DGP-WG/13-WP/1)

*Note.— This amendment will be considered by the Council for incorporation in the 2013-2014 Edition of the Technical Instructions by way of an addendum.*

20) Fuel cells used to power portable electronic devices (for example, cameras, cellular phones, laptop computers and camcorders)	No	Yes	Yes	No	No	...
Spare fuel cell cartridges	Yes	Yes	Yes	No	No	
#						d) each fuel cell and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, <b>including Amendment 1</b> , 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; ...
#						h) interaction between fuel cells and integrated batteries in a device must conform to IEC 62282-6-100 Ed. 1, <b>including Amendment 1</b> . Fuel cells whose sole function is to charge a battery in the device are not permitted;
...						

## Attachment 2

### GLOSSARY OF TERMS

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UN Model Regulations, Appendix B, ST/SG/AC.10/40/Add.1 (see also paragraph 3.2.51 of this report)

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#### Glossary of terms

<i>Term and explanation</i>	<i>UN Number(s), when relevant</i>
<del>AIR BAG INFLATORS, PYROTECHNIC or AIR BAG MODULES, PYROTECHNIC or SEAT-BELT PRETENSIONERS, PYROTECHNIC</del> <b>SAFETY DEVICES, ELECTRICALLY INITIATED.</b> Articles which contain pyrotechnical substances and are used as life-saving vehicle airbags or seat belts <u>or dangerous goods of other classes and are used in vehicles, vessels or aircraft to enhance safety to persons. Examples are: air bag inflators, air bag modules, seat-belt pretensioners and pyromechanical devices. These pyromechanical devices are assembled components for tasks such as but not limited to separation, locking, or release-and-drive or occupant restraint. The term includes Safety devices, pyrotechnic.</u>	0503, 3268

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DGP-WG/13-WP/12 (see paragraph 3.2.13.1 d) of this report)

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<b>ASBESTOS.</b> Asbestos is a generic name for naturally occurring mineral silicate fibres of the Serpentine and Amphibole series. In the Serpentine series is Chrysotile, <del>commonly known as white asbestos.</del> In the Amphibole series are Actinolite, Amosite or <del>Mysorite (commonly known as brown asbestos),</del> Anthophyllite, Crocidolite ( <del>commonly known as blue asbestos</del> ) and Tremolite. All types of asbestos can be hazardous to health, <del>blue and brown</del> <b>Amphibole</b> asbestos being the more dangerous types.]	2212, 2590
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*Editorial Note.*— Air bag inflators, air bag modules and seat belt pretensioners will be added to Table 3-1 with cross references to **Safety devices**, electrically initiated and **Safety devices, pyrotechnic.**

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APPENDIX B

PROPOSED AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

Part S-3  
DANGEROUS GOODS LIST,  
SPECIAL PROVISIONS AND QUANTITY LIMITATIONS

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UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1

Name	UN No.	Class or division	Subsidiary risk	State variations	Special provisions	UN packing group	Excepted quantity	Passenger aircraft		Cargo aircraft	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	6	7	8	9	10	11	12	13
Ammonium nitrate with more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance	0222	1.1D			A226			FORBI	DDEN	FORBI	DDEN

UN Model Regulations, Chapter 3.2, Dangerous Goods List, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/13 (see paragraph 3.2.17.1 c) of this report)

<u>Adsorbed gas, flammable, n.o.s.</u>	<u>3510</u>	<u>2.1</u>					<u>E0</u>	<u>[219]</u>	<u>[(5 kg)]</u>	<u>[219]</u>	<u>[150 kg]</u>
<u>Adsorbed gas, toxic, n.o.s.*</u>	<u>3512</u>	<u>2.3</u>					<u>E0</u>	<u>[See 210]</u>		<u>[219]</u>	<u>[150 kg]</u>
<u>Adsorbed gas, toxic, flammable, n.o.s.*</u>	<u>3514</u>	<u>2.3</u>	<u>2.1</u>				<u>E0</u>	<u>[See 210]</u>		<u>[See 210]</u>	
<u>Adsorbed gas, toxic, oxidizing, n.o.s.*</u>	<u>3515</u>	<u>2.3</u>	<u>5.1</u>				<u>E0</u>	<u>[See 210]</u>		<u>[See 210]</u>	
<u>Adsorbed gas, toxic, corrosive, n.o.s.*</u>	<u>3516</u>	<u>2.3</u>	<u>8</u>				<u>E0</u>	<u>[See 210]</u>		<u>[See 210]</u>	
<u>Adsorbed gas, toxic, flammable, corrosive, n.o.s.*</u>	<u>3517</u>	<u>2.3</u>	<u>2.1</u> <u>8</u>				<u>E0</u>	<u>[See 210]</u>		<u>[See 210]</u>	
<u>Adsorbed gas, toxic, oxidizing, corrosive, n.o.s.*</u>	<u>3518</u>	<u>2.3</u>	<u>5.1</u> <u>8</u>				<u>E0</u>	<u>[See 210]</u>		<u>[See 210]</u>	

## Chapter 6

### SPECIAL PROVISIONS

Table S-3-4. Special Provisions

TIs UN

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UN Model Regulations, Dangerous goods list, SP370, ST/SG/AC.10/40/Add.1

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A226 (370) This entry applies to:

- ammonium nitrate with more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any added substance; and
- ammonium nitrate with not more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any added substance, that are not too sensitive for acceptance into Class 1 when tested in accordance with Test Series 2 (see UN Manual of Tests and Criteria, Part I). See also UN No. 1942.

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UN Model Regulations, Dangerous goods list, SP374, ST/SG/AC.10/40/Add.1  
DGP-WG/13-WP/13 (see paragraph 3.2.17.1 e) of this report)

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[ A227 (374) This entry may only be used, as authorized by the competent authority, for ~~packagings, large packagings or intermediate bulk containers (IBC),~~ or parts thereof, which have contained dangerous goods, other than radioactive material, which are transported for disposal, recycling or recovery of their material, other than reconditioning, repair, routine maintenance, remanufacturing or reuse, and which have been emptied to the extent that only residues of dangerous goods adhering to the packaging parts are present when they are handed over for transport.]

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## Part S-4

## PACKING INSTRUCTIONS

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## Chapter 3

## CLASS 1 — EXPLOSIVES

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UN Model Regulations, paragraph 4.1.4.1, P116, PP65, ST/SG/AC.10/40/Add.1

116	PACKING INSTRUCTION 116		116
<p><i>Inner packagings</i></p> <p><b>Bags</b> paper, water and oil resistant plastics textile, plastic-coated or lined woven plastics, sift-proof</p> <p><b>Receptacles</b> fibreboard, water-resistant metal plastics wood, sift-proof</p> <p><b>Sheets</b> paper, water-resistant paper, waxed plastics</p>	<p><i>Intermediate packagings</i></p> <p>Not necessary</p>	<p><i>Outer packagings</i></p> <p><b>Bags</b> paper, multiwall, water-resistant (5M2) plastics, film (5H4) textile, sift-proof (5L2) textile, water-resistant (5L3) woven plastics (5H1, <del>5H2</del>, <del>5H3</del>)</p> <p><b>Boxes</b> aluminium (4B) fibreboard (4G) natural wood, ordinary (4C1) natural wood, with sift-proof walls (4C2) other metal (4N) plywood (4D) reconstituted wood (4F) solid plastics (4H2) steel (4A)</p> <p><b>Drums</b> aluminium (1B1, 1B2) fibre (1G) other metal (1N1, 1N2) plastics (1H1, 1H2) steel (1A1, 1A2)</p> <p><b>Jerricans</b> plastics (3H1, 3H2) steel (3A1, 3A2)</p>	
<p><b>PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:</b></p> <ul style="list-style-type: none"> <li>— For UN 0082, 0241, 0331 and 0332, inner packagings are not necessary if leakproof, removable head drums are used as the outer packaging.</li> <li>— For UN 0082, 0241, 0331 and 0332, inner packagings are not required when the explosive is contained in a material impervious to liquid.</li> <li>— For UN 0081, inner packagings are not required when contained in rigid plastic which is impervious to nitric esters.</li> <li>— UN 0331, inner packagings are not required when bags (5H2), (5H3) or (5H4) are used as outer packagings.</li> <li>— <del>Bags (5H2 or 5H3) should be used only for UN 0082, 0241, 0331 and 0332.</del></li> <li>— For UN 0081, bags must not be used as outer packagings.</li> </ul>			

UN Model Regulations, P208, ST/SG/AC.10/40/Add.1  
See also paragraphs 3.2.17.1 c) and 3.2.29.1 c) of this report.

210	PACKING INSTRUCTION 210	210
<p>The general packing requirements of Part 4, Chapter 1 of the Technical Instructions must be met.</p> <p>Small quantities of gases in Division 2.3, including mixtures of gases, may be carried in an aircraft under the following conditions:</p> <ol style="list-style-type: none"><li>1. The maximum quantity of gas permitted per package must be determined using the following formula: <math display="block">\text{Permitted mass} \leq 10^{-3} (\text{RMM}) (\text{LC}_{50})</math>where: RMM = relative molecular mass LC<sub>50</sub> expressed in mL/m<sup>3</sup> as defined in Part 2, Chapter 6 of the Technical Instructions Permitted mass expressed in grams.  For mixtures of toxic gases, where the LC<sub>50</sub> of the mixture or its mass per unit volume at NTP are unknown, the following formula shall be used to determine the permitted mass of the mixture: <math display="block">\frac{\text{mass of component 1}}{10^{-3} (\text{RMM})_1 (\text{LC}_{50})_1} + \frac{\text{mass of component 2}}{10^{-3} (\text{RMM})_2 (\text{LC}_{50})_2} + \frac{\text{mass of component } n}{10^{-3} (\text{RMM})_n (\text{LC}_{50})_n} \leq 1</math>where: NTP is normal temperature and pressure (RMM) = relative molecular mass of component 1 ... n  This latter formula makes no allowance for any synergistic effect of the mixture and it should not be used where the toxic effects are other than additive.</li><li>2. The gas must be contained in a gas cylinder which meets the requirements of Packing Instruction 200, <a href="#">[Packing Instruction 219 for adsorbed gases]</a> or an IP.8 glass ampoule, provided it is compatible with the gas.  The maximum quantity of gas permitted in a glass ampoule is determined by the above formula but is further limited to not more than 100 g.</li><li>3. The glass ampoule or gas cylinder must be tightly packed as to prevent movement in an outer metal pressure vessel containing inert absorbent and cushioning material. The outer metal pressure vessels must be designed to contain the total quantity of gas in case of leakage of the ampoule or cylinder. The outer metal pressure vessel must meet the requirements of Packing Instruction 200. Special care must be taken to prevent corrosion of the inner wall of the outer metal pressure vessels.</li><li>4. The outer metal pressure vessel must be tightly packed, so as to prevent movement, in a strong outside packaging.</li></ol>		

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