



## DANGEROUS GOODS PANEL (DGP) WORKING GROUP MEETING (DGP-WG/15)

Montreal, 27 April to 1 May 2015

### REPORT OF THE MEETING

#### 1. INTRODUCTION

1.1 The meeting of the Dangerous Goods Panel Working Group Meeting (DGP-WG/15) was opened by Mr. C. Radu, Deputy Director, Aviation Safety, Air Navigation Bureau on 27 April 2015. Ms. M. Paquette was elected Chairperson of the meeting and Mr. B. Firkins was elected Vice-Chairperson.

#### 2. ATTENDANCE

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

Members	Advisers/Observers	State/International Organization
	M. Böhm	Austria
B. Firkins		Australia
B. Carrara	H. Guedes	Brazil
M. Paquette	M. Casas-Cordero D. Evans T. Howard P. Juneau	Canada
	J. Abouchaar S. Aidong C. Chan (Hong Kong SAR) C. Donghao	China
	J. Wiren Bengtsson H. Thaarup	Denmark
P. Tatin	V. Royou	France
	G. Closhen	Germany
M. Gelsomino	C. Carboni	Italy
H. Sugimoto	A. Awano N. Iki H. Shima N. Takahashi	Japan

<b>Members</b>	<b>Advisers/Observers</b>	<b>State/International Organization</b>
T. Muller	R. Dardenne K. Vermeersch	the Netherlands
D. Mirko	D. Kurdchenko	Russian Federation
	N.W. Mathonsi T. Zembe	South Africa
P. Ros		Spain
	R. Joss	Switzerland
H. Al Muhairi	H. Al Obaidli P. Balasubramanian P. King A. Wagih	United Arab Emirates
R. McLachlan	J. Hart D. Warden	United Kingdom
	R. Bornhorst J. Gardlin M. Givens R. Hill K. Leary J. McLaughlin D. Pfund H. Webster	United States
D. Brennan	P. Oppenheimer B. Sullivan D. Tindley J. Wyatt	International Air Transport Association (IATA)
	D. Ferguson P. Rohrbach	International Coordinating Council of Aerospace Industries Associations
M. Rogers	S. Schwartz	International Federation of Air Line Pilots' Associations (IFALPA)
K. Rooney	L. McGuigan	International Civil Aviation Organization (ICAO)
	E. Sigrist	European Chemical Industry Council (CEFIC)
	A. Altemos G. Leach N. McCulloch	Dangerous Goods Advisory Council (DGAC)
	B. McClelland A. McCulloch	Global Express Association (GEA)
	C. Updyke	National Electrical Manufacturers Association (NEMA)

Members	Advisers/Observers	State/International Organization
	G. Kerchner	The Rechargeable Battery Association (PRBA)
	D. Cortez	Universal Postal Union (UPU)
	J. Le Tonqueze	Worldwide Flight Services (WFS)
	B. Bonnardel-Azzarelli	World Nuclear Transport Institute (WNTI)

### 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 Infected live animals (DGP-WG/15-WP/22)

3.1.1.1.1 Inconsistencies with respect to the provisions for the transport of infected live animals between the Technical Instructions and the Supplement were reported. The Technical Instructions allowed for the transport of infected live animals under the terms and conditions of an approval granted by the appropriate national authority, while the Supplement indicated that infected live animals can only be transported by air when an exemption is granted by the States concerned.

3.1.1.1.2 Although there was support for revising the Supplement to align with the Technical Instructions by making transport subject to an approval rather than an exemption, the Secretary suggested that the misalignment should be given further consideration particularly in relation to Annex 18 and believed the World Health Organization (WHO) should be contacted for guidance. Representatives of the World Health Organization (WHO) and the World Organisation for Animal Health advised that transport of infected live animals should be subject to prior approval from, at a minimum, the States of Origin, Transit and Destination. It was suggested that further consideration be given to distinguishing between animals infected with Category A infectious substances versus Category B.

3.1.1.1.3 Discussions between the Secretary and the proposer would continue with the aim of developing a revised proposal for DGP/25.

### **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 2017-2018 Edition**

#### **3.2.1 Agenda Item 2.1: Part 1 — General**

##### **3.2.1.1 Draft Amendments to the Technical Instructions to Align With the UN Recommendations — Part 1 (DGP-WG/15-WP/11)**

3.2.1.1.1 Draft amendments to Part 1 were proposed to reflect the decisions taken by the UN Sub-Committee. The only issue raised during discussion of the working paper related to the inclusion into the Technical Instructions of definitions for items not permitted for transport by air. Whether or not to include definitions for such items had been discussed at DGP/24 (see paragraph 2.1.1.2 of the DGP/24 Report). That discussion related specifically to large salvage packagings. Although it was agreed to include this definition in the Technical Instructions, there was no definitive conclusion on whether all terms should be included. DGP-WG/15 was invited to consider whether to include the definitions for other items included in Part 1;3 which were not permitted in transport by air. It was agreed that they would be included and that the words “Not permitted for air transport” would be maintained as a preamble to each of these definitions.

3.2.1.2 It was agreed that DGP-WG/15-WP/11 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 working paper.

##### **3.2.1.3 Review and Approval of Dangerous Goods Training Programmes — State of the Operator (DGP-WG/15-WP/28)**

3.2.1.3.1 It was noted that Part S-7;5.6.1 of the Supplement to the Technical Instructions referred to the requirement in the Technical Instructions for an operator’s dangerous goods training programme to be approved but did not specify which State was to approve it. This had led some to believe that approval was needed by the State of Origin or Destination, neither of which were necessarily the State of the Operator, resulting in the potential for an operator’s training programme being reviewed and approved by several States. An amendment to Part S-7;5.6.1 of the Supplement was proposed to specify that the operator’s training programme was required to be approved by the State of the Operator. This was agreed.

3.2.1.3.2 It was suggested that Part 1;4.1 of the Technical Instructions included provisions for establishing and maintaining dangerous goods training programmes and reviewing and approving them. A revision to the heading of Part 1;4.1 and the introduction of two new headings in the section were proposed to clearly indicate this. These amendments were agreed. The proposal also included a specific reference to the State of Origin in relation to the national authority responsible for reviewing and approving training programmes other than those for the operator and designated postal operators. There was no support for this part of the proposal and it was therefore withdrawn.

### 3.2.2 Part 2 — Classification

#### 3.2.2.1 Draft Amendments to the Technical Instructions to Align With the UN Recommendations — Part 2 (DGP-WG/15-WP/12)

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

- a) It was agreed that a requirement for a copy of the document of approval granted by the appropriate national authority to accompany a consignment shipped under the new provision in Part 1;1.2 b) should be included;
- b) References to competent authority would be replaced with appropriate national authority as applicable;
- c) There was a lack of consistency when referring to the UN Model Regulations and the United Nations Recommendations. The Secretariat would ensure consistent use of the references throughout the Technical Instructions;
- d) References to Special Provision A208 would be replaced with A209 under the new provisions for substances not accepted for transport (paragraphs 2.6, 3.5, 6.2.5 and 8.3) as this was the special provision which applied to these provisions;
- e) The heading to the new provisions for substances not accepted for transport (paragraphs 2.6, 3.5, 6.2.5 and 8.3) would be modified to read “...forbidden for transport” to align with wording used throughout the Technical Instructions.
- f) It was questioned whether it was appropriate to include the new provisions for viscosity determination under 3;3.2.2 a) in a footnote. It was noted that the UN recognized footnotes as regulatory text, although it was suggested that the provision was more of an explanatory rather than a regulatory nature. The issue would be raised at the UN Sub-Committee.

3.2.2.1.2 A representative of the World Nuclear Transport Institute (WNTI) referred to the reclassification of UN 3507 — **Uranium Hexafluoride, Radioactive Material, Excepted Package** as a Division 6.1 toxic substance of Packing Group I with radioactive and corrosive subsidiary risks. The subject had been discussed at DGP-WG/14 in relation to concerns that the reclassified substance would not be permitted for transport by air if it were considered to be toxic by inhalation (see paragraph 3.2.3.2 of the DGP-WG/14 Report). The UN Sub-Committee had decided against assigning SP 335 (“This substance is toxic by inhalation”) to the substance, and the proposed amendment to the entry in Table 3-1 aligned with the Model Regulation. Members were encouraged to contact the Secretary if they needed further information on the subject.

3.2.2.1.3 It was agreed that DGP-WG/15-WP/12 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 working paper.

### 3.2.2.2 **Classification and Alignment with the UN Model Regulations (DGP-WG/15-WP/25)**

3.2.2.2.1 A number of inconsistencies between the UN Model Regulations and the Technical Instructions in relation to mandatory versus recommended classification provisions were reported. A list of these inconsistencies was provided and the working group was asked to consider each inconsistency and determine whether changes to the Technical Instruction were necessary or if it should be brought to the attention of the UN Sub-Committee.

3.2.2.2.2 The Secretary noted that an exhaustive exercise comparing the UN Model Regulations with the Technical Instructions had been undertaken in the late 1990s. The goal was to harmonize the Technical Instructions as much as possible with the UN Model Regulations and that necessary deviations were consciously determined at that time. Reference to the Dangerous Goods Panel Guidance Document was made, noting that the document should be updated whenever the Technical Instructions deviated from the UN Model Regulations but that this was not always done. Noting that the DGP had determined the need for an editorial working group to carefully review amendments to the Technical Instructions, it was suggested that this group could look at the issues raised in the working paper in more detail and that updating the Dangerous Goods Panel Guidance Document should become a recurring task for the group.

### 3.2.2.3 **Format and Structure: Instructions versus Recommendations (DGP-WG/15-WP/26)**

3.2.2.3.1 It was noted that Standards and Recommended Practices had a distinctive style and format in Annexes, including Annex 18, which made it easy to differentiate between the two. Standards appeared in normal typeface while Recommended Practices appeared in italic typeface prefaced by the word “Recommendation”. It was suggested that the approach taken to distinguish between recommendatory versus mandatory text was not standard in the Technical Instructions. Mandatory text did appear as normal type face, but recommendatory text was sometimes shown in italic typeface prefaced by the word “Note” and sometimes shown in normal typeface. It was noted that the terms “should”, “shall” and “must” were not always interpreted accurately, which sometimes led to improper translation into the other language versions of the Technical Instructions. It was suggested that a distinctive standardized format would facilitate accurate translation. The working group was therefore invited to consider whether applying a consistent style and format to distinguish between mandatory and recommendatory text in the Technical Instructions should be considered. Examples of how this could be accomplished were provided.

3.2.2.3.2 Although there was support for any effort to clarify the provisions, it was felt that the revisions proposed in the working paper would significantly alter paragraph numbering in the Technical Instructions; might cause an unintentional change; and would result in the need to ensure references were up-to-date. This would be an onerous task, and unlikely to be achievable in time for DGP/25. The working paper was withdrawn.

### 3.2.2.4 **Special Provision A44 (DGP-WG/15-WP/27)**

3.2.2.4.1 An inconsistency between what is permitted in UN 3316 — **Chemical kit** and **First aid kit** in accordance with Special Provision 251 of the UN Model Regulations versus Special Provision A44 of the Technical Instructions was identified. The UN special provision only allowed dangerous goods permitted in limited quantities in the kits whereas the Technical Instructions allowed dangerous goods which were permitted either in limited quantities or in excepted quantities, making the Technical

Instructions less restrictive than the UN Model Regulations. An amendment to Special Provision A44 which removed the reference to excepted quantities was proposed so as to align the Technical Instructions with the UN Model Regulations.

3.2.2.4.2 Although there was support for harmonization with the UN Model Regulations, it was felt that more consideration was needed before agreeing to the amendment including determining if the UN Model Regulations should instead align with the Technical Instructions for this particular provision. Although the deadline for submitting formal papers to the UN Sub-Committee had passed, the proposer agreed to submit an informal paper to the Sub-Committee seeking opinions on the issue raised in his paper.

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

#### **3.2.3.1 Review of Special Provisions A302 and A324 to remove State of Destination from Approval (DGP-WG/15-WP/1)**

3.2.3.1.1 The working group was reminded that Special Provision A302 allowed for the carriage of cylinders containing compressed oxygen or compressed air for the purpose of providing life support for aquatic animals during transport with the prior approval of the States of Origin, Destination and of the Operator. It was suggested that justification for requiring approval from the State of Destination was no longer valid as it was originally included with the recognition that the need for transport was restricted to just one region of the world, but that the need had since spread to other regions. Difficulties for shippers and operators obtaining approval from the State of Destination were reported; it was suggested that a contributing factor was the fact that the State of Destination had no oversight authority over the shipper or the operator and had little interest in the potential value of the shipments to the shipper or the operator. The working group was therefore asked to remove State of Destination from the approval process.

3.2.3.1.2 A question related to the quantity of oxygen needed to support the animals during transport was raised, but it was decided that this was not relevant to the specific proposal and that if there were concerns, they should be raised in a separate paper. Although two panel members did not support removing State of Destination from the approval process, most believed that requiring an approval from that State was not necessary and did not provide any additional safety measures. The amendment was therefore agreed.

3.2.3.1.3 Recognizing that Special Provision A302 was used as the basis for developing Special Provision A324, which applied to the transport of a symbolic flame, it was agreed to also remove the requirement for approval from the State of Destination in Special Provision A324.

3.2.3.1.4 Panel members who opposed the proposal were reminded that State variations extending the requirement for approval from other States could be filed.

**3.2.3.2 Draft Amendments to the Technical Instructions to Align  
With the UN Recommendations — Part 3  
(DGP-WG/15-WP/13)**

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

- a) It was noted that a new provision was added to SP225 of the UN Model Regulations in the form of a note. The same provision was added to Special Provision A19 in the Technical Instructions, but as a regular provision since the provision included regulatory text. It was questioned whether it was appropriate for it to appear in a note in the UN Model Regulations. This would be raised to the UN Sub-Committee.
- b) New entries for UN 3531 and UN 3532 were marked as forbidden on passenger aircraft by the Secretariat in the list of amended entries for Table 3-1. It was suggested that these Division 4.1, Packing Group III entries should be permitted on both passenger and cargo aircraft. It was further suggested that the new special provision assigned to UN 3531 and UN 3532 might need further clarification. The special provision, packing instruction and the quantities assigned to UN 3531 and UN 3532 would be further reviewed by panel members prior to DGP/25.
- c) A general provision referring to special provisions that included a requirement for package marking in the form of specific wording indicated in quotation marks was added to the introductory section of 3;3 in alignment with the UN Model Regulations. It was suggested that the requirement be added to the specific special provisions where this applied instead of the introductory text, recognizing the limited number of special provisions to which it would apply. This would be considered prior to DGP/25.
- d) New and revised provisions for UN 3166, which included reclassification of engines and new entries for machines, new special provisions and new packing instructions, would be carefully reviewed by panel members. It was suggested that some of the special provisions assigned to these articles could be merged, some redundant provisions could be deleted, and some new provisions would be inappropriate for transport by air. A complete review of all provisions related to vehicles, engines and machinery would be undertaken by panel members prior to DGP/25.
- e) Reference to the quantity limits shown in columns 11 and 13 of Table 3-1 in Special Provision A66 would be deleted as it only applied to the UN Model Regulations.
- f) Whether or not the revision to Special Provision A88, which applied to prototype or low-production lithium batteries and referred to a new packing instruction, should be adopted was considered. It was proposed that as these can only be transported under an approval, the new packing instruction should be included in the Supplement to the Technical Instructions instead of the Technical Instructions. This would be further reviewed by panel members prior to DGP/25.
- g) The new text in Special Provision A102 would be removed as it applied to bulk consignments which were not permitted by the air mode.

- h) The wording related to the transition period provided in Special Provision A132 was unclear and would be reviewed.
- i) The new provision in Special Provision A134 related to batteries meeting the requirements of 2.9.3 would be removed as it already appeared in the applicable packing instructions, i.e. Packing Instructions 950 and 951.
- j) It was suggested that the wording in new Special Provision A202 referring to “may be transported” placed an inappropriate responsibility on the operator since it was the shipper’s responsibility to apply the provisions. The wording would be replaced with “offered for transport”. It was also suggested that the required statement on the transport document provided in sub-paragraph g) was too prescriptive and that the wording should be modified in line with other special provisions, i.e. “Transport in accordance with this special provision must be noted on the dangerous goods transport document.” The UN Sub-Committee would be advised of these changes.
- k) The transition period for the new hazard label for lithium batteries that was included in a note in new Special Provision A206 would be moved to form part of the mandatory provision. This would ensure that the transition period would be available in States which might not otherwise consider relaxation from requirements provided in notes. Some members noted that although they recognized the need for harmonization with other modes, they did not support a transition period for the hazard label and suggested that shippers be encouraged to apply the new label. It was noted that the label name provided in column 5 of Table 3-1 would need to refer to the specific miscellaneous label for lithium batteries.

3.2.3.2.2 It was agreed that DGP-WG/15-WP/13 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 working paper.

### 3.2.3.3 **Requirements for Sterilization Devices Containing Nitrogen Dioxide or Nitric Oxide (DGP-WG/15-WP/21)**

3.2.3.3.1 The working group was asked to consider adopting new special provisions to allow for the transport of sterilization devices required for medical response in disaster relief that contain UN 1067 — **Nitrogen dioxide**, UN 1660 — **Nitric oxide, compressed** and UN 2031— **Nitric acid**, other than red fuming, with more than 20% and less than 65% nitric acid (Packing Group II) on passenger and cargo aircraft. It was reported that sterilization with these gases or liquids did not require electricity and offered improved compatibility and safety over other materials used for sterilization of medical equipment and devices. This would be useful in emergency and disaster response scenarios. The wording of the proposed special provisions was based on Special Provision A131.

3.2.3.3.2 Although there was support for efforts to facilitate transport of devices needed for public health and welfare, there were concerns with developing separate special provisions for each new device entering the market, recognizing that other special provisions for sterilization devices had already been incorporated in the Technical Instructions. The proposer would work with panel members who raised concerns and develop a new proposal for DGP/25.

### 3.2.4 Part 4 — Packing Instructions

#### 3.2.4.1 Draft Amendments to the Technical Instructions to Align With the UN Recommendations — Part 4 (DGP-WG/15-WP/14)

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

- a) It was suggested that the structure of Packing Instruction 200 needed to be reviewed, specifically in relation to handling of provisions in the UN packing instruction for substances which were forbidden in the air mode. This would be done prior to DGP/25.
- b) A misalignment between Packing Instruction 203 of the Technical Instructions and the corresponding packing instruction in the UN Model Regulations was raised whereby the Technical Instructions referred to receptacles being “tightly” packed whereas the UN Model Regulations did not refer to “tightly”.
- c) It was questioned whether the new provision in Packing Instruction 451 for packagings of other material with a small amount of metal which applied to UN 3474 was appropriate for the air mode. This would be considered prior to DGP/25.
- d) An error in the amendments to Packing Instructions 965 through 970 was noted in relation to the requirement for the lithium battery handling label (which would now be referred to as a mark in alignment with the UN Model Regulations) whereby it was inadvertently included in Section I. The requirement would be removed from Section I.

3.2.4.1.2 It was agreed that DGP-WG/15-WP/14 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 working paper.

#### 3.2.4.2 Packing Instruction 650 (DGP-WG/15-WP/19)

3.2.4.2.1 A proposal to remove the requirement for the name and telephone number of a person responsible for consignments of UN 3373 — **Biological substance, Category B** to be provided on a written document from Packing Instruction 650 was presented. It was reported that even though formal acceptance checks in accordance with Part 7;1 were not required for UN 3373, consignments were sometimes refused carriage if this information was missing or if it was believed to be incomplete. Noting that name and telephone number were not required in accordance with the UN Model Regulations, it was suggested that the information provided was not essential and could be removed.

3.2.4.2.2 Although there was some support from members who believed there was little value in having a phone number when there was no requirement for it to be a 24-hour emergency number, the majority did not support removing the requirement. These members believed that in the event of an incident, having the name and telephone number of a person responsible on a written document was helpful in order to determine exactly what the Category B substance was. The proposal was withdrawn.

### 3.2.5 Part 5 — Shipper's Responsibilities

#### 3.2.5.1 Draft Amendments to the Technical Instructions to Align With the UN Recommendations — Part 5 (DGP-WG/15-WP/15)

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

- a) It was agreed that the new provision referring to the symbol in the case of the Class 9 label for lithium cells and batteries in paragraph 3.5.1 c) should be turned into a stand-alone sentence.
- b) The lithium battery handling “label” provisions would be moved to Chapter 2 and references to the lithium battery handling “label” would be replaced with lithium battery “mark” for the sake of alignment with the new “mark” adopted in the UN Model Regulations.
- c) A transition period allowing for the use of either the handling label required by the current edition of the Technical Instructions or the new mark adopted in the UN Model Regulations until 31 December 2018 would be included under the new mark.
- d) The new documentation requirement for UN 3528, 3529 and 3530 shown as new 4.1.4.10 would be incorporated in existing 4.1.5.8.1 b) by adding A208 to the list of special provisions. This, along with a review of other special provisions (including new A202) which should be referenced in 4.1.5.8.1 b), would be done prior to DGP/25.

3.2.5.1.2 It was agreed that DGP-WG/15-WP/15 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 working paper.

#### 3.2.5.2 Determination of Transport Index (DGP-WG/15-WP/2 and DGP-WG/15-WP/32)

3.2.5.2.1 At DGP-WG/14, a recommendation based on advisory material from the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material was proposed for inclusion as a note under Part 5;1.2.3 of the Technical Instructions. The note clarified that the transport index for packages of radioactive material where the measured dose rate comprised more than one type of radiation should be based on the sum of all the dose rates from each type of radiation. Although there had been support for the proposal from a safety perspective, the amendment was not agreed as it was believed to be a multi-modal issue which needed further consideration. A revised proposal was presented to DGP-WG/15 in the form of a new note under Part 7 — Operator's Responsibilities, Chapter 2 — Storage and loading, paragraph 2.9.1 — Limitation of exposure of persons to radiation. An alternate proposal suggested that the note would be more appropriate in Part 5 — Shipper's Responsibilities as it was the shipper's responsibility to determine the transport index.

3.2.5.3 There was strong support for including the note in Part 5. Recognizing that it was a multi-modal issue, the normal process would be for the issue to first be reviewed by the IAEA Transport Safety Standards Committee (TRANSSC) and a proposal brought to the UN Sub-Committee if deemed

appropriate. The six-year IAEA amendment cycle would mean that the amendment would not be processed in time for the 2017-2018 Edition of the Technical Instructions. It was agreed that the Secretary would bring the proposal to the summer sessions of TRAANSC and the UN Sub-Committee and that she would bring comments from those meetings to DGP/25. Recognizing that the amendment referenced existing guidance material and did not introduce any new requirements, it was felt that it may be acceptable to introduce it into the 2017-2018 Edition of the Technical Instructions provided there were no objections from these bodies.

#### **3.2.5.4 Packing Instruction 101 — Authorized versus Approved (DGP-WG/15-WP/10)**

3.2.5.4.1 Inconsistent use of the terms “approved” and “authorized” in the general packing provisions for Class 1, which referred to “approved” (Part 4;3.3.1.12), Packing Instruction 101 which also referred to “approved”, and the documentation requirements for explosive substances where Packing Instruction 101 had been adopted by an appropriate national authority, which referred to “authorized” (Part 5;4.1.5.8.2). It was noted that this inconsistency came to light after a consignment was rejected for using the term “approved” on the dangerous goods transport document. It was suggested that this was a minor discrepancy which should not have resulted in rejection and that Note 1 under Part 7;1.3.1 advised against such rejections. However, for the sake of consistency and to help prevent future rejected consignments, the working group was asked to consider amending the Technical Instructions and was provided with the following options to consider:

- a) Replacing “approved” with “authorized” in Packing Instruction 101 and the related text in Part 4;3.3.1.12;
- b) Replacing “authorized” with “approved” in Part 5;4.1.5.8.3;
- c) Removing the prescriptive text requirements from Packing Instruction 101, Part 4;3.3.1.2 and Part 5;4.1.5.8.3; or
- d) Allowing for either word by providing examples of both in a note under 5;4.1.5.8.2.

The meeting agreed that the term “approved” should be applied. An amendment to Part 5;4.1.5.8.3 to replace “authorized” with “approved” was agreed.

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

##### **3.2.6.1 Draft Amendments to the Technical Instructions to Align With the UN Recommendations — Part 6 (DGP-WG/15-WP/16)**

3.2.6.1.1 Draft amendments to Part 6 were proposed to reflect the decisions taken by the UN Sub-Committee. The following issues were raised during the discussion:

- a) A misalignment between the Technical Instructions and the UN Model Regulations in 2.3 was noted whereby the Technical Instructions included an optional provision for the “/” symbol in the UN specification marking while the UN Model Regulations did not. It was agreed that the provision should be maintained in the Technical Instructions so as to prevent unnecessary rejection of packages which did not include

the symbol. The UN Sub-Committee would be asked to consider whether the provision should be included in the UN Model Regulations.

- b) It was noted that a new reference to ISO 11515-2013 was inadvertently omitted from 5.2.1.1. It would be added to the DGP/25 working paper.

3.2.6.1.2 It was agreed that DGP-WG/15-WP/16 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 working paper.

### 3.2.7 **Part 7 — Operator's Responsibilities**

#### 3.2.7.1 **Provision of Information to Passengers (DGP-WG/15-WP/8)**

3.2.7.1.1 An amendment to the provisions requiring operators to ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft was proposed (Part 7;5.1) (see paragraph 3.2.7.3 of the DGP-WG/14 Report). A proposal was made at DGP-WG/14 to take into account technological changes being adopted by large airlines which simplified and improved the processes around issuing boarding passes and baggage tags and the deposit of checked baggage with the airline. The outcome of the DGP-WG/14 discussions was that thought should be given to revising the entire section by making it less prescriptive and more goal-oriented. This would include a requirement for operators to provide information to passengers on the types of dangerous goods which a passenger was forbidden to carry on board an aircraft and a method to ensure passengers had acknowledged receiving it.

3.2.7.1.2 A revised proposal allowing for the operator to determine the method to achieve this and requiring that the method be detailed in the operations manual or other appropriate manual approved by the appropriate national authority of the State of the Operator was considered.

3.2.7.1.3 While there was strong support for the amendment in principle, there were some concerns with the specific wording in relation to requiring the operator to include their methods for providing the information in the operations manual or other appropriate manuals approved by the appropriate national authority. There was concern that responsibility was being placed entirely on the air operator since references to the airport operator had been removed in the proposed amendment.

3.2.7.2 A small working group was convened to address concerns raised during the discussion. It was reported that progress was made and that guidance material to support the revised provisions was being developed. A revised amendment to the Technical Instructions and guidance material for inclusion in the Supplement would be submitted to DGP/25 for consideration.

#### 3.2.7.3 **Information to the Pilot-in-Command for Consumer Commodities (DGP-WG/15-WP/23)**

3.2.7.3.1 It was noted that for consignments of **Consumer commodities** — ID 8000, either the actual gross mass of each package or the average gross mass of all packages was permitted on the dangerous goods transport document in accordance with Packing Instruction Y963, sub-paragraph l). A similar provision was provided in Part 7;4 in relation to the information required to the pilot-in-command, but only when consumer commodities were presented to the operator by the shipper in a unit load device. A revision to Part 7;4.1.1 f) to align with the provisions in Packing Instruction Y963 was proposed.

3.2.7.3.2 The proposal was agreed, subject to the addition of the words “as appearing on the dangerous goods transport document”.

#### 3.2.7.4 **Dry ice as a Refrigerant for Certain Dangerous Goods** (DGP-WG/15-WP/31, Revision No. 2)

3.2.7.4.1 An amendment to allow for shippers to ship UN 1845 — **Carbon dioxide, solid** or **Dry ice** with UN 3373 — **Biological substance, Category B** or **ID 8000 — Consumer commodity** in unit load devices (ULDs) was proposed. It was noted that shippers were permitted to ship UN 1845 — **Carbon dioxide, solid** or **Dry ice** in unit load devices in accordance with Packing Instruction 954, provided the dry ice was not used for dangerous goods. UN 3373 and ID 8000 were also permitted in unit load devices prepared by shippers and these were often shipped under refrigeration using dry ice. However, while UN 3373 and ID 8000 were permitted in ULDs prepared by shippers, dry ice was not permitted in the ULD with either of these dangerous goods because of the restriction against shippers loading dry ice in an ULD with other dangerous goods.

3.2.7.4.2 The amendment, which included revisions to Part 5;1.1 g), Packing Instruction 954 and Part 7;1.4.1 c), was agreed.

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

##### 3.2.8.1 **Flameless Electronic Lighters (DGP-WG/15-WP/20)**

3.2.8.1.1 It was questioned whether small flameless lighters powered by lithium batteries should be considered a portable electronic device containing a lithium battery or a lighter under Table 8-1 of the provisions for passengers and crew. It was noted that these devices were designed to be charged via a USB cable whereby stored energy was released through a heating coil to ignite cigarettes or cigars. It was suggested that they should be included as a consumer article under Item 15) of Table 8-1 which included articles such as small cigarette lighters, lighter fuel and lighter refills. A proposal to this effect was presented which limited carriage to one per person, required that they be carried on the person and required that the batteries be of a type to have met the requirements of each test in the UN Manual of Tests and Criteria, Part III, sub-section 38.3.

3.2.8.1.2 The amendment was supported in principle, but some concerns were raised:

- a) Recognizing that Item 15) applied to several different types of cigarette-lighting devices, some members believed that a further amendment restricting the carriage of one sub-device per person should be made.
- b) There was concern that too many specific items were being added to Table 8-1 making it difficult to navigate through the provisions.
- c) It was suggested that there were similar devices fuelled by different energy sources and that specifically mentioning lithium battery-powered would exclude the other types from the provisions; and
- d) It was suggested that some of the other restrictions normally applied to lithium batteries should be considered.

3.2.8.1.3 The proposer would develop a new proposal based on comments received for submission to DGP/25.

### **3.2.8.2 Restrictions for E-Cigarettes Carried by Passengers and Crew (DGP-WG/15-WP/24)**

3.2.8.2.1 Safety concerns related to the carriage of e-cigarettes by passengers were raised at DGP-WG/14. Several incidents had been reported involving e-cigarettes overheating by way of their heating element being accidentally activated resulting in a fire in checked baggage. The working group had agreed that a new entry based on the specific risks posed was necessary, recognizing that the restrictions placed on PEDs in Table 8-1 of the passenger provisions did not adequately address the risks posed and the provisions for battery-powered equipment capable of generating extreme heat (Table 8-1, item 16), while more adequately addressing the risks, were inappropriate since the devices were permitted in checked baggage and operator approval was required. DGP-WG/14 decided against developing an amendment in haste and that a proposal for consideration at DGP-WG/15 would be more appropriate. To ensure that the safety risks were known, an electronic bulletin was issued to all States recommending that e-cigarettes be carried in the cabin and not in checked baggage (EB 2014/074).

3.2.8.2.2 DGP-WG/15 was presented with a proposed new entry in Table 8-1 for battery-powered portable electronic smoking devices. "Lithium battery" was deliberately left out of the title so that the provision could be applied to e-cigarettes powered by battery sources other than lithium batteries. The proposal prohibited carriage in checked baggage and restricted the charging of the devices while on board the aircraft as there were concerns with batteries exploding or catching fire while being charged. The working group was invited to consider the lithium metal content and watt-hour rating limits.

3.2.8.2.3 There was strong support for the amendment. One member provided a report from a fire and rescue government agency within his State which examined incidents involving e-cigarettes which strengthened the need for early implementation of new restrictions. It was agreed that the new provisions, subject to a revision restricting the carriage of the devices for personal use only and a revision to the wording of paragraph d), should be incorporated in the 2015-2016 Edition of the Technical Instructions by way of an addendum.

### **3.2.8.3 Cordless Hair Styling Devices Including Hair Curlers and Hair Straighteners (DGP-WG/15-WP/34)**

3.2.8.3.1 A more generic title for the passenger provision for hair curlers containing hydrocarbon gas in Table 8-1 was proposed to allow for other types of cordless hair styling devices and to differentiate between devices containing hydrocarbon gas and those powered by lithium batteries. Although there was sympathy for the intent of the proposal, the amendment was not agreed. Some members believed the article could be considered as a personal electronic device, recognizing that additional restrictions might be necessary. Concerns that too many specific items were being added to Table 8-1 making it difficult to navigate through the provisions were reiterated (see paragraph 3.2.8.1 of this report). There was general agreement that an overall review of the structure of Table 8-1 needed to be revisited. One panel member offered to perform such a review prior to DGP/25. The proposer would consult with this member and develop a revised amendment would for DGP/25.

### **3.2.8.4 Proposal to add some examples of “Portable Electronic Devices” in Table 8-1 (DGP-WG/15-WP/35)**

3.2.8.4.1 An amendment to the passenger provision for portable electronic devices was proposed which extended the list of examples of what would be considered portable electronic devices. It was suggested that the word “portable” caused some confusion in the proposer’s State since there were some larger commodities containing lithium batteries or non-spillable batteries which they considered not to be portable such as small battery-powered toy vehicles for children and electronic scooters. The working group did not support the proposal, recognizing that a review of the structure of Table 8-1 would be undertaken prior to DGP/25 with the intent of developing a simplified list that would limit the need to for additional entries (see paragraph 3.2.8.3). The proposer would consult with the panel member undertaking the review and develop a new proposal for DGP/25.

### **3.2.8.5 Portable Medical Electronic Devices (DGP-WG/15-WP/36)**

3.2.8.5.1 It was noted that the format of the entry for portable medical electronic devices in Table 8-1 — Provisions for Passengers and Crew could imply that the restrictions applied only to portable medical electronic devices containing lithium metal cells or batteries not exceeding 2 grams or lithium ion cells or batteries not exceeding 100 Wh and not to spare batteries or to larger batteries. The Secretariat indicated that a formatting error had been inadvertently introduced into the published version of the Technical Instructions and agreed that the format did not allow for the intended interpretation of the provisions. On the basis that this was an editorial error, it would be corrected through a corrigendum to the current edition of the Technical Instructions.

## **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 2017-2018 Edition**

### **3.3.1 Guidance for States when Inspecting Dangerous Training Programmes (DGP-WG/15-WP/3)**

3.3.1.1.1 Enhanced guidance material for States in assessing operators’ training programmes was proposed for inclusion in Part S-7;5.6. The material highlighted the importance of assessing the currency, relevancy and consistency of training material, the knowledge and capability of those responsible for creating and delivering and/or overseeing training programmes, and the need for effective assessment, and record keeping.

3.3.1.1.2 Amendments to Attachment II to Part S-7;7 (Dangerous Goods Manual and Training Programme Checklists) were also proposed. These included:

- a) replacing references to “approval checklist” with “assessment checklist”; and
- b) adding new entries to these checklists.

3.3.1.1.3 The working group expressed its appreciation for the work done and supported the addition of guidance material for States inspecting dangerous training programmes. There was general agreement, however, that efforts needed to be taken to align any new guidance material with the competency-based principles provided in DGP-WG/15-WP/30 (see paragraph 3.6.1.5 of this report).

There were some specific comments related to the content including queries related to distinguishing between the terms inspection, assessment and approvals. Some believed any new material should be processed with the revised training provisions developed by the competency-based training working group which would be considered for incorporation in the 2019-2020 Edition of the Technical Instructions rather than introducing the material on its own in the next edition of the Supplement. The proposer believed that efforts could be taken to align his proposed guidance material with the competency-based training provisions and that he would prepare a revised proposal for submission to DGP/25 to for incorporation in the 2017-2018 Edition.

**3.3.1.2 Draft Amendments to the Supplement to the Technical Instructions to Align With the UN Recommendations (DGP-WG/15-WP/17)**

3.3.1.2.1 Draft amendments to the Supplement to the Technical Instructions were proposed to reflect the decisions taken by the UN Sub-Committee. Applicable issues raised during discussion of DGP-WG/15-WP/13 would be reflected in the Supplement.

3.3.1.2.2 It was agreed that DGP-WG/15-WP/17 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 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 2017-2018 Edition**

**3.4.1.1 Draft Amendments to the Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods to Align with the UN Recommendations (DGP-WG/15-WP/18)**

3.4.1.1.1 Draft amendments to the Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods were proposed to reflect the decisions taken by the UN Sub-Committee. No issues were raised.

3.4.1.1.2 It was agreed that DGP-WG/15-WP/18 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/25 working paper.

**3.5 Agenda Item 5: Development of mitigating measures to address risks associated with the transport of lithium batteries including measures that address recommendations from the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting**

**3.5.1.1 Agenda Item 5.1: “Bulk” shipments of excepted lithium batteries and cells**

**3.5.1.1.1 Additional Considerations for Section II of the Lithium Battery Packing Instructions (DGP-WG/15-WP/6) and Limitations on Overpacks, Consolidations and Shipper Loaded Units for Section II of Packing Instructions 965 and 968 (DGP-WG/15-WP/7)**

3.5.1.1.2 Two working papers related to Section II of the lithium battery packing instructions were presented. Both proposed amendments developed after DGP-WG/14 based on discussions at that meeting and through follow-up discussions.

***Additional Considerations for Section II of the Lithium Battery Packing Instructions (DGP-WG/15-WP/6)***

3.5.1.1.3 Revisions to the lithium battery packing instructions to address suggested discrepancies between the requirements for lithium batteries shipped in accordance with Section II of the lithium battery packing instructions and thus not subject to most of the requirements of the Technical Instructions and the requirements for other types of dangerous goods where exceptions could be applied were proposed at DGP-WG/14 (see paragraphs 3.5.2.1.5 to 3.5.2.1.8 of the DGP-WG/14 Report). Preventing “bulk” shipments of lithium batteries (i.e. multiple packages of lithium batteries placed in an overpack or a unit load device) prepared under Section II of Packing Instructions 965 and 968 from being offered for transport was also the subject of lengthy discussion at DGP-WG/14. DGP-WG/14 decided that addressing the issues raised concerning Section II lithium batteries needed more concentrated consideration from a dedicated group of members and that a working group through correspondence would work on developing a comprehensive proposal for DGP-WG/15.

3.5.1.1.4 These included:

- a) the requirement for the name and address of the shipper and the consignee to appear on the outside of each package or if the packages were placed in an overpack, only the overpack would be required to be marked with that information;
- b) a more specific description of the types of packagings permitted; and
- c) an indication of the number of packages in a consignment containing lithium batteries on the airway bill, when an airway bill was used.

3.5.1.1.5 During the presentation of the proposal, it was noted that text which had been proposed at DGP-WG/14 relating to the package being a large enough size for the handling label to be applied on one

side without being folded was inadvertently omitted. The working group was invited to consider this text as part of the proposal.

***Limitations on Overpacks, Consolidations and Shipper Loaded Units for Section II of Packing Instructions 965 and 968 (DGP-WG/15-WP/7)***

3.5.1.1.6 Preventing the “bulk” (i.e. multiple packages of lithium batteries placed in an overpack or a unit load device) shipments of lithium batteries prepared under Section II of Packing Instructions 965 and 968 from being offered for transport was the subject of lengthy discussion at DGP-WG/14. The need for operators to be aware of large quantities of lithium batteries so that they could determine their own mitigating strategies against the risks they posed was agreed. The Second Meeting of the International Multidisciplinary Lithium Battery Transport Coordination Working Group (Cologne, Germany 9 to 11 September 2014) had identified bulk shipments of excepted lithium batteries as a risk to safety and developed a recommendation to prohibit packages of such cells and batteries from being overpacked or consolidated.

***Discussion of the proposals provided in DGP-WG/15-WP/6 and DGP-WG/15-WP/7***

3.5.1.1.7 Before fully discussing the proposals, the working group was invited to consider a comparative analysis between provisions for lithium batteries prepared for transport in accordance with Section IB of Packing Instructions 965 and 968 and those prepared for transport in accordance with Section II of the same packing instructions which was developed by another panel member. It was noted that Section II was intended to be a simple-to-use, standalone exception, but that individual provisions required for fully regulated consignments of dangerous goods had been and continued to be incorporated into Section II. The original intent of Sections IB and II and whether or not the current provisions were addressing this content was discussed. It was noted that the intent of Section II was to allow for the average person to ship very small quantities of lithium batteries without being subject to full regulation, but that the unforeseen consequence was that some shippers had been taking advantage of the Section II provisions to facilitate the shipment of such items in bulk. Section IB was added with the intent of eliminating bulk shipments, but some shippers continued to exploit the minimal requirements in Section II. Some questioned whether maintaining the exceptions was justified, noting that the number of differences between provisions was diminishing. A representative of the express carriers argued against the notion of there being little difference between the sections when it came to the operator’s responsibilities, noting that Section II shipments were treated as general cargo and were not subject to acceptance checks. Some members cautioned against lengthy discussions on Section II batteries separately from the discussions on the recommendations from ICCAIA and IFALPA presented under DGP-WG/15-WP/4 and DGP-WG/15-WP/33 (see paragraph 3.5.1.2.1 of this report). It was agreed that the justification for limiting the number of overpacks could be influenced through the work that would be undertaken on developing packaging performance standards and that discussion on this particular amendment would be deferred.

3.5.1.1.7.1 A number of issues related to the added requirement for the name and address of the shipper and consignee on the outside of the package, the use of the qualifying term “rigid” before outer packaging and the addition of a requirement for the number of packages in the consignment to be included on an air waybill were raised. A dedicated working group was convened to address these issues and revisions to the amendment were proposed. The revised amendment was agreed.

### 3.5.1.2 Agenda Item 5.2: Performance-based provisions

#### 3.5.1.2.1 **Transport of Lithium Batteries as Cargo via Air (DGP-WG/15-WP/4 and DGP-WG/15-WP/33)**

3.5.1.2.1.1 Continued concerns with respect to cargo compartment fire protection, particularly in relation to the carriage of high density packages of lithium batteries as cargo, were raised by the International Coordinating Council of Aerospace Industries Associations (ICCAIA) and the International Federation of Air Line Pilots' Associations (IFALPA). Recommendations for addressing these concerns were presented to the working group.

3.5.1.2.1.2 ICCAIA's position was that the fire protection capabilities and certification of original equipment manufacturers' (OEMs) airframes and systems were developed considering the carriage of general cargo and not the unique hazards associated with the carriage of dangerous goods, including lithium batteries. Test data was cited which identified that existing cargo compartment fire protection systems certified to European and American regulations were unable to suppress or extinguish a fire involving significant quantities of lithium batteries, resulting in reduced time for safe flight and landing of an aircraft to a diversion airport.

3.5.1.2.1.3 Concerns related to lithium battery hazards included:

- a) the inability of packaging currently required by the Technical Instructions to contain a lithium battery fire or to prevent the propagation between adjacent packages of batteries;
- b) the potential for an uncontrolled lithium battery fires to negate the capability of current aircraft cargo fire protection systems, leading to a catastrophic failure of the airframe; and
- c) new test results from the Federal Aviation Administration (FAA) William J. Hughes Technical Centre (FAA Tech Centre) which demonstrated the potential for electrolyte gases exhausted during the propagation of both lithium metal and lithium ion batteries to create an explosive atmosphere regardless of the presence of Halon when contained inside an enclosed space such as a unit load device or cargo compartment.

3.5.1.2.2 Applying the safety risk model provided in the *Safety Management Manual (SMM)* (Doc 9859) (hereafter referred to as the "Safety Management Manual"), the presenters determined that immediate action to mitigate the unacceptable risks posed by lithium batteries was necessary.

3.5.1.2.3 The ICCAIA recommendations, which IFALPA endorsed, were:

- a) that appropriate packaging and shipping requirements be established to more safely ship lithium ion batteries as cargo on passenger aircraft;
- b) that high density packages of lithium ion batteries and cells (UN 3480) not be transported as cargo on passenger aircraft until such time as safer methods of transport were established and followed; and

- c) that appropriate packaging and shipping requirements be established to more safely ship lithium metal and lithium ion batteries as cargo on freighter aircraft.

3.5.1.2.4 A separate working paper submitted by IFALPA recommended extending the restriction in sub-paragraph b) above to all-cargo aircraft. It was stated that while lithium ion batteries were carried as cargo on both passenger and cargo aircraft, the majority of large shipments were transported on cargo aircraft. This, combined with the fact that cargo aircraft were not required to be outfitted with cargo compartments having an active fire suppression system, made the risk to cargo aircraft even greater than to passenger aircraft. It was argued that the principles in the Safety Management Manual for States to develop practices to ensure the safe operation of aircraft did not distinguish between passenger and cargo aircraft. For this reason, IFALPA also recommended that the current prohibition on UN 3090 — **Lithium metal batteries** from transport on passenger aircraft be extended to all-cargo aircraft.

3.5.1.2.5 Clarification on what was meant by the term “high density” was sought during discussion of the working paper. It was explained that high density was meant to describe quantities of lithium batteries which had the potential to overwhelm the cargo compartment fire protection features. The outcome of a thermal runaway event had been demonstrated to be variable depending on battery chemistry, cargo compartment characteristics, and loading configurations. Tests had demonstrated that some configurations with an accumulation of packages containing less than 5 kg each of 18650 lithium ion cells had the potential to lead to significant or catastrophic damage of an aircraft. Quantifying a limitation for “high density” that would apply to every situation was therefore impossible. It was suggested that the inability to determine a safe limit for every situation was the reason that several large operators had recently introduced complete bans on the transport of lithium ion batteries as cargo.

3.5.1.2.6 A question was raised in relation to how the ICCAIA determined that the likelihood of a cargo fire involving lithium batteries was “occasional” when conducting their risk assessment. Others also questioned this value, suggesting that a large number of lithium battery incidents involved undeclared or non-compliant batteries. It was explained that the value was based on reports of three aircraft accidents involving lithium batteries which supported the description for “occasional” provided in Doc 9859 as an event that occurred infrequently. It was stressed that the likelihood was not based solely on a lithium battery *causing* a fire, it was based on the potential for a lithium battery to be *involved* in a fire.

3.5.1.2.7 Another panel member expressed concern that many of the operators he spoke to within his State had not undertaken a risk assessment on the likely consequences and impacts before imposing a prohibition. A team in his State had conducted their own risk assessment on the transport of lithium metal and ion batteries. Their findings were that the risks were heightened either from hidden dangerous goods which included lithium batteries which could become the source of a fire or from other dangerous goods which could cause a fire and threaten the shipment of declared batteries. He suggested that a ban on lithium batteries would have the unintended consequence of more undeclared shipments of lithium batteries and therefore result in an increased risk. Some expressed disagreement with the notion that a large number of people or organizations would break the law and continue to ship batteries if they were banned. They reported that data from their States indicated that the percentage of deliberate non-compliance was low. The Secretary reminded the working group of the need for data. She emphasized that the ANC and the Council had become increasingly concerned when arguments were made without data to substantiate them.

3.5.1.2.8 The idea that undeclared and mis-declared lithium batteries were a risk was not disputed by anyone; however, those not supporting the notion that a prohibition would increase non-compliance and therefore the risk stressed that the potential for a suppressed fire being an ignition source for batteries

to go into thermal runaway applied to all batteries regardless of whether or not they were compliant. They deemed the continued allowance of unrestricted quantities of even compliant lithium batteries in cargo compartments knowing that a fire could exceed the capabilities of the fire protection system to be unacceptable.

3.5.1.2.9 Those who supported the need for immediate action to mitigate the risks emphasized that their goal was not to ban the transport of lithium batteries permanently but rather to find a way to transport them safely. Recognizing the need for a layered approach towards mitigation, it was suggested that coordination with the Flight Operations (FLTOSP) and Airworthiness Panels (AIRP) would be necessary to accomplish this. The Secretariat was asked to provide feedback on how this could be accomplished. She noted that the information contained in DGP-WG/15-WP/4, including the position of ICCAIA and IFALPA, had been provided to FLTOSP and AIRP. Both panels were also provided with the recommendations developed by the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting (Cologne, Germany, 9 to 11 September 2014 (subsequently referred to as the Second Multidisciplinary Lithium Battery Meeting or Multidisciplinary Meeting)). She would be providing the DGP with feedback from both panels once she had received it.

3.5.1.2.10 Although there was disagreement on the level of risk posed by fully compliant shipments of lithium batteries, there were no objections to the problem statement developed by the Multidisciplinary Meeting which affirmed that a fire involving significant quantities of lithium batteries (UN 3090 and UN 3480) could exceed the fire suppression capability of the aircraft and could lead to a catastrophic failure of the air frame. The working group fully supported the need to develop performance-based standards based on the principle that hazardous effects from the batteries would be contained within the package. Terms of reference for a group of experts made up of all interested parties were developed. The group was tasked with providing subject matter expertise on aircraft cargo compartment fire safety and the safe transport of lithium batteries in aircraft. The terms of reference are provided in Appendix D to this report. They were developed with the aim of allowing for a flexible solution that would address the varying degree of risks posed by different battery types and sizes. The Secretary asked that DGP members indicate their interest in attending such a meeting. It was noted that a multidisciplinary approach employing a layered mitigation approach was necessary to address risks posed by lithium batteries. This would involve focusing on the source of the threat (battery) and expanding outward (i.e. packaging, cargo unit load device, cargo compartment, aircraft). For this reason, the Secretary noted participation from FLTOSP and AIRP members would be essential

3.5.1.2.11 Recognizing that the joint ICCAIA/IFALPA working paper recommended that high density packages of lithium ion batteries and cells should not be transported as cargo on passenger aircraft until such time as safer methods of transport were established and followed, the working group was asked to indicate their level of support for this recommendation. The member nominated by IFALPA reminded the group that his organization recommended extending this prohibition to cargo aircraft for lithium ion batteries and to also impose a prohibition on lithium metal batteries on cargo aircraft. Some panel members, while not opposing the joint recommendation, were unable to support it on the basis that it had not been identified as a formal proposal in accordance with standard DGP procedures, and therefore there had been insufficient time to conduct the necessary consultation with relevant experts within their States. Some of these members reiterated the argument that a prohibition would only increase the number of undeclared shipments and also stated that they could not support a proposal referring to high density packages without a clear definition for the term. The IFALPA/ICCAIA representatives repeated that it was impossible to determine a quantitative limit for high density that would apply to every situation because of the number of variables involved. These included differing battery chemistries, differing

characteristics of cargo compartments, and differing loading configurations. This was exacerbated by the fact that there was no way to control the number of packages of Section II batteries loaded on the aircraft.

3.5.1.2.12 The IFALPA representative expressed disappointment with the lack of support for the recommendations of his organization and of the ICCAIA. Representatives of both organizations indicated that a formal proposal would be developed for DGP/25 which would allow adequate time for consultation with States. Both organizations would participate fully in the working group on performance-based packaging standards and would ensure that their proposal would take the recommendations of that working group into account. The ICCAIA representatives acknowledged the concerns raised in relation to the lack of a quantifiable definition for high-density packages and offered to work on further refinement of the concept for consideration at DGP/25.

3.5.1.2.13 Dates and a venue for the working group tasked with performance-based packaging standards for the safe transport of lithium batteries by air would be determined by the Secretariat in the near-term through coordination with the members involved.

### 3.5.1.3 **Agenda Item 5.3: Limitation on state of charge**

3.5.1.3.1 No amendments were proposed under this agenda item, although it was proposed that state of charge would likely be considered by the working group on performance-based performance standards (see paragraph 3.5.1.2.1 of this report).

3.5.1.3.2 An information paper from PRBA — The Rechargeable Battery Association outlined technical concerns members of his association had raised in relation to the Second Multidisciplinary Lithium Battery Meeting's recommendation to limit the state of charge (SOC) to 30 per cent. These concerns were also raised at DGP-WG/14 (see paragraph 3.6.5.11 of the DGP-WG/14 Report).

### 3.5.1.4 **Agenda Item 5.4: Simplified provisions**

#### 3.5.1.4.1 **Lithium Batteries in the Mail (DGP-WG/15-WP/5)**

3.5.1.4.2 It was reported that there had been different interpretations of the intent of the provisions in the opening paragraph of Section II to Packing Instructions 967 and 970 in one member's State. This had become evident during the process of considering whether or not to grant specific approval to his State's designated postal operator (DPO) to introduce the acceptance of lithium batteries prepared in accordance with Section II of Packing Instructions 967 and 970 into the mail. Other members stated similar differences of interpretation within their States. An amendment to clarify the provisions was therefore proposed.

3.5.1.4.3 There was strong support for amending the text to remove any ambiguity. A representative of the Universal Postal Union (UPU) reported receiving numerous requests for clarification as did several panel members. There were some concerns with the actual wording of the proposal, and a revised version of the proposed text to address these concerns was agreed.

3.5.1.4.4 Although the proposal focused on Packing Instructions 967 and 970 as these were the two which applied to the post, it was agreed to incorporate the amendment to Section II in all lithium battery packing instructions.

### 3.5.1.5 **Agenda Item 5.5: Guidance material to assist States with oversight and awareness programmes**

3.5.1.5.1 No working papers were presented under this agenda Item.

### 3.5.1.6 **Agenda Item 5.6: Miscellaneous lithium battery issues**

#### 3.5.1.6.1 **Small Lithium Cells and Batteries (DGP-WG/15-WP/29)**

3.5.1.6.2 It was noted that industry test result data on lithium metal button cells presented during the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting (9 to 11 September 2014, Cologne, Germany) demonstrated that these small cells did not create high temperatures or propagate when subjected to tests similar to those conducted by the FAA Tech Centre.

3.5.1.6.3 Representatives of the battery industry suggested that small lithium metal cells and batteries designed exclusively for use in life-saving medical devices were subject to very rigorous national and international testing standards and, because of the high costs associated with manufacturing these cells and batteries, were not packaged and shipped in large quantities like consumer-type lithium metal cells and batteries. The battery industry representatives believed that these low-volume shipments did not present a significant risk in transport.

3.5.1.6.4 A new special provision assigned to UN 3090 — **Lithium metal batteries** was proposed which would except lithium metal button cells with no more than 0.3 g of lithium metal and lithium metal cells and batteries designed exclusively for use in medical applications with no more than 1 g of lithium metal per cell and no more than 2 g lithium metal per battery when carried as cargo from most of the requirements of the Technical Instructions.

3.5.1.6.5 There was little support for the proposal. Several panel members referenced the Multidisciplinary Meeting's recommendation to establish a method to distinguish lithium metal button cells from other types of lithium metal cells (Recommendation 14/14) and that any proposal to consider different classification criteria should first be considered at the UN. Panel members also cautioned against regulating according to end use, which was what would be done if the proposed exception for medical devices containing lithium metal batteries was adopted. It was requested that these very rigorous national and international testing standards for medical device batteries be presented to the panel for evaluation. Adopting the special provision would also introduce another layer of complexity to the already complex lithium battery provisions.

3.5.1.6.6 The proposal was not agreed, although it was suggested that the development of package performance standards could lead to a method for accommodating the issues raised in the proposal.

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

**3.6.1.1 Agenda Item 6.1: Development of a global framework for the sharing of dangerous goods incident and accident information**

**3.6.1.2 Development of a global framework for the sharing of dangerous goods incident and accident information (DGP-WG/15-WP/37)**

3.6.1.2.1 Although the subject of dangerous good reporting and the development of a global framework for the sharing of dangerous goods incident and accident information had been discussed at several DGP meetings, it was suggested that little progress had been made. The creation of a DGP working group on reporting was therefore proposed. There was strong support for the creation of such a group, recognizing that attempts to progress the work through correspondence had proven to be difficult. A group was established which initiated discussions that resulted in the establishment of a framework for developing a global reporting system and provisions and guidance to States to support such a system for incorporation in Annex 18, the Technical Instructions, and the Supplement. The group would have a face-to-face meeting during the third quarter of 2015 in order to develop constructive proposals for DGP/25.

**3.6.1.3 Agenda Item 6.2: Development of guidance material on countering the potential use of dangerous goods in an act of unlawful interference**

3.6.1.3.1 No working papers were presented under this agenda item.

**3.6.1.4 Agenda Item 6.3: Development of competency-based training provisions for dangerous goods**

**3.6.1.5 Competency-Based Training for Dangerous Goods Personnel and State Employees (DGP-WG/15-WP/30)**

3.6.1.5.1 Finalized training provisions and guidance material developed by the DGP Working Group on Competency Based Training were presented to the meeting. The material included:

- a) a competency framework for dangerous goods personnel (seen and supported at DGP-WG/14) proposed for inclusion in an attachment to the 2017-2018 Edition of the Technical Instructions;
- b) a finalized competency framework for State employees proposed for inclusion in the 2017-2018 Edition of the Supplement to the Technical Instructions;
- c) guidance material on competency-based training and how it was used to develop the competency frameworks proposed for inclusion in an attachment to the 2017-2018 Edition of the Technical Instructions; and

- d) comprehensive amendments to the training provisions in Part 1;4 proposed for inclusion as an attachment to the 2017-2018 Edition of the Technical Instructions for information purposes and intended for incorporation in Part 1;4 of the 2019-2020 Edition of the Technical Instructions.

3.6.1.5.2 The meeting was reminded of the decision at DGP-WG/14 to issue the guidance material, competency-based framework for dangerous goods personnel and amendments to Part 1;4 in an attachment to the Technical Instructions and for providing it on the ICAO public website as a transitional measure. Accordingly, the material listed in sub-paragraphs a), c) and d) above was presented in a proposed new Attachment 4 to the Technical Instructions. It was intended that the revised training provisions in new Attachment 4 (sub-paragraph d) above) would be moved to Part 1;4 of the Technical Instructions once the transition period was over and that the guidance material would remain in Attachment 4 (2019-2020 Edition). The competency framework for State employees was proposed for inclusion in the Supplement to the Technical Instructions.

3.6.1.5.3 It was recalled that DGP-WG/14 had been presented with a proposed revised version of the content of training courses tables (Tables 1-4 and 1-5) which merged the two tables into one and replaced the categories of staff listed in the tables with job functions. Although there was support for replacing Tables 1-4 and 1-5 with the new table, DGP-WG/14 had deliberated on whether developing competency-based training programmes would make the need for including any “content of training courses” table(s) in the Technical Instructions obsolete. DGP-WG/14 concluded that not including such information would be a drastic change which States and industry might not be ready for and that the revised version of the tables reflecting a function-based approach should be maintained with the proposed Part 1;4 provisions as a transitional measure. The chairman of the training working group reported, however, that discussions on the issue had continued post DGP-WG/14 by members of his group, and they came to the conclusion that including the revised table with the Part 1;4 provisions even as a transitional measure might have the adverse effect of prolonging the transition from subject-matter to function-driven training programmes commensurate with responsibilities. The group did see value in providing guidance on determining what subject matter knowledge would be necessary to perform specific functions, but believed such guidance should not be provided with the Part 1;4 provisions as was currently done for Tables 1-4 and 1-5 but rather with the guidance material proposed for inclusion as a new attachment to the Technical Instructions (see paragraph 3.6.1.5.1 c)). The group further revised the function-based table proposed at DGP-WG/14 by removing the values that were included at the intersection of function/subject matter and turning the tables into a matrix tool for developing training programmes. The group believed that providing such a tool would foster a more analytical approach for training developers to take in determining the type and level of knowledge needed to perform specific functions and would reinforce the need to determine training needs commensurate with responsibilities.

3.6.1.5.4 The working group was invited to provide specific comments on the following:

- a) a new provision developed as a means to clarify that entities involved with handling non-dangerous goods cargo are still required to be trained;
- b) whether or not to include a note recommending that all training courses address the provisions for dangerous goods carried by passengers and crew;
- c) whether or not the new matrix tool for analysing the type and level of knowledge needed to perform specific functions was considered to be effective and whether removing Tables 1-4 and 1-5 from the training provisions was appropriate.

3.6.1.5.5 The Secretary suggested the need for legal advice in relation to sub-paragraph a) above as she had been informed that requiring training for entities other than operators not knowingly involved with handling dangerous goods (i.e. freight forwarders handling general cargo) was beyond the legal authority of certain civil aviation authorities (CAAs). Some panel members did not see the need for this as it was not an issue within their States. Reference was made to preliminary advice provided by the ICAO Legal Bureau when the term freight forwarder was incorporated in the Technical Instructions indicating that the Technical Instructions could address any persons who might be involved in the transport of dangerous goods which the Legal Bureau believed could be interpreted to include those who did not normally accept dangerous goods but who should nevertheless be on the lookout for dangerous goods travelling as normal cargo. This advice conflicted, however, with the suggestion that the current structure of Annex 18 did not provide a legal basis for addressing staff not handling dangerous goods. Despite difficulties related to the legal authority to require training for freight forwarders handling non-dangerous goods in some States, all panel members strongly agreed that training these entities would contribute to a safe transport supply chain, particularly in relation to the detection of undeclared dangerous goods. The issue would be further reviewed prior to DGP/25.

3.6.1.5.6 It was noted that the current provisions in Part 1;4.1.1 a) restricted the training requirement to shippers of dangerous goods. Concerns that the proposed new 1;4.1.1 provision expanded the scope to all shippers were raised. Although this was not the intent, it was agreed that proposed text in 1;4.1.1 needed further consideration by the DGP Working Group on Training.

3.6.1.5.7 Some members expressed concern with removing Tables 1-4 and 1-5 from the Technical Instructions until experience with the provisions provided in new Attachment 4 was gained and data was gathered. They suggested that the current tables should be maintained in parallel with the new matrix tool until it could be confidently determined that the new provisions were effective. Members of the training working group stressed the importance of reviewing the material developed in detail before forming any firm opinions. Anyone with further concerns was encouraged to provide comments to the chairman of the working group.

3.6.1.5.8 It was noted that some additional guidance material would be needed, such as the assessment of competence once training had been completed.

3.6.1.5.9 The training working group would meet prior to DGP/25 to address all comments and concerns and to develop a final proposal for presentation to the panel.

### **3.6.1.6 Agenda Item 6.4: Consideration of transitional measures for amendments to the Technical Instructions**

#### **3.6.1.7 Transition Period (DGP-WG/15-WP/9)**

3.6.1.7.1 The introduction of a six-month transitional period before new editions of the Technical Instructions became mandatory was proposed at DGP-WG/14. While there was some support in principle for that proposal, especially from members from States which depended on the non-English versions of the Technical Instructions, six months was seen to be too long.

3.6.1.7.2 A revised proposal which limited the transition period to ninety days was presented to DGP-WG/15. It was noted that other international regulations allowed for transitional periods and argued that a transition period for the Technical Instructions would facilitate the timely incorporation of new regulations into computerized dangerous goods systems and allow for effective training of dangerous

goods personnel on the new requirements. It was suggested that a transition period would also prevent potential delays in acceptance which could occur when dangerous goods consignments were prepared at the end of the applicability period of one edition of the Technical Instructions but end up in the transport chain at the beginning of an applicability period for the next edition.

3.6.1.7.3 Although there was some support for the proposal, the majority did not believe a transition period was appropriate. Many believed having two different sets of regulations at one time would complicate the acceptance process. Concern was raised with the potential for a shipper to mix and match provisions from two different editions of the Technical Instructions (e.g. labelling provisions from previous edition, documentation requirements from the current), although the proposer assured that this was not the intent and that only one set of regulations would be permitted. There was sympathy in relation to late publication of the Technical Instructions, particularly the language versions. These versions were normally published three months after the English version, making it difficult to incorporate the new provisions in training programmes and to implement them in time for a 1 January applicability date. Although amendments agreed by the panel were publically available on the ICAO website immediately after panel meetings, it was suggested that industry and States had to wait for the published version of the Technical Instructions to incorporate changes. The Secretariat was asked whether measures could be taken to speed up the publication process. The Secretary noted diminished resources at ICAO for translation services and the lower priority given the Technical Instructions over Annexes and Procedures for Air Navigation Services, but agreed to work with the language sections to determine if any measures could be taken to facilitate earlier publication.

3.6.1.7.4 There was support for a standing agenda item at DGP meetings to consider specific transitional measures for certain provisions. The Secretary noted it would be up to panel members to submit working papers on the subject.

### **3.7 Agenda Item 7: Other business**

#### **3.7.1 Efforts Addressing Dangerous Goods in the Post (DGP-WG/15-IP/6)**

3.7.1.1.1 Information on developments by the Universal Postal Union (UPU) and its member countries to control the introduction of dangerous goods into postal networks and to educate customers and employees of the post was provided to the working group by a UPU representative. Developments included:

- a) a baseline dangerous goods training programme which was developed by UPU in cooperation with ICAO, the International Air Transport Association (IATA), DGP members, had been provided to all 193 UPU member countries and made available for download from the UPU public website;
- b) guidance material was developed by the UPU on controlling the introduction of dangerous goods into postal networks based on best practices of UPU member countries and the guidance material provided in the Supplement to the Technical Instructions;
- c) a dangerous goods awareness campaign was developed through cooperation with ICAO, IATA and the World Customs Organization (WCO);

- d) a reporting system for posts to report incidents involving dangerous goods in UPU mail was developed; and
- e) maintaining an updated list of designated operators who had been approved by their CAA to accept and ship equipment containing admissible lithium batteries provided on the UPU public website had continued.

3.7.1.1.2 The working group noted the information provided by the UPU with appreciation.

— — — — —



## APPENDIX A

### CONSOLIDATION OF AMENDMENTS TO THE TECHNICAL INSTRUCTIONS AGREED AT DGP-WG/14 AND DGP-WG/15

#### Part 1

#### GENERAL

#### Chapter 1

#### SCOPE AND APPLICABILITY

*Parts of this Chapter are affected by State Variations AE 3, AE 8, BE 2, BE 4, BE 5, BR 4, CA 6, CH 3, DE 1, DE 4, DK 2, FR 2, GB 2, HR 2, HR 3, HR 4, HR 5, IN 1, IR 1, IT 1, IT 5, KH 1, NL 6, RO 1, RO 2, RO 3, US 1, VC 1, VC 2, VC 3, VU 2; see Table A-1*

---

UN Model Regulations, Chapter 1.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/11 (see paragraph 3.2.1.1 of this report)

---

*Note.— Recommendations on Tests and Criteria, which are incorporated by reference into certain provisions of these Instructions, are published as a separate Manual (United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria) (ST/SG/AC.10/11/Rev.5, [Rev.6 Amend.1](#) and [Amend.2](#)), the contents of which are:*

*Part I. Classification procedures, test methods and criteria relating to explosives of Class 1;*

*Part II. Classification procedures, test methods and criteria relating to self-reactive substances of Division 4.1 and organic peroxides of Division 5.2; and*

*Part III. Classification procedures, test methods and criteria relating to substances or articles of Class 2, Class 3, Class 4, Division 5.1, Class 8 and Class 9.*

*Appendices. Information common to a number of different types of tests and national contacts for test details.*

#### 1.1 GENERAL APPLICABILITY

...

##### 1.1.5 General exceptions

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

...

---

UN Model Regulations, Chapter 1.1.1.2, Note 3, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/11 (see paragraph 3.2.1.1 of this report)

---

- f) required for the propulsion of the means of transport or the operation of its specialized equipment during transport (e.g. refrigeration units) or that are required in accordance with the operating regulations (e.g. fire extinguishers) (see 2.2).

*[Note.— This exception is only applicable to the means of transport performing the transport operation.](#)*

...

---

UN Model Regulations, Chapter 1.1.1.7, Note 3, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/11 (see paragraph 3.2.1.1 of this report)

---

### 1.3 APPLICATION OF STANDARDS

Where the application of a standard is required and there is any conflict between the standard and these Instructions, the Instructions take precedence. The requirements of the standard that do not conflict with these Instructions must be applied as specified, including the requirements of any other standard, or part of a standard, referenced within that standard as normative.

...

## Chapter 3

### GENERAL INFORMATION

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

#### 3.1 DEFINITIONS

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

---

UN Model Regulations, Chapter 1.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/11 (see paragraph 3.2.1.1 of this report)

---

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

...

**Design life.** For composite cylinders and tubes, the maximum life (in number of years) to which the cylinder or tube is designed and approved in accordance with the applicable standard.

...

**GHS.** ~~The fourth~~ sixth revised edition of the *Globally Harmonized System of Classification and Labelling of Chemicals*, published by the United Nations as document ST/SG/AC.10/30/Rev. 46.

...

**Large salvage packaging.** (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 or non-conforming dangerous goods packages, or dangerous goods that have spilled or leaked are placed for purposes of transport for recovery or disposal.

...

**Liquids.** Dangerous goods which at 50°C have a vapour pressure of not more than 300 kPa (3 bar), which are not completely gaseous at 20°C and at a pressure of 101.3 kPa, and which have a melting point or initial melting point of 20°C or less at a pressure of 101.3 kPa. A viscous substance for which a specific melting point cannot be determined must be subjected to the ASTM D 4359-90 test; or to the test for determining fluidity (penetrometer test) prescribed in section 2.3.4 of Annex A of the *European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)* (United Nations publication: ECE/TRANS/202225 (Sales No. E.14.VIII.1).

...

**Manual of Tests and Criteria.** The ~~fourth~~ sixth revised edition of the United Nations publication entitled Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.6/Amend.1 and Amend.2).

...

DGP-WG/15-WP/11 (see paragraph 3.2.1.1.1 of this report):

**Multiple-element gas containers (MEGCs).** (~~See UN Recommendations, Chapter 1.2.~~) Not permitted for air transport.) A multimodal assembly of cylinders, tubes or bundles of cylinders which are interconnected by a manifold and which are assembled within a framework. The MEGC includes service equipment and structural equipment necessary for the transport of gases.

...

**Pressure drums.** (~~See UN Recommendations, Chapter 1.2.~~) Not permitted for air transport.) A welded transportable pressure receptacle of a water capacity exceeding 150 litres and of not more than 1 000 litres, (e.g. cylindrical receptacles equipped with rolling hoops, spheres on skids).

...

**Remanufactured large packaging.** (~~See UN Recommendations, Chapter 1.2.~~) Not permitted for air transport.) A metal or rigid plastics large packaging that:

- a) is produced as a UN type from a non-UN type; or
- b) is converted from one UN design type to another UN design type.

Remanufactured large packagings are subject to the same requirements of the UN Model Regulations that apply to new large packagings of the same type (see also design type definition in 6.6.5.1.2 of the UN Model Regulations).

...

**Reused large packaging.** (~~See UN Recommendations, Chapter 1.2.~~) Not permitted for air transport.) A large packaging to be refilled which has been examined and found free of defects affecting the ability to withstand the performance tests: the term includes those which are refilled with the same or similar compatible contents and are transported within distribution chains controlled by the consignor of the product.

...

**Salvage pressure receptacle.** (~~See UN Recommendations, Chapter 1.2.~~) Not permitted for air transport.) A pressure receptacle with a water capacity not exceeding 3 000 litres into which are placed damaged, defective, leaking or non-conforming pressure receptacle(s) for the purpose of transport e.g. for recovery or disposal.

...

---

UN Model Regulations, Chapter 1.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/11 (see paragraph 3.2.1.1 of this report)

---

**Self-accelerating polymerization temperature (SAPT).** The lowest temperature at which polymerization may occur with a substance in the packaging as offered for transport. The SAPT must be determined in accordance with the test procedures established for the self-accelerating decomposition temperature for self-reactive substances in accordance with Part II, Section 28 of the *Manual of Tests and Criteria*.

...

**Service life.** For composite cylinders and tubes, the number of years the cylinder or tube is permitted to be in service.

...

---

DGP-WG/15-WP/11 (see paragraph 3.2.1.1.1 of this report):

---

**Tube.** (Not permitted for air transport.) A transportable pressure receptacle of seamless or composite construction having a water capacity exceeding 150 litres but not more than 3 000 litres.

...

---

DGP-WG/15-WP/28 (see paragraph 3.2.1.3 of this report):

---

## Chapter 4

### TRAINING

...

#### 4.1 ESTABLISHMENT OF **DANGEROUS GOODS** TRAINING PROGRAMMES

##### **4.1.1 Establishment and maintenance**

4.1.1.1 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;
- 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; and
- h) designated postal operators.

**4.1.2 Review and approval**

4.1.2.1 Dangerous goods training programmes required by 4.1.1.1 b) must be subjected to review and approval by the appropriate authority of the State of the Operator.

4.1.2.2 Dangerous goods training programmes required by 4.1.1.1 h) must be subjected to review and approval by the civil aviation authority of the State where the mail was accepted by the designated postal operator.

4.1.2.3 Dangerous goods training programmes required by other than 4.1.1.1 b) and h) should be subjected to review and approval as determined by the appropriate national authority.

...

## Part 2

# CLASSIFICATION OF DANGEROUS GOODS

## INTRODUCTORY CHAPTER

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

### 1. RESPONSIBILITIES

---

UN Model Regulations, Chapter 2.0.0, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1.1 a) and b) of this report)

---

1.1 Classification must be made by the appropriate national authority when so required or may otherwise be made by the shipper.

1.2 A shipper who has identified, on the basis of test data, that a substance listed by name in column 1 of the Dangerous Goods List in Part 3, Chapter 2, Table 3-1 meets classification criteria for a hazard class or division that is not identified in the list, may, with the approval of the appropriate national authority, consign the substance:

a) under the most appropriate generic or not otherwise specified (n.o.s.) entry reflecting all hazards; or

b) under the same UN number and name but with additional hazard communication information as appropriate to reflect the additional subsidiary risk(s) (documentation, label) provided that the primary hazard class remains unchanged and that any other transport conditions (e.g. limited quantity, packaging provisions) that would normally apply to substances possessing such a combination of hazards are the same as those applicable to the substance listed.

A copy of the document of approval must accompany the consignment.

*Note.— When an appropriate national authority grants such approvals, it should inform the United Nations Subcommittee of Experts on the Transport of Dangerous Goods accordingly and submit a relevant proposal of amendment to the Dangerous Goods List. Should the proposed amendment be rejected, the appropriate national authority should withdraw its approval.*

...

---

UN Model Regulations, Chapter 2.0.2.2 ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1 of this report)

---

### 3. UN NUMBERS AND PROPER SHIPPING NAMES

3.1 Dangerous goods are assigned to UN numbers and proper shipping names according to their hazard classification and their composition.

3.2 Dangerous goods commonly carried are listed in Table 3-1. Where an article or substance is specifically listed by name, it must be identified in transport by the proper shipping name in Table 3-1. Such substances may contain technical impurities (for example, those deriving from the production process) or additives for stability or other purposes that do not affect its classification. However, a substance listed by name containing technical impurities or additives for stability or other purposes affecting its classification must be considered a mixture or solution (see 3.5). For dangerous goods not specifically listed by name, “generic” or “not otherwise specified (n.o.s.)” entries are provided (see 3.8) to identify the article or substance in transport. The substances listed by name in column 1 of Table 3-1 must be transported according to their classification in the list or under the conditions specified in 1.2. Each entry in Table 3-1 is characterized by a UN number. Table 3-1 also contains relevant information for each entry, such as hazard class, subsidiary risk(s) (if any), packing group (where assigned), packing requirements, passenger and cargo aircraft requirements, etc. Entries in Table 3-1 are of the following four types:

**Chapter 1****CLASS 1 — EXPLOSIVES**

...

**1.3 DIVISIONS**


---

UN Model Regulations, Chapter 2.1.1.4 (f) ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1 of this report)

---

1.3.1 Class 1 is divided into six divisions:

- a) Division 1.1 — Substances and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire load virtually instantaneously).

...

- f) Division 1.6 — Extremely insensitive articles which do not have a mass explosion hazard.

This division comprises articles which predominantly contain ~~only~~ extremely insensitive substances and which demonstrate a negligible probability of accidental initiation or propagation.

*Note.— The risk from articles of Division 1.6 is limited to the explosion of a single article.*

...

**1.4 COMPATIBILITY GROUPS**

...

---

UN Model Regulations, Chapter 2.1.2.1.1 ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1 of this report)

---

**Table 2-2. Classification codes**

<i>Description of substance or article to be classified</i>	<i>Compatibility group</i>	<i>Classification code</i>
---	----------------------------	----------------------------

...

Articles <u>predominantly</u> containing <del>only</del> extremely insensitive substances	N	1.6N
---	---	------

...

---

UN Model Regulations, Chapter 2.1.3.7, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1 of this report)

---

**1.5.3 Classification documentation**

1.5.3.1 An appropriate national authority assigning an article or substance into Class 1 should confirm with the applicant that classification in writing.

1.5.3.2 An appropriate national authority classification document may be in any form and may consist of more than one page, provided pages are numbered consecutively. The document should have a unique reference.

1.5.3.3 The information provided must be easy to identify, legible and durable.

1.5.3.4 Examples of the information that may be provided in the classification documents are as follows:

- a) the name of the appropriate national authority and the provisions in national legislation under which it is granted its authority;
- b) the modal or national regulations for which the classification document is applicable;
- c) confirmation that the classification has been approved, made or agreed in accordance with the UN Model Regulations or these Instructions;
- d) the name and address of the person in law to which the classification has been assigned and any company registration which uniquely identifies a company or other body corporate under national legislation;
- e) the name under which the explosives will be placed onto the market or otherwise supplied for transport;
- f) the proper shipping name, UN number, class, hazard division and corresponding compatibility group of the explosives;
- g) where appropriate, the maximum net explosive mass of the package or article;
- h) the name, signature, stamp, seal or other identification of the person authorized by the appropriate national authority to issue the classification document is clearly visible;
- i) where safety in transport or the hazard division is assessed as being dependent upon the packaging, the packaging mark or a description of the permitted:
  - i) inner packagings;
  - ii) intermediate packagings; and
  - iii) outer packagings;
- j) the classification document states the part number, stock number or other identifying reference under which the explosives will be placed onto the market or otherwise supplied for transport;
- k) the name and address of the person in law who manufactured the explosives and any company registration which uniquely identifies a company or other body corporate under national legislation;
- l) any additional information regarding the applicable packing instruction and special packing provisions where appropriate;
- m) the basis for assigning the classification, i.e. whether on the basis of test results, default for fireworks, analogy with classified explosive, by definition from the Dangerous Goods List etc.;
- n) any special conditions or limitations that the appropriate national authority has identified as relevant to the safety for transport of the explosives, the communication of the hazard and international transport;
- o) the expiry date of the classification document is given where the appropriate national authority considers one to be appropriate.

...

## Chapter 2

### CLASS 2 — GASES

...

---

UN Model Regulations, Chapter 2.2.4 ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraphs 3.2.2.1 d) and e) of this report)

---

#### **2.6 Gases forbidden for transport**

2.6.1 Chemically unstable gases of Class 2 are forbidden for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A209. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

...

## Chapter 3

### CLASS 3 — FLAMMABLE LIQUIDS

...

#### **3.2 ASSIGNMENT OF PACKING GROUPS**

3.2.1 Table 2-4 should be used for the determination of the packing group of a liquid that presents a risk due to flammability. For liquids whose only hazard is flammability, the packing group for the material is the packing group shown in Table 2-4. For a liquid possessing an additional hazard(s), the packing group, determined by using Table 2-4, and the packing group based on the severity of the additional hazard(s), must be considered. In such cases, the table of precedence of hazard characteristics appearing in Table 2-1 should be used to determine the correct classification of the liquid.

3.2.2 Viscous flammable liquids such as paints, enamels, lacquers, varnishes, adhesives and polishes having a flash point of less than 23°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:

---

UN Model Regulations, Chapter 2.3.2.2 (a), ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1.1 f) of this report)

---

- a) the viscosity<sup>1</sup> ~~expressed as the flowtime in seconds~~ and flash point are in accordance with Table 2-5;
- b) less than 3 per cent of the clear solvent layer separates in the solvent separation test;
- c) the mixture or any separated solvent does not meet the criteria for Division 6.1 or Class 8;
- d) the net quantity per package does not exceed 30 L for passenger aircraft or 100 L for cargo aircraft.

...

---

<sup>1</sup> Viscosity determination: Where the substance concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer must be used to determine the dynamic viscosity coefficient of the substance, at 23°C, at a number of shear rates. The values obtained are plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.

UN Model Regulations, Chapter 2.3.2.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1 of this report)

**Table 2-5. Viscosity and flashpoints**

<i>Kinematic viscosity (extrapolated) v (at near-zero shear rate) mm<sup>2</sup>/s at 23°C</i>	<i>Flow time t in seconds</i>	<i>Jet diameter in mm</i>	<i>Flash point in °C (closed-cup)</i>
<u>20 &lt; v ≤ 80</u>	20 < t ≤ 60	4	above 17
<u>80 &lt; v ≤ 135</u>	60 < t ≤ 100	4	above 10
<u>135 &lt; v ≤ 220</u>	20 < t ≤ 32	6	above 5
<u>220 &lt; v ≤ 300</u>	32 < t ≤ 44	6	above -1
<u>300 &lt; v ≤ 700</u>	44 < t ≤ 100	6	above -5
<u>700 &lt; v</u>	100 < t	6	-5 and below

...

UN Model Regulations, Chapter 2.3.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraphs 3.2.2.1 d) and e) of this report)

### **3.5 Substances forbidden for transport**

3.5.1 Chemically unstable substances of Class 3 are forbidden for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A209. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

## **Chapter 4**

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

...

UN Model Regulations, Chapter 2.4, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraph 3.2.2.1 of this report)

#### **4.1 DEFINITIONS AND GENERAL PROVISIONS**

4.1.1 Class 4 is divided into three divisions as follows:

a) Division 4.1 — Flammable solids.

Solids which, under conditions encountered in transport, are readily combustible or may cause or contribute to fire through friction; self-reactive substances and polymerizing substances which are liable to undergo a strongly exothermic reaction; desensitized explosives which may explode if not diluted sufficiently.

- b) Division 4.2 — Substances liable to spontaneous combustion.

Substances which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up in contact with air, and being then liable to catch fire.

- c) Division 4.3 — Substances which, in contact with water, emit flammable gases.

Substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

4.1.2 As referenced in this Chapter, test methods and criteria, with advice on application of the tests, are given in the current edition of the UN *Manual of Tests and Criteria*, for the classification of the following types of substances of Class 4:

- a) Flammable solids (Division 4.1);
- b) Self-reactive substances (Division 4.1);
- c) Polymerizing substances (Division 4.1);
- ed) Pyrophoric solids (Division 4.2);
- ee) Pyrophoric liquids (Division 4.2);
- ef) Self-heating substances (Division 4.2); and
- fg) Substances which, in contact with water, emit flammable gases (Division 4.3).

Test methods and criteria for self-reactive substances and polymerizing substances are given in Part II of the UN *Manual of Tests and Criteria*, and test methods and criteria for the other types of substances of Class 4 are given in Part III, section 33 of the UN *Manual of Tests and Criteria*.

## **4.2 FLAMMABLE SOLIDS, SELF-REACTIVE SUBSTANCES-AND, DESENSITIZED EXPLOSIVES AND POLYMERIZING SUBSTANCES**

### **4.2.1 General**

Division 4.1 includes the following types of substances:

- a) flammable solids (see 4.2.2);
- b) self-reactive substances (see 4.2.3); ~~and~~
- c) solid desensitized explosives (see 4.2.4); and
- d) polymerizing substances (see 4.2.5).

...

### **4.2.5 Division 4.1 — Polymerizing substances and mixtures (stabilized)**

#### **4.2.5.1 Definitions and properties**

4.2.5.1.1 Polymerizing substances are substances which, without stabilization, are liable to undergo a strongly exothermic reaction resulting in the formation of larger molecules or resulting in the formation of polymers under conditions normally encountered in transport. Such substances are considered to be polymerizing substances of Division 4.1 when:

- a) their self-accelerating polymerization temperature (SAPT) is 75°C or less under the conditions (with or without chemical stabilization as offered for transport) and in the packaging in which the substance or mixture is to be transported;
- b) they exhibit a heat of reaction of more than 300 J/g; and

c) they do not meet any other criteria for inclusion in Classes 1 to 8.

4.2.5.1.2 A mixture meeting the criteria of a polymerizing substance must be classified as a polymerizing substance of Division 4.1.

4.2.5.1.3 Polymerizing substances are subject to temperature control in transport if their self-accelerating polymerization temperature (SAPT) is 50 °C or less in the packaging in which the substance is to be transported.

4.2.5.1.4 Polymerizing substances that also meet the criteria of 2.9.3 of the UN Model Regulations as environmentally hazardous substances must be consigned under the appropriate polymerizing substance entry.

...

#### **4.4 SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES (DIVISION 4.3)**

...

##### **4.4.3 Assignment of packing groups**

4.4.3.1 Packing Group I must be assigned to any substance which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 L/kg of substance over any one minute.

4.4.3.2 Packing Group II must be assigned to any substance which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 L/kg of substance per hour, and which does not meet the criteria for Packing Group I.

4.4.3.3 Packing Group III must be assigned to any substance which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is ~~equal to or~~ greater than 1 L/kg of substance per hour, and which does not meet the criteria for Packing Groups I or II.

...



## Chapter 6

### CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

...

#### 6.2 DIVISION 6.1 — TOXIC SUBSTANCES

...

---

UN Model Regulations, Chapter 2.1.3.7, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraphs 3.2.2.1 d) and e) of this report)

---

#### 6.2.5 Substances forbidden for transport

6.2.5.1 Chemically unstable substances of Division 6.1 are forbidden for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A209. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

...

## Chapter 7

### CLASS 7 — RADIOACTIVE MATERIAL

...

#### 7.2.4 Classification of packages

...

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** 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" on its external surface except for the following:
  - i) radioluminescent time-pieces or devices;
  - ii) consumer products that either have received regulatory approval in accordance with 1;6.1.4 c) 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 2-14 are met for each individual item and each package, respectively.

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 2-14 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.

...

## Chapter 8

### CLASS 8 — CORROSIVE SUBSTANCES

---

UN Model Regulations, Chapter 2.1.3.7, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/12 (see paragraphs 3.2.2.1 d) and e) of this report)

---

#### **8.3 Substances forbidden for transport**

Chemically unstable substances of Class 8 are forbidden for transport unless the necessary precautions have been taken to prevent the possibility of a dangerous decomposition or polymerization under normal conditions of transport. For the precautions necessary to prevent polymerization, see Special Provision A209. To this end particular care must be taken to ensure that receptacles do not contain any substances liable to promote these reactions.

...

## Part 3

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

## Chapter 1

### GENERAL

...

#### 1.2 PROPER SHIPPING NAME

...

1.2.2 Proper shipping names may be used in the singular or plural as appropriate. In addition, when qualifying words are used as part of the proper shipping name, their sequence on documentation or package markings ~~marks~~ is optional. For instance, “**Dimethylamine solution**” may alternatively be shown as “**Solution of Dimethylamine**”. However, the entry in column 1 reflects the preferred sequence. Alternative spelling reflecting common usage around the world is acceptable for words such as “**caesium**” for “**cesium**”, “**sulfur**” for “**sulphur**”, “**aluminum**” for “**aluminium**”, etc. However, the spelling appearing in Table 3-1 is preferred.

...

**Table 3-1. Dangerous Goods List**

---

See Attachments A and B for proposed changes to Table 3-1 (Attachment A = Numerical order according to Column 2, UN No. Attachment B = Alphabetical order according to Column 1, Name)

---

## Chapter 3

### SPECIAL PROVISIONS

...

---

UN Model Regulations, paragraph 3.3.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 c) of this report)

---

Table 3-2 lists the special provisions referred to in column 7 of Table 3-1 and the information contained in them is additional to that shown for the relevant entry. Where the wording of the special provision is equivalent to that in the UN Model Regulations, the UN special provision number is shown in parentheses. Where a special provision includes a requirement for package marking, the provisions of Part 5:2.2 must be met. If the required mark is in the form of specific wording indicated in quotation marks, the size of the mark must be at least 12 mm, unless otherwise indicated in the special provision or elsewhere in these Instructions.

...

**Table 3-2. Special provisions**

TIs UN

...

---

UN Model Regulations, SP 225, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

- 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.

Fire extinguishers must be manufactured, tested, approved and labelled according to the provisions applied in the State of Manufacture.

*Note.— Provisions applied in the State of Manufacture means the provisions applicable in the State of Manufacture or those applicable in the State of use.*

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, for example, by fork lift or crane when loaded or unloaded.

*Cylinders which contain gases for use in the above-mentioned extinguishers or for use in stationary fire-fighting installations must meet the requirements in Part 6:5 and all requirements applicable to the relevant dangerous goods when these cylinders are transported separately.*

TIs UN

---

...

---

UN Model Regulations, SP 240, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 d) of this report)

---

A21 This entry only applies to vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries and equipment powered by wet batteries or sodium batteries which are transported with these batteries installed.

For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, battery-assisted bicycles (pedal cycles with an electric motor) and other vehicles of this type (e.g. self-balancing vehicles or vehicles not equipped with at least one seating position), wheelchairs, lawn tractors, self-propelled farming and construction equipment, boats and aircraft. This includes vehicles transported in a packaging. In this case some parts of the vehicle may be detached from its frame to fit into the packaging.

Examples of equipment are lawnmowers, cleaning machines or model boats and model aircraft. Equipment powered by lithium metal batteries or lithium ion batteries must be consigned under the entries UN 3091 **Lithium metal batteries contained in equipment** or UN 3091 **Lithium metal batteries packed with equipment** or UN 3481 **Lithium ion batteries contained in equipment** or UN 3481 **Lithium ion batteries packed with equipment**, as appropriate.

~~Vehicles or equipment that also contain an internal combustion engine must be consigned under the entries UN 3166 **Engine, internal combustion, flammable gas powered** or UN 3166 **Engine, internal combustion, flammable liquid powered** or UN 3166 **Vehicle, flammable gas powered** or UN 3166 **Vehicle, flammable liquid powered**, as appropriate. Hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the battery(ies) installed, must be consigned under the entries UN 3166 **Vehicle, flammable gas powered** or UN 3166 **Vehicle, flammable liquid powered**, as appropriate.~~

~~Vehicles or equipment powered by a fuel cell engine must be consigned under the entries UN 3166 **Vehicle, fuel cell, flammable gas powered** or UN 3166 **Vehicle, fuel cell, flammable liquid powered**, or UN 3166 **Engine, fuel cell, flammable gas powered** or UN 3166 **Engine, fuel cell, flammable liquid powered**, as appropriate.~~

Vehicles may contain other dangerous goods than batteries (e.g. fire extinguishers, compressed gas accumulators or safety devices) required for their functioning or safe operation without being subject to any additional requirements for these other dangerous goods, unless otherwise specified in these Instructions.

...

---

UN Model Regulations, SP 207, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

A38 (207) ~~Polymeric beads and m~~oulding compounds may be made from polystyrene, poly(methyl methacrylate) or other polymeric material.

TIs UN

...

---

UN Model Regulations, SP 236, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 e) of this report)

---

- A66 (236) Polyester resin kits consist of two components: a base material (either Class 3 or Division 4.1, Packing Group II or III) and an activator (Division 5.2 organic peroxide). The organic peroxide must be type D, E or F, not requiring temperature control. The packing group must be Packing Group II or III is assigned, according to the criteria for either Class 3 or Division 4.1, as appropriate, applied to the base material.

...

---

DGP-WG/14 Report (see paragraph 3.2.7.2 of DGP-WG/14-WP/32):

---

- A70 Internal combustion or fuel cell engines being shipped either separately or incorporated into a vehicle, machine or other apparatus, without batteries or other dangerous goods, are not subject to these Instructions when carried as cargo provided that:

...

Multiple engines may be shipped in a unit load device or ~~other type of pallet~~ provided that the shipper has made prior arrangements with the operator(s) for each shipment.

When this special provision is used, the words "not restricted" and the special provision number A70 must be provided on the air waybill when an air waybill is issued.

...

---

UN Model Regulations, SP 310, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 f) of this report)

---

- [A88 ~~Pre-production P~~ prototypes of lithium batteries or cells when these prototypes are transported for testing or low production runs (i.e., annual production runs consisting of not more than 100 lithium batteries or cells) lithium batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN Manual of Tests and Criteria may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the following requirements in Packing Instruction 910 of the Supplement are met:

- ~~a) except as provided in paragraph c), cells or batteries must be transported in an outer packaging that is a metal, plastic or plywood drum or a metal, plastic or wooden box and that meets the criteria for Packing Group I packagings;~~
- ~~b) except as provided in paragraph c), each cell or battery must be individually packed in an inner packaging inside an outer packaging and surrounded by cushioning material that is non-combustible, and non-conductive. Cells or batteries must be protected against short circuiting;~~
- ~~c) lithium batteries with a mass of 12 kg or greater and having a strong, impact resistant outer casing, or assemblies of such batteries, may be packed in strong outer packagings or protective enclosures not subject to the requirements of Part 6 of these Instructions. The batteries or battery assemblies must be protected against short circuiting; and~~

TIs UN

- 
- ~~d) a copy of the document of approval showing the quantity limitations must accompany the consignment.~~ Transport in accordance with this special provision must be noted on the dangerous goods transport document.

Irrespective of the limit specified in column 13 of Table 3-1, the battery or battery assembly as prepared for transport may have a mass exceeding 35 kg G.]

...

---

UN Model Regulations, SP 244, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 g) of this report)

---

- A102 (244) This listing includes aluminium dross, aluminium skimmings, spent cathodes, spent potliner and aluminium salt slags.

---

UN Model Regulations, SP 204, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 h) of this report)

---

- A132 (204) Articles containing smoke-producing substance(s) corrosive according to the criteria for Class 8 must be labelled with a "Corrosive" subsidiary risk label. Articles containing smoke-producing substance(s) toxic by inhalation according to the criteria for Division 6.1 must be labelled with a "TOXIC" subsidiary risk label (Figure 5-17), except that those manufactured before 31 December 2016 may be offered for transport until 31 December 2018 without a "TOXIC" subsidiary label.

...

---

UN Model Regulations, SP 312, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 i) of this report)

---

- A134 (312) ~~Vehicles or machinery powered by a fuel cell engine must be consigned under the entries UN 3166 **Vehicle, fuel cell, flammable gas powered** or UN 3166 **Vehicle, fuel cell, flammable liquid powered**, or UN 3166 **Engine, fuel cell, flammable gas powered** or UN 3166 **Engine, fuel cell, flammable liquid powered**, as appropriate. These entries include hybrid electric vehicles powered by both a fuel cell and an internal combustion engine with wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the battery(ies) installed.~~

...

---

DGP-WG/14 Report (see paragraph 3.2.7.2 of DGP-WG/14-WP/32):

---

- A151 When dry ice is used as a refrigerant for other than dangerous goods loaded in a unit load device ~~or other type of pallet~~, the quantity limits per package shown in columns 11 and 13 of Table 3-1 for dry ice do not apply. In such case, the unit load device ~~or other type of pallet~~ must be identified to the operator and must allow the venting of the carbon dioxide gas to prevent a dangerous build-up of pressure.

TIs UN

...

---

UN Model Regulations, SP 373, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

- A190 (373) Neutron radiation detectors containing non-pressurized boron trifluoride gas in excess of 1 g 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 Table 3-1 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:
- i) the pressure in each neutron radiation detector must not exceed 105 kPa absolute at 20°C;
  - ii) the amount of gas must not exceed 13 grams per detector;
  - 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.*
- iv) each neutron radiation detector must be of welded metal construction with brazed metal to ceramic feed through assemblies. 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  $1 \times 10^{-10}$  cm<sup>3</sup>/s leaktightness standard before filling.
- b) radiation detectors transported as individual components must be transported as follows:
- i) they must be packed in a sealed intermediate plastic liner with sufficient absorbent or adsorbent material to absorb or adsorb the entire gas contents;
  - ii) they must be packed in strong outer packagings and the completed package must be capable of withstanding a 1.8 m drop test without leakage of gas contents from detectors; and
  - iii) the total amount of gas from all detectors per outer packaging must not exceed 52 grams.
- c) completed neutron radiation detector systems containing detectors meeting the conditions of sub-paragraph a) must be transported as follows:
- i) the detectors must be contained in a strong sealed outer casing;
  - ii) the casing must contain sufficient absorbent or adsorbent material to absorb or adsorb the entire gas contents; and
  - iii) the completed system must be packed in strong outer packagings capable of withstanding a 1.8 m drop test without leakage unless a system's outer casing affords equivalent protection.

TIs UN

---

...

---

UN Model Regulations, SP 369, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

A194 (369) In accordance with Part 2, Introductory Chapter, paragraph 4, this radioactive material in an excepted package possessing toxic and corrosive properties is classified in ~~Class 8~~ Division 6.1 with a radioactive material and corrosive subsidiary risks.

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~~ Division 6.1 substances with a corrosive subsidiary risk, the provisions of 5;1.2.2.2, 5;1.6.3, 7;1.6 and 7;3.2.1 to 7;3.2.4 apply.

No Class 7 label is required to be displayed.

...

---

UN Model Regulations, SP 378, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 j) of this report)

---

A202 (378) Radiation detectors containing this gas in non-refillable cylinders not meeting the requirements of Part 6.5 and Packing Instruction 200 may be offered for transport under this entry provided:

a) the working pressure in each cylinder does not exceed 50 bar;

b) the cylinder capacity does not exceed 12 L;

c) each cylinder has a minimum burst pressure of at least three times the working pressure when a relief device is fitted and at least four times the working pressure when no relief device is fitted;

d) each cylinder is manufactured from material which will not fragment upon rupture;

e) each detector is manufactured under a registered quality assurance programme;

Note.— ISO 9001:2008 may be used for this purpose.

f) detectors are transported in strong outer packagings. The complete package must be capable of withstanding a 1.2 m drop test without breakage of the detector or rupture of the outer packaging. Equipment that includes a detector must be packed in a strong outer packaging unless the detector is afforded equivalent protection by the equipment in which it is contained; and

g) transport in accordance with this special provision must be noted on the dangerous goods transport document.

Radiation detectors, including detectors in radiation detection systems, are not subject to any other requirements of these Instructions if the detectors meet the requirements in a) to f) above and the capacity of detector cylinders does not exceed 50 mL.

...

---

UN Model Regulations, SP 380, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

A203 (380) If a vehicle is powered by a flammable liquid and a flammable gas internal combustion engine, it must be assigned to UN 3166 — Vehicle, flammable gas powered.

TIs UN

---

...

---

UN Model Regulations, SP 382, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

A204 (382) Polymeric beads may be made from polystyrene, poly (methyl methacrylate) or other polymeric material. When it can be demonstrated that no flammable vapour, resulting in a flammable atmosphere, is evolved according to test U1 (Test method for substances liable to evolve flammable vapours) of Part III, sub-section 38.4.4 of the Manual of Tests and Criteria, polymeric beads, expandable need not be classified under this UN number. This test should only be performed when de-classification of a substance is considered.

...

---

UN Model Regulations, SP 383, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

A205 (383) Table tennis balls manufactured from celluloid are not subject to these Instructions where the net mass of each table tennis ball does not exceed 3.0 g and the total net mass of table tennis balls does not exceed 500 g per package.

...

---

UN Model Regulations, SP 384, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 k) of this report)

---

A206 (384) The hazard label must conform to the model shown in Figure 5-26. Figure 5-25 may continue to be used until 31 December 2018.

...

---

UN Model Regulations, SP 385, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 d) of this report)

---

A207 (385) This entry applies to vehicles powered by flammable liquid or gas internal combustion engines or fuel cells.

Hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed must be consigned under this entry. Vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed, must be consigned under the entry UN 3171 — **Battery-powered vehicle** (see Special Provision A21).

For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are cars, motorcycles, trucks, locomotives, scooters, three- and four-wheeled vehicles or motorcycles, lawn tractors, self-propelled farming and construction equipment, boats and aircraft.

Dangerous goods such as batteries, air bags, fire extinguishers, compressed gas accumulators, safety devices and other integral components of the vehicle that are necessary for the operation of the vehicle or for the safety of its operator or passengers, must be securely installed in the vehicle and are not otherwise subject to these Instructions. However, lithium batteries must meet the requirements of 2.9.3, except when otherwise specified by these Instructions.

TIs UN

---

...

---

UN Model Regulations, SP 363, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 d) of this report)

---

[A208 (363) a) This entry applies to engines or machinery, powered by fuels classified as dangerous goods via internal combustion systems or fuel cells (e.g. combustion engines, generators, compressors, turbines, heating units), except those which are assigned under UN 3166 or UN 3363.

b) Engines or machinery which are empty of liquid or gaseous fuels and which do not contain other dangerous goods, are not subject to these Instructions.

*[Note 1.— An engine or machinery is considered to be empty of liquid fuel when the liquid fuel tank has been drained and the engine or machinery cannot be operated due to a lack of fuel. Engine or machinery components such as fuel lines, fuel filters and injectors do not need to be cleaned, drained or purged to be considered empty of liquid fuels. In addition, the liquid fuel tank does not need to be cleaned or purged.]*

*[Note 2.— An engine or machinery is considered to be empty of gaseous fuels when the gaseous fuel tanks are empty of liquid (for liquefied gases), the positive pressure in the tanks does not exceed 2 bar and the fuel shut-off or isolation valve is closed and secured.]*

c) Engines and machinery containing fuels meeting the classification criteria of Class 3, must be consigned under the entries UN 3528 — **Engine, internal combustion, flammable liquid powered** or UN 3528 — **Engine, fuel cell, flammable liquid powered** or UN 3528 — **Machinery, internal combustion, flammable liquid powered** or UN 3528 — **Machinery, fuel cell, flammable liquid powered**, as appropriate.

d) Engines and machinery containing fuels meeting the classification criteria of Division 2.1, must be consigned under the entries UN 3529 — **Engine, internal combustion, flammable gas powered** or UN 3529 — **Engine, fuel cell, flammable gas powered** or UN 3529 — **Machinery, internal combustion, flammable gas powered** or UN 3529 — **Machinery, fuel cell, flammable gas powered**, as appropriate.

Engines and machinery powered by both a flammable gas and a flammable liquid must be consigned under the appropriate UN 3529 entry.

e) Engines and machinery containing liquid fuels meeting the classification criteria for environmentally hazardous substances and not meeting the classification criteria of any other class or division, must be consigned under the entries UN 3530 — **Engine, internal combustion** or UN 3530 — **Machinery, internal combustion**, as appropriate.

f) Engines or machinery may contain other dangerous goods than fuels (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for their functioning or safe operation without being subject to any additional requirements for these other dangerous goods, unless otherwise specified in these Instructions. However, lithium batteries must meet the requirements of 2.9.3, except when otherwise specified by these Instructions.

TIs UN

- 
- ~~g) The engines or machinery are not subject to any other requirements of these Instructions if the following requirements are met:~~
- ~~i) The engine or machinery, including the means of containment containing dangerous goods, must be in compliance with the construction requirements specified by the appropriate national authority;~~
  - ~~ii) Any valves or openings (e.g. venting devices) must be closed during transport;~~
  - ~~iii) The engines or machinery must be oriented to prevent inadvertent leakage of dangerous goods and secured by means capable of restraining the engines or machinery to prevent any movement during transport which would change the orientation or cause them to be damaged;~~
  - ~~iv) for UN No. 3528 and UN No. 3530:~~
    - ~~Where the engine or machinery contains more than 60 L of liquid fuel and has a capacity of not more than 450 L, the labelling requirements of 5.3 must apply.~~
    - ~~Where the engine or machinery contains more than 60 L of liquid fuel and has a capacity of more than 450 L but not more than 3 000 L, it must be labelled on two opposing sides in accordance with 5.3.~~
    - ~~Where the engine or machinery contains more than 60 L of liquid fuel and has a capacity of more than 3 000 L, it must be placarded on two opposing sides in accordance with 5.3.1.1.2.]~~
  - ~~v) for UN No. 3529:~~
    - ~~Where the fuel tank of the engine or machinery has a water capacity of not more than 450 L, the labelling requirements of 5.3 must apply.~~
    - ~~Where the fuel tank of the engine or machinery has a water capacity of more than 450 L but not more than 1 000 L, it must be labelled on two opposing sides in accordance with 5.2.2.~~
    - ~~Where the fuel tank of the engine or machinery has a water capacity of more than 1 000 L, it must be placarded on two opposing sides in accordance with 5.3.1.1.2.~~
  - ~~vi) A dangerous goods transport document in accordance with 5.4 is required, [except for UN 3528 and UN 3530, where a dangerous goods transport document is only required when the engine or machinery contains more than 60 L of liquid fuels]. Transport in accordance with this special provision must be noted on the dangerous goods transport document.]~~

...

---

UN Model Regulations, SP 386, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

~~A209 (386) Substances which are stabilized by temperature control are forbidden for transport by air unless exempted (see 1:1.1.2). When chemical stabilization is employed, the person offering the packaging for transport must ensure that the level of stabilization is sufficient to prevent the substance in the packaging from dangerous polymerization at a bulk mean temperature of 50°C. Where chemical stabilization becomes ineffective at lower temperatures within the anticipated duration of transport, temperature control is required and the substances are forbidden for transport by air unless exempted (see 1:1.1.2). In making this determination, factors to be taken into consideration include, but are not limited to, the capacity and geometry of the packaging and the effect of any insulation present, the temperature of the substance when offered for transport, the duration of the journey and the ambient temperature conditions typically encountered in the journey (considering also the season of year), the effectiveness and other properties of the stabilizer employed, applicable operational controls imposed by regulation (e.g. requirements to protect from sources of heat, including other cargo carried at a temperature above ambient) and any other relevant factors.~~

...

## Chapter 4

### DANGEROUS GOODS IN LIMITED QUANTITIES

...

---

UN Model Regulations, Chapter 3.4, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

#### 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.

4.5.2 Packages containing limited quantities of dangerous goods and prepared in accordance with this chapter must bear the marking mark shown in Figure 3-1 below. The marking mark must be readily visible, legible and able to withstand open weather exposure without a substantial reduction in effectiveness. The marking mark 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 the 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 mark 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 Use of overpacks

4.5.3.1 ~~When packages~~ For an overpack containing dangerous goods packed in limited quantities, the following applies: ~~are placed in an overpack, the overpack must be marked with the word "OVERPACK" and the marking required by this chapter, u~~ Unless the markings ~~marks~~ representative of all dangerous goods in the overpack are visible, the overpack must be:

- a) marked with the word "OVERPACK". The lettering of the "OVERPACK" mark must be at least 12 mm high; and
- b) marked with the marks required by this chapter.

...

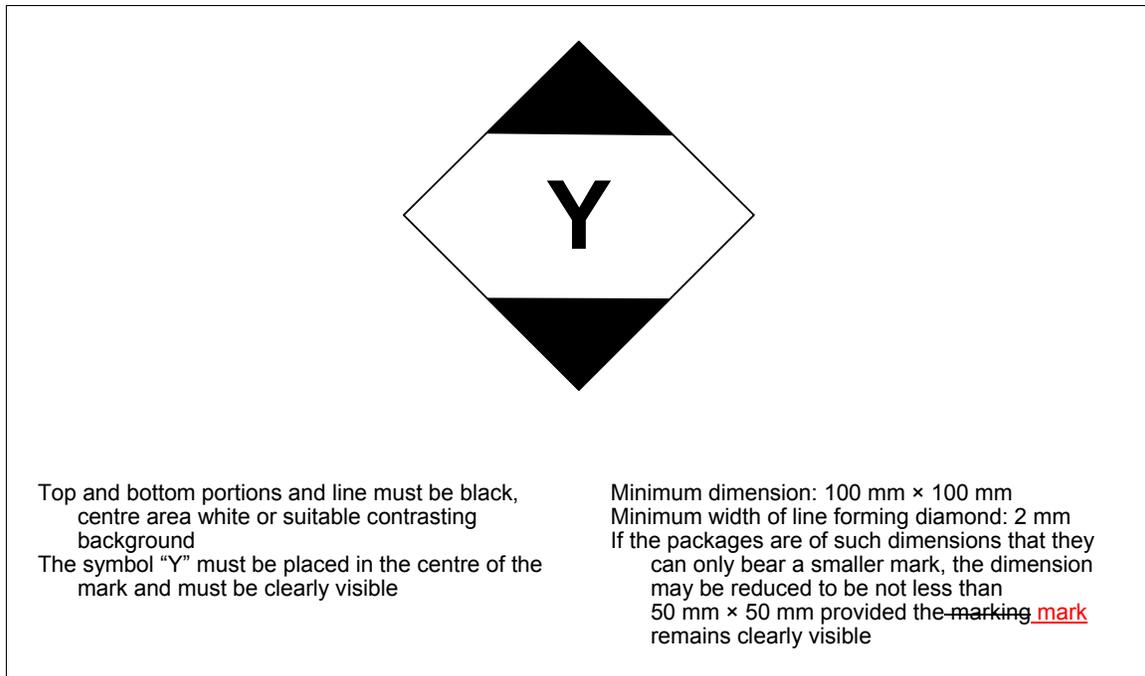


Figure 3-1. Limited quantities mark

...

---

UN Model Regulations, Chapter 3.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.2 of this report)

---

## Chapter 5

### DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

...

#### 5.2 PACKAGINGS

5.2.1 Packagings used for the transport of dangerous goods in excepted quantities must be in compliance with the following:

- a) there must be an inner packaging and each inner packaging must be constructed of plastic (when used for liquid dangerous goods it must have a thickness of not less than 0.2 mm), or of glass, porcelain, stoneware, earthenware or metal (see also 4;1.1.3.1) and the closure of each inner packaging must be held securely in place with wire, tape or other positive means; any receptacle having a neck with moulded screw threads must have a leak proof threaded type cap. The closure must be resistant to the contents;
- b) each inner packaging must be securely packed in an intermediate packaging with cushioning material in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents. ~~The intermediate packaging must completely contain the contents in case of breakage or leakage, regardless of package orientation.~~ For liquid dangerous goods, the intermediate or outer packaging must contain sufficient absorbent material to absorb the entire contents of the inner packagings. ~~In such cases~~ When placed in the intermediate packaging, the absorbent material may be the cushioning material. Dangerous goods must not react dangerously with cushioning,

absorbent material and packaging material or reduce the integrity or function of the materials. Regardless of its orientation, the package must completely contain the contents in case of breakage or leakage;

- c) the intermediate packaging must be securely packed in a strong, rigid outer packaging (wooden, fibreboard or other equally strong material);
- d) each package type must be in compliance with the provisions in 5.3;
- e) each package must be of such a size that there is adequate space to apply all necessary ~~markings~~ marks; and
- f) overpacks may be used and may also contain packages of dangerous goods or goods not subject to these Instructions provided that the packages are secured within the overpack.

...

#### 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.

5.4.2 The ~~marking~~ mark 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 Use of overpacks

5.4.3.1 ~~An~~ For an overpack containing dangerous goods in excepted quantities, the following applies: ~~must display the markings required by 5.4.1, u~~ Unless such the markings marks representative of all dangerous goods ~~on packages within in~~ the an overpack are clearly visible, the overpack must be:

- a) marked with the word "OVERPACK". The lettering of the "OVERPACK" mark must be at least 12 mm high; and
- b) marked with the marks required by this chapter.

The other provisions of 5:2.4.10 apply only if other dangerous goods which are not packed in excepted quantities are contained in the overpack and only in relation to these other dangerous goods.

...

## Part 4

# PACKING INSTRUCTIONS

...

## Chapter 1

### GENERAL PACKING REQUIREMENTS

*Parts of this Chapter are affected by State Variations JP 24;  
see Table A-1*

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

...

---

UN Model Regulations, paragraph 4.1.1.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

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~~ **mark** 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.

...

---

UN Model Regulations, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

1.1.14 Except as provided in 5;3.5.1.1 a), a package must be of such size that there is adequate space to affix all necessary labels and ~~markings~~ **marks**.

...

---

UN Model Regulations, paragraph 4.1.1.12, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

1.1.18 Every packaging intended to contain liquids must successfully undergo a suitable leakproofness test. **This test is part of a quality assurance programme as required by 4;1.1.2 which shows the capability** ~~and be capable~~ of meeting the appropriate test level indicated in 6;4.4.2:

- a) before it is first used for transport;
- b) after remanufacturing or reconditioning, before it is reused for transport.

For this test, packagings need not have their own closures fixed.

The inner receptacle of composite packagings may be tested without the outer packaging provided the test results are not affected. This test is not necessary for inner packagings of combination packagings.

...

### Chapter 3

## CLASS 1 — EXPLOSIVES

...

### Packing Instruction 114

...

**b) solid dry**

*Inner packagings*

Bags  
paper, kraft  
plastics  
textile, siftproof  
woven plastics, siftproof  
Receptacles  
fibreboard  
metal  
paper  
plastics  
wood  
woven plastics, siftproof

*Intermediate packagings*

Not necessary

*Outer packagings*

Boxes  
fibreboard (4G)  
natural wood, ordinary (4C1)  
natural wood, with siftproof walls (4C2)  
plywood (4D)  
reconstituted wood (4F)  
Drums  
aluminium (1B1, 1B2)  
fibre (1G)  
other metal (1N1, 1N2)  
plastics (1H1, 1H2)  
plywood (1D)  
steel (1A1, 1A2)

UN Model Regulations, P112(c), PP48, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

**PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:**

- For UN 0077, 0132, 0234, 0235 and 0236, packagings must be lead-free.
- For UN 0508 and 0509, metal packagings must not be used. Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6.3, are not considered metal packagings.
- For UN 0160 and 0161, when metal drums (1A1, 1A2, 1B1, 1B2, 1N1 or 1N2) are used as the outer packaging, metal packagings must be so constructed that the risk of explosion, by reason of increase in internal pressure from internal or external causes, is prevented.
- For UN 0160 and 0161, inner packagings are not required if drums are used as the outer packaging.

...

### Packing Instruction 137

**Inner packagings**

Bags  
plastics  
Boxes  
fibreboard  
wood  
Tubes  
fibreboard  
metal  
plastics  
Dividing partitions in the  
outer packagings

**Intermediate packagings**

Not necessary

**Outer packagings**

Boxes  
aluminium (4B)  
fibreboard (4G)  
natural wood, ordinary (4C1)  
natural wood, with siftproof walls (4C2)  
other metal (4N)  
+ plastics, solid (4H2)  
plywood (4D)  
reconstituted wood (4F)  
steel (4A)

---

UN Model Regulations, packing instruction 137, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14  
(see paragraph 3.2.4.1 of this report)

---

**PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:**

- 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” **must be marked in accordance with 4.1.1.13**. 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

...

---

UN Model Regulations, paragraph 4.1.6.12, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

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 11114-1:2012 and ISO 11114-2:2000<sup>13</sup> must be met.

...

---

UN Model Regulations, paragraph 4.1.6.8, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

4.1.1.8 Valves must be designed and constructed in such a way that they are inherently able to withstand damage without release of the contents or must be protected from damage, which could cause inadvertent release of the contents of the cylinder and closed cryogenic receptacle, by one of the following methods:

- a) Valves are placed inside the neck of the cylinder and closed cryogenic receptacle and protected by a threaded plug or cap;
- b) Valves are protected by caps. Caps must possess vent holes of a sufficient cross-sectional area to evacuate the gas if leakage occurs at the valves;
- c) Valves are protected by shrouds or guards;

- d) Not used; or
- e) Cylinders and closed cryogenic receptacles are transported in an outer packaging. The packaging as prepared for transport must be capable of meeting the drop test specified in 6;4.3 at the Packing Group I performance level.

For cylinders and closed cryogenic receptacles with valves as described in b) and c), the requirements of ISO 11117:1998 must be met; for valves with inherent protection, the requirements of Annex A of ISO 10297:2006 or Annex A of ISO 10297:2014 must be met. For metal hydride storage systems, the valve protection requirements specified in ISO 16111:2008 must be met.

...

---

UN Model Regulations, paragraphs 4.1.6.12 and 4.1.6.13, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

4.1.1.12 Cylinders and closed cryogenic receptacles must not be offered for filling:

- a) when damaged to such an extent that the integrity of the cylinder and closed cryogenic receptacle or its service equipment may be affected;
- b) unless the cylinder and closed cryogenic receptacle and its service equipment have been examined and found to be in good working order; or
- c) unless the required certification, retest, and filling ~~markings~~ marks are legible.

4.1.1.13 Filled cylinders and closed cryogenic receptacles must not be offered for transport:

- a) when leaking;
- b) when damaged to such an extent that the integrity of the cylinder and closed cryogenic receptacle or its service equipment may be affected;
- c) unless the cylinder and closed cryogenic receptacle and its service equipment have been examined and found to be in good working order; or
- d) unless the required certification, retest, and filling ~~markings~~ marks are legible.

...

## 4.2 PACKING INSTRUCTIONS

### Packing Instruction 200

For cylinders, the general packing requirements of 4;1.1 and 4;4.1.1 must be met.

Cylinders, constructed as specified in 6;5 are authorized for the transport of a specific substance when specified in the following tables (Table 1 and Table 2). Cylinders other than UN marked and certified cylinders may be used if the design, construction, testing, approval and ~~markings~~ marks conform to the requirements of the appropriate national authority in which they are approved and filled. The substances contained must be permitted in cylinders and permitted for air transport according to these Instructions. Cylinders for which prescribed periodic tests have become due must not be charged and offered for transport until such retests have been successfully completed. Valves must be suitably protected or must be designed and constructed in such a manner that they are able to withstand damage without leakage as specified in Annex B of ISO 10297:1999. Cylinders with capacities of one litre or less must be packaged in outer packaging constructed of suitable material of adequate strength and design in relation to the packaging capacity and its intended use, and secured or cushioned so as to prevent significant movement within the outer packaging during normal conditions of transport. For some substances, the special packing provisions may prohibit a particular type of cylinder. The following requirements must be met:

- 1) Pressure relief devices must be fitted on cylinders used for the transport of UN 1013 **Carbon dioxide** and UN 1070 **Nitrous oxide**. Other cylinders must be fitted with a pressure relief device if specified by the appropriate national authority of the country of use. The type of pressure relief device, the set to discharge pressure and relief capacity of pressure relief devices, if required, must be specified by the appropriate national authority of the country of use. Manifolding of cylinders is not permitted.

UN Model Regulations, packing instruction P200, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1.1 a) of this report)

- 2) The following two tables cover compressed gases (Table 1) and liquefied and dissolved gases (Table 2). They provide:
- the UN number, name and description, and classification of the substance;
  - the LC<sub>50</sub> for toxic substances;
  - the types of cylinders authorized for the substance, shown by the letter "X";
  - the maximum test period for periodic inspection of the cylinders;

Note.— For cylinders which make use of composite materials, the maximum test period must be five years. The test period may be extended to that specified in Tables 1 and 2 (i.e. up to ten years), if approved by the appropriate national authority of the country of use.

- the minimum test pressure of the cylinders;
  - the maximum working pressure of the cylinders for compressed gases (where no value is given, the working pressure must not exceed two-thirds of the test pressure) or the maximum filling ratio(s) dependent on the test pressure(s) for liquefied and dissolved gases;
  - special packing provisions that are specific to a substance.
- 3) In no case must cylinders be filled in excess of the limit permitted in the following requirements:
- For compressed gases, the working pressure must be not more than two-thirds of the test pressure of the cylinders. Restrictions to this upper limit on working pressure are imposed by special packing provision "o". In no case must the internal pressure at 65°C exceed the test pressure.
  - For high pressure liquefied gases, the filling ratio must be such that the settled pressure at 65°C does not exceed the test pressure of the cylinders.

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

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

$$FR = 8.5 \times 10^{-4} \times d_g \times P_h$$

where FR = maximum filling ratio  
 $d_g$  = gas density (at 15°C, 1 bar)(in g/l)  
 $P_h$  = minimum test pressure (in bar).

If the density of the gas is unknown, the maximum filling ratio must be determined as follows:

$$FR = \frac{P_h \times MM \times 10^{-3}}{R \times 338}$$

where FR = maximum filling ratio  
 $P_h$  = minimum test pressure (in bar)  
 MM = molecular mass (in g/mol)  
 $R = 8.31451 \times 10^{-2}$  bar.l/mol.K (gas constant).

For gas mixtures, the average molecular mass is to be taken, taking into account the volumetric concentrations of the various components.

- For low pressure liquefied gases, the maximum mass of contents per litre of water capacity (filling factor) must equal 0.95 times the density of the liquid phase at 50°C; in addition, the liquid phase must not fill the cylinder at any temperature up to 60°C. The test pressure of the cylinder must be at least equal to the vapour pressure (absolute) of the liquid at 65°C, minus 100 kPa (1 bar).

For low pressure liquefied gases for which filling data is not provided in the table, the maximum filling ratio must be determined as follows:

$$FR = (0.0032 \times BP - 0.24) \times d_1$$

where FR = maximum filling ratio  
BP = boiling point (in Kelvin)  
 $d_1$  = density of the liquid at boiling point (in kg/l).

d) For UN 1001, **Acetylene, dissolved**, and UN 3374 **Acetylene, solvent free**, see p).

e) For liquefied gases charged with compressed gases, both components — the liquid phase and the compressed gas — have to be taken into consideration in the calculation of the internal pressure in the cylinder.

The maximum mass of contents per litre of water capacity must not exceed 0.95 times the density of the liquid phase at 50°C; in addition, the liquid phase must not completely fill the cylinder at any temperature up to 60°C.

When filled, the internal pressure at 65°C must not exceed the test pressure of the cylinders. The vapour pressures and volumetric expansions of all substances in the cylinders must be considered. When experimental data is not available, the following steps must be carried out:

i) Calculation of the vapour pressure of the liquid component and of the partial pressure of the compressed gas at 15°C (filling temperature);

ii) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15°C to 65°C and calculation of the remaining volume for the gaseous phase;

iii) Calculation of the partial pressure of the compressed gas at 65°C considering the volumetric expansion of the liquid phase;

*Note.— The compressibility factor of the compressed gas at 15°C and 65°C must be considered.*

iv) Calculation of the vapour pressure of the liquid component at 65°C;

v) The total pressure is the sum of the vapour pressure of the liquid component and the partial pressure of the compressed gas at 65°C;

vi) Consideration of the solubility of the compressed gas at 65°C in the liquid phase;

The test pressure of the cylinder must not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the liquid component is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (vi)) into account.

4) Gas mixtures containing any of the following gases must not be offered for transport in aluminium alloy cylinders unless approved by the appropriate national authority of the State of Origin and the State of the Operator:

UN 1037 **Ethyl chloride**  
UN 1063 **Methyl chloride**  
UN 1063 **Refrigerant gas R 40**  
UN 1085 **Vinyl bromide, stabilized**  
UN 1086 **Vinyl chloride, stabilized**  
UN 1860 **Vinyl fluoride, stabilized**  
UN 1912 **Methyl chloride and methylene chloride mixture**

5) The filling of cylinders must be carried out by qualified staff using appropriate equipment and procedures. The procedures should include checks of:

- The conformity of cylinders and accessories with these Instructions;
- Their compatibility with the product to be transported;
- The absence of damage which might affect safety;
- Compliance with the degree or pressure of filling, as appropriate;
- Marks and identification.

These requirements are deemed to be met if the following standards are applied:

ISO 10691:2004 Gas cylinders — Refillable welded steel cylinders for liquified petroleum gas (LPG) — Procedures for checking before, during and after filling.

ISO 11372:2011 Gas cylinders — Acetylene cylinders — Filling conditions and filling inspection

ISO 11755:2005 Gas cylinders — Cylinder bundles for compressed and liquefied gases (excluding acetylene) — Inspection at time of filling

ISO 13088:2011 Gas cylinders — Acetylene cylinder bundles — Filling conditions and filling inspection

ISO 24431:2006 Gas cylinders — Cylinders for compressed and liquefied gases (excluding acetylene) — Inspection at time of filling

56) "Special packing provisions":

Material compatibility

- a) Aluminium alloy cylinders are forbidden.
- b) Copper valves are forbidden.
- c) Metal parts in contact with the contents must not contain more than 65 per cent copper.
- 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:

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

m) Cylinders must be filled to a working pressure not exceeding 5 bar.

o) In no case must the working pressure or filling ratio shown in the table be exceeded.

- p) For UN 1001 **Acetylene, dissolved**, and UN 3374 **Acetylene, solvent free**: cylinders must be filled with a homogeneous monolithic porous mass; the working pressure and the quantity of acetylene must not exceed the values prescribed in the approval or in ISO 3807-1:2000-~~or~~ ISO 3807-2:2000 or ISO 3807:2013, as applicable.

For UN 1001 **Acetylene, dissolved**, cylinders must contain a quantity of acetone or suitable solvent as specified in the approval (see ISO 3807-1:2000-~~or~~ ISO 3807-2:2000 or ISO 3807:2013, as applicable); cylinders fitted with pressure relief devices must be transported vertically.

The test pressure of 52 bar applies only to cylinders ~~conforming to ISO 3807-2:2000~~ fitted with a fusible plug.

- ra) Ethyl chloride may be carried in securely sealed glass ampoules (IP.8) containing not more than 5 g of ethyl chloride with a ullage of not less than 7.5 per cent at 21°C. Ampoules must be cushioned with efficient non-combustible material in partitioned cartons with not more than 12 ampoules per carton. The cartons must be tightly packed to prevent movement in wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or plastic boxes (4H1, 4H2) that meet the performance testing requirements of 6;4 at the Packing Group II performance level. Not more than 300 g of ethyl chloride is permitted per package.

s) Aluminium alloy cylinders must be:

- Equipped only with brass or stainless steel valves; and
- Cleaned in accordance with ISO 11621:1997 and not contaminated with oil.

Periodic inspection:

- u) The interval between periodic tests may be extended to 10 years for aluminium alloy cylinders when the alloy of the cylinder has been subjected to stress corrosion testing as specified in ~~ISO 7866:1999~~ [ISO 7866:2012 + Cor 1:2014](#).
- v) The interval between periodic inspections for steel cylinders may be extended to 15 years if approved by the appropriate national authority of the country of use.

Requirements for N.O.S. descriptions and for mixtures:

- 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.

The test pressure and filling ratio must be calculated in accordance with the relevant requirements of PI 200.

The necessary steps must be taken to prevent dangerous reactions (i.e. polymerization or decomposition) during transport. If necessary, stabilization or addition of an inhibitor may be required.

*Note.— For the carriage of oxygen to provide life support to aquatic animals, see Note 7 of the Introductory Notes to this Part.*

...

...

## Packing Instruction 202

### Requirements for open cryogenic receptacles

Open cryogenic receptacles must be constructed to meet the following requirements:

...

- 9. Open cryogenic receptacles must bear the following marks permanently affixed, e.g. by stamping, engraving or etching:
  - the manufacturer's name and address;
  - the model number or name;
  - the serial or batch number;
  - the UN number and proper shipping name of gases for which the receptacle is intended;
  - the capacity of the receptacle in litres.

*Note.— The size of the ~~marking~~ [mark](#) must be as set out for cylinders in Part 6;5.2.7.1. Open cryogenic receptacles manufactured prior to 1 January 2012 are not required to be so marked.*

- 10. Open cryogenic receptacles are permitted for nitrogen, argon, krypton, neon and xenon refrigerated liquids.

---

DGP-WG/14 Report (see paragraph 3.2.4.1 of DGP-WG/14-WP/32):

---

### Packing Instruction 203

Passenger and cargo aircraft for UN 1950 and 2037 only

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

For the purposes of this packing instruction, a receptacle is considered to be an inner packaging.

*Note.— “Receptacle” has the same meaning as set out in 1;3. Any reference in this packing instruction to receptacle will include “aerosols” of UN 1950 and “receptacles, small, containing gas” and “gas cartridges” of UN 2037.*

#### **Metal aerosols (IP.7, IP.7A, IP.7B) and non-refillable receptacles containing gas (gas cartridges)**

Non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) must not exceed 1 000 mL capacity.

The following conditions must be met:

- a) the pressure in the receptacle must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;
- b) if the pressure in the receptacle exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;
- c) if the pressure in the receptacle exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;
- d) if the pressure in the receptacle exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;
- e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule for an aerosol. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into the outer metal receptacle;
- f) the liquid content must not completely fill the closed receptacle at 55°C;
- g) each receptacle exceeding 120 mL capacity must have been heated until the pressure in the receptacle is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect. For aerosols, non-flammable (tear gas devices) this heat test applies to all aerosols regardless of their capacity.

#### **Plastic aerosols (IP.7C)**

Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of the ~~se~~ Technical Instructions, in which case the quantity must not exceed 500 mL.

The following conditions must be met:

- a) the contents must not completely fill the closed receptacle at 55°C;
- b) the pressure in the receptacle may not exceed 970 kPa at 55°C; and

- c) each receptacle must be leak tested in accordance with the provisions of 6;3.2.8.1.6.

**Non-flammable aerosols containing medical preparations or biological products**

Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:

- a) the pressure in the aerosol must not exceed 970 kPa at 55°C;  
 b) the liquid contents must not completely fill the closed receptacle at 55°C;  
 c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;  
 d) the valves must be protected by a cap or other suitable means during transport.

<u>UN number and name</u>	<u>Net quantity per package</u>	
	<u>Passenger</u>	<u>Cargo</u>
<u>UN 1950 Aerosols, flammable</u>	<u>75 kg</u>	<u>150 kg</u>
<u>UN 1950 Aerosols, flammable (engine starting fluid)</u>	<u>Forbidden</u>	<u>150 kg</u>
<u>UN 1950 Aerosols, non-flammable</u>	<u>75 kg</u>	<u>150 kg</u>
<u>UN 1950 Aerosols, non-flammable (tear gas devices)</u>	<u>Forbidden</u>	<u>50 kg</u>

DGP-WG/14 Report (see paragraph 3.2.4.1 of DGP-WG/14-WP/32) and DGP-WG/15-WP/14 (see paragraph 3.2.4.1.1 b) of this report)

**ADDITIONAL PACKING REQUIREMENTS**

- Packagings must meet Packing Group II performance requirements.
- Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents during normal conditions of air transport.
- **Receptacles must be tightly packed, so as to prevent excessive movement and inadvertent discharge during normal conditions of transport.**

DGP-WG/14 Report (see paragraph 3.2.4.1 of DGP-WG/14-WP/32):

**UN 1950 Aerosols, non-flammable (tear gas devices) – Cargo Aircraft Only**

- Only metal receptacles, IP.7, IP.7A, IP.7B are permitted. The aerosols must be individually placed into spiral wound tubes fitted with metal ends or a double-faced fibreboard box with suitable padding before being packed into the outer packaging.

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

*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)

## Packing Instruction Y203

Passenger and cargo aircraft for UN 1950 and 2037 only

The requirements of 3.4 must be met.

For the purposes of this packing instruction, a receptacle is considered to be an inner packaging.

*Note.— “Receptacle” has the same meaning as set out in 1.3. Any reference in this packing instruction to receptacle will include “aerosols” of UN 1950 and “receptacles, small, containing gas” and “gas cartridges” of UN 2037.*

### **Metal aerosols (IP.7, IP.7A, IP.7B) and non-refillable receptacles containing gas (gas cartridges)**

Non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) containing toxic substances must not exceed 120 mL capacity.

All other non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) must not exceed 1 000 mL capacity.

The following conditions must be met:

- a) the pressure in the receptacle must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;
- b) if the pressure in the receptacle exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;
- c) if the pressure in the receptacle exceeds 1 105 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;
- d) if the pressure in the receptacle exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;
- e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule for an aerosol. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into the outer metal receptacle;
- f) the liquid content must not completely fill the closed receptacle at 55°C;
- g) each receptacle exceeding 120 mL capacity must have been heated until the pressure in the receptacle is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect.

### **Plastic aerosols (IP.7C)**

Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of ~~the Technical~~ these Instructions, in which case the quantity must not exceed 500 mL.

The following conditions must be met:

- a) the contents must not completely fill the closed receptacle at 55°C;
- b) the pressure in the receptacle may not exceed 970 kPa at 55°C; and
- c) each receptacle must be leak tested in accordance with the provisions of 6.3.2.8.1.6.

### **Non-flammable aerosols containing medical preparations or biological products**

Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:

- a) the pressure in the aerosol must not exceed 970 kPa at 55°C;
- b) the liquid contents must not completely fill the closed receptacle at 55°C;
- c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;
- d) the valves must be protected by a cap or other suitable means during transport.

UN Model Regulations, packing instruction P207, ST/SG/AC.10/42/Add.1

The words “and inadvertent discharge during normal conditions of transport” is included in the 18th revised edition of the UN Model Regulations. DGP-WG/15 is invited to consider whether these words should be included in the Technical Instructions along with the word “excessive” introduced through ST/SG/AC.10/42/Add.1.

#### ADDITIONAL PACKING REQUIREMENTS

- Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents during normal conditions of air transport.
- [Receptacles must be tightly packed, so as to prevent excessive movement and inadvertent discharge during normal conditions of transport.]

#### OUTER PACKAGINGS (see 6;3.1)

##### Boxes

Aluminium  
Fibreboard  
Natural wood  
Other metal  
Plastics  
Plywood  
Reconstituted wood  
Steel

##### Drums

Aluminium  
Fibre  
Other metal  
Plastics  
Plywood  
Steel

### Packing Instruction 204

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

~~Aerosols, non-flammable, containing biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:~~

- ~~— a) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~
- ~~— b) the liquid contents must not completely fill the closed receptacle at 55°C;~~
- ~~— c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;~~
- ~~— d) the valves must be protected by a cap or other suitable means during transport;~~
- ~~— e) aerosols must be tightly packed, so as to prevent movement, in wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or plastic boxes (4H1, 4H2) of Packing Group II.~~

### Packing Instruction Y204

The requirements of 3;4 must be met.

Single packagings are not permitted.

#### COMBINATION PACKAGINGS:

**INNER:**

~~Aerosols, non flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:~~

- ~~— a) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~
- ~~— b) the liquid contents must not completely fill the closed receptacle at 55°C;~~
- ~~— c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;~~
- ~~— d) the valves must be protected by a cap or other suitable means during transport;~~
- ~~— e) aerosols must be tightly packed, so as to prevent movement, in one of the following boxes:~~

**OUTER:****Boxes**

- ~~— Fibreboard~~
- ~~— Plastics~~
- ~~— Plywood~~
- ~~— Reconstituted wood~~
- ~~— Wooden~~

...

**Packing Instruction 212**

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

~~Aerosols, non flammable, which are tear gas devices are permitted in inner non-refillable metal receptacles not exceeding 1 000 mL capacity each providing all the following conditions are met:~~

- ~~— a) the pressure in the aerosol must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;~~
- ~~— b) if the pressure in the aerosol does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;~~
- ~~— c) if the pressure in the aerosol exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;~~
- ~~— d) if the pressure in the aerosol exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;~~
- ~~— e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into an aerosol;~~
- ~~— f) the liquid content must not completely fill the closed receptacle at 55°C;~~
- ~~— g) each aerosol must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;~~
- ~~— h) the valves must be protected by a cap or other suitable means during transport;~~

- ~~i) aerosols must be individually placed into spiral wound tubes fitted with metal ends or a double faced fibreboard box with suitable padding, which must be tightly packed in wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or plastic boxes (4H1, 4H2) of Packing Group II. Maximum net quantity per package is 50 kg.~~

...

---

UN Model Regulations, packing instruction P205, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

### Packing Instruction 214

Cargo aircraft only for UN 3468 only

This Instruction applies to storage systems containing hydrogen absorbed in a metal hydride (UN 3468) individually or when contained in equipment and apparatus when transported on cargo aircraft.

- 1) For metal hydride storage systems, the general packing requirements of 4;4.1 must be met.
- 2) Only cylinders not exceeding 150 L in water capacity and having a maximum developed pressure not exceeding 25 MPa are covered by this packing instruction.
- 3) Metal hydride storage systems meeting the applicable requirements of 6;5 for the construction and testing of cylinders containing gas may be used for the transport of hydrogen only.
- 4) When steel cylinders or composite cylinders with steel liners are used, only those bearing the "H" mark, in accordance with 6;5.2.9.2 j) are permitted.
- 5) Metal hydride storage systems must meet the service conditions, design criteria, rated capacity, type tests, batch tests, routine tests, test pressure, rated charging pressure and provisions for pressure relief devices for transportable metal hydride storage systems specified in ISO 16111:2008, and their conformity and approval must be assessed in accordance with 6;5.2.5.
- 6) Metal hydride storage systems must be filled with hydrogen at a pressure not exceeding the rated charging pressure shown in the permanent ~~markings~~ mark on the system as specified in ISO 16111:2008.
- 7) The periodic test requirements for a metal hydride storage system must be in accordance with ISO 16111:2008 and carried out in accordance with 6;5.2.6, and the interval between periodic inspections must not exceed five years.
- 8) Storage systems with a water capacity of less than 1 L must be packaged in rigid outer packagings constructed of suitable material of adequate strength and design in relation to the packaging capacity and its intended use. They must be adequately secured or cushioned so as to prevent damage during normal conditions of transport.
- 9) Maximum net quantity per package for cargo aircraft is 100 kg of metal hydride storage systems, including when such storage systems are packed with equipment or contained in equipment.

...

UN Model Regulations, packing instruction P206, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

## Packing Instruction 218

Passenger and cargo aircraft for UN 3500, 3501, 3502, 3503, 3504 and 3505 only

### General requirements

The general requirements of 4;4.1 applicable to cylinders must be met. Cylinders, constructed as specified in 6;5 are authorized for the transport of UN 3500, UN 3501, UN 3502, UN 3503, UN 3504 and UN 3505. Cylinders other than UN marked and certified cylinders may be used if the design, construction, testing, approval and ~~markings~~ marks conform to the requirements of the appropriate national authority of the State in which they are approved and filled. The substances contained must be permitted in cylinders and permitted for air transport according to these Instructions. Cylinders for which prescribed periodic tests have become due must not be charged and offered for transport until such retests have been successfully completed.

### Compatibility requirements

- 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.
- The necessary steps must be taken to prevent dangerous reactions (i.e. polymerization or decomposition) during transport. If necessary, stabilization or addition of an inhibitor may be required.

### Periodic inspection

- The maximum test period for periodic inspection of the cylinders must be 5 years.

### ADDITIONAL PACKING REQUIREMENTS

- Cylinders must be so filled that at 50°C the non-gaseous phase does not exceed 95% of their water capacity and they are not completely filled at 60°C. When filled, the internal pressure at 65°C must not exceed the test pressure of the cylinders. The vapour pressures and volumetric expansion of all substances in the cylinders must be taken into account.
- Spray application equipment (such as a hose and wand assembly) must not be connected during transport.
- The minimum test pressure must be in accordance with Packing Instruction 200 for the propellant but must not be less than 20 bar.
- Non-refillable cylinders used may have a water capacity in litres not exceeding 1 000 litres divided by the test pressure expressed in bars provided capacity and pressure restrictions of the construction standard comply with ISO 11118:1999, which limits the maximum capacity to 50 litres.

— For liquids charged with a compressed gas both components — the liquid phase and the compressed gas — have to be taken into consideration in the calculation of the internal pressure in the cylinder. When experimental data is not available, the following steps must be carried out:

- a) Calculation of the vapour pressure of the liquid component and of the partial pressure of the compressed gas at 15°C (filling temperature);
  - b) Calculation of the volumetric expansion of the liquid phase resulting from the heating from 15°C to 65°C and calculation of the remaining volume for the gaseous phase;
  - c) Calculation of the partial pressure of the compressed gas at 65°C considering the volumetric expansion of the liquid phase;
- Note.— The compressibility factor of the compressed gas at 15°C and 65°C must be considered.
- d) Calculation of the vapour pressure of the liquid component at 65°C;
  - e) The total pressure is the sum of the vapour pressure of the liquid component and the partial pressure of the compressed gas at 65°C;
  - f) Consideration of the solubility of the compressed gas at 65°C in the liquid phase.

The test pressure of the cylinders or pressure drums must not be less than the calculated total pressure minus 100 kPa (1 bar).

If the solubility of the compressed gas in the liquid component is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph f) into account.

**OUTER PACKAGINGS**

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

---

UN Model Regulations, packing instruction P208, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 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:
  - a) Cylinders constructed as specified in 6;5.2 and in accordance with ISO 11513:2011 or ISO 9809-1:2010; and
  - b) Cylinders constructed before 1 January 2016 in accordance with 6;5.3 and a specification approved by the appropriate national authorities of the countries of transport and use.
- 2) The pressure of each filled cylinder must be less than 101.3 kPa at 20°C and less than 300 kPa at 50°C.
- 3) The minimum test pressure of the cylinder is 21 bar.
- 4) The minimum burst pressure of the cylinder is 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 material 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) The filling procedure must be in accordance with Annex A of ISO 11513:2011.
- 10) The maximum period for periodic inspections is five years.
- 11) 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.

UN Model Regulations, packing instruction P005, ST/SG/AC.10/42/Add.1, DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 d) of this report) and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

### Packing Instruction ~~951~~ **220**

Cargo aircraft only for UN ~~3166~~ **3529** only

(See Packing Instruction ~~950-378~~ for flammable liquid-powered ~~vehicles~~ and engines or machinery, Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles, or Packing Instruction 952 for battery-powered equipment and vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

#### General requirements

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

#### Compatibility requirements

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

<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>
UN <del>3166</del> <b>3529</b> <u>Engines, internal combustion, flammable gas powered, Machinery, internal combustion, flammable gas powered</u> or <u>Vehicle, flammable gas powered</u> or <u>Vehicle, fuel cell, flammable gas powered</u> , or <u>Engine, fuel cell, flammable gas powered</u> <u>or Machinery, fuel cell, flammable gas powered</u>	Forbidden	No limit

#### ADDITIONAL PACKING REQUIREMENTS

##### *Flammable gas vessels*

- 1) for flammable gas-powered ~~vehicles~~, machines or equipment, pressurized vessels containing the flammable gas must be completely emptied of flammable gas. Lines from vessels to gas regulators, and gas regulators themselves, must also be drained of all trace of flammable gas. To ensure that these conditions are met, gas shut-off valves must be left open and connections of lines to gas regulators must be left disconnected upon delivery of the ~~vehicle~~ engine or machinery to the operator. Shut-off valves must be closed and lines reconnected at gas regulators before loading ~~the vehicle~~ aboard the aircraft;

or alternatively,

- 2) flammable gas-powered ~~vehicles~~, machines or equipment that have pressure receptacles (fuel tanks) equipped with electrically operated valves that close automatically in case the power is disconnected, or with manual shut-off valves, may be transported under the following conditions:
  - i) the tank shut-off valves must be in the closed position and in the case of electrically operated valves, power to those valves must be disconnected;
  - ii) after closing the tank shut-off valves, the ~~vehicle~~, equipment or machinery must be operated until it stops from lack of fuel before being loaded aboard the aircraft;
  - iii) in no part of the closed system must the remaining pressure of compressed gases exceed 5 per cent of the maximum allowable working pressure of the pressure receptacle (fuel tank) system, or more than 2 000 kPa (20 bar), whichever is the lower.

##### *Batteries*

All batteries must be installed and securely fastened in the battery holder of the ~~vehicle~~, 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 meet the provisions of Part 2;9.3, 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.

**Other operational equipment**

- 1) Dangerous goods required for the operation or safety of the ~~vehicle~~, machine or equipment, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the ~~vehicle~~, machine or equipment. ~~Aircraft may also contain other articles and substances which would otherwise be classified as dangerous goods but which are installed in that aircraft in accordance with the pertinent airworthiness requirements and operating regulations. If fitted, life rafts, emergency escape slides and other inflation devices must be protected such that they cannot be activated accidentally. Vehicles containing dangerous goods identified in Table 3-1 as forbidden on passenger aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.~~
- 2) ~~Vehicles equipped with theft protection devices, installed radio communications equipment or navigational systems must have such devices, equipment or systems disabled.~~

**Internal combustion or fuel cell engine shipped separately (not installed)**

- 1) When internal combustion engines or fuel cell engines are being shipped separately, all fuel, coolant or hydraulic systems remaining in or on the engine must be drained as far as practicable and all disconnected fluid pipes must be sealed with leakproof caps, which are positively retained.
- 2) This requirement also applies to ~~vehicles~~, machines or equipment containing internal combustion engines or fuel cell engines which are being shipped in a dismantled state such that fuel lines have been disconnected.

...

## Chapter 5

## CLASS 3 — FLAMMABLE LIQUIDS

...

Packing Instruction ~~950~~ **378**Passenger and cargo aircraft for UN ~~3466~~ **3528** only

(See Packing Instruction ~~951~~ **200** for flammable gas-powered ~~vehicles and engines~~ or machinery, Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles, or Packing Instruction 952 for battery-powered equipment and vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

**General requirements**

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

**Compatibility requirements**

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

<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>
UN 3166 <del>Engines, internal combustion, flammable liquid powered or Machinery, internal combustion, flammable liquid powered</del> <b>Vehicle, flammable liquid powered or Vehicle, fuel cell, flammable liquid powered or Engine, fuel cell, flammable powered or Machinery, fuel cell, flammable liquid powered</b>	No limit	No limit

**ADDITIONAL PACKING REQUIREMENTS***Flammable liquid fuel tanks*

Except as otherwise provided for in this packing instruction, fuel tanks must be drained of fuel and tank caps fitted securely. Special precautions are necessary to ensure complete drainage of the fuel system of ~~vehicles~~, machines or equipment incorporating internal combustion engines, such as lawn mowers and outboard motors, where such machines or equipment could possibly be handled in other than an upright position. ~~When it is not possible to handle in other than an upright position, vehicles, except those with diesel engines, must be drained of fuel as far as practicable, and if any fuel remains, it must not exceed one quarter of the tank capacity.~~

*Diesel engines*

~~Vehicles equipped with diesel engines are excepted from the requirement to drain the fuel tanks, provided that a sufficient ullage space has been left inside the tank to allow fuel expansion without leakage, and the tank caps are tightly closed. A careful check must be made to ensure there are no fuel leakages.~~

*Batteries*

All batteries must be installed and securely fastened in the battery holder of the ~~vehicle~~, 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 meet the provisions of Part 2;9.3, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the ~~vehicle~~, machine or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
- 3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

**Other operational equipment**

- 1) Dangerous goods required for the operation or safety of the ~~vehicle~~, machine or equipment, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the ~~vehicle~~, machine or equipment. ~~Aircraft may also contain other articles and substances which would otherwise be classified as dangerous goods but which are installed in that aircraft in accordance with the pertinent airworthiness requirements and operating regulations. If fitted, life rafts, emergency escape slides and other inflation devices must be protected such that they cannot be activated accidentally. Vehicles containing dangerous goods identified in Table 3-1 as forbidden on passenger aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.~~
- 2) ~~Vehicles equipped with theft protection devices, installed radio communications equipment or navigational systems must have such devices, equipment or systems disabled.~~

**Internal combustion or fuel cell engine shipped separately (not installed)**

- 1) When internal combustion engines or fuel cell engines are being shipped separately, all fuel, coolant or hydraulic systems remaining in or on the engine must be drained as far as practicable and all disconnected fluid pipes must be sealed with leakproof caps, which are positively retained.
- 2) This requirement also applies to vehicles, ~~machines or equipment~~ containing internal combustion engines or fuel cell engines which are being shipped in a dismantled state such that fuel lines have been disconnected.

**Chapter 6**

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

...

UN Model Regulations, packing instruction P412 , ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report)

### Packing Instruction 450

Passenger and cargo aircraft for UN 3527 (Packing Group II or III) only

#### General requirements

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

#### 1) Compatibility requirements

- Substances must be compatible with their packagings as required by 4;1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion for substances with a Class 8 subsidiary risk.

#### 2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

<b><u>COMBINATION PACKAGINGS</u></b>						<b><u>SINGLE PACKAGINGS</u></b>
<u>Packing conditions</u>	<u>Inner packaging (see 6;3.2)</u>	<u>Inner packaging quantity (per receptacle) — for base liquid material</u>	<u>Inner packaging quantity (per receptacle) — for liquid activator</u>	<u>Inner packaging quantity (per receptacle) — for solid activator</u>	<u>Total quantity per package</u>	
<u>Activator (Organic peroxide)</u>	<u>Plastics*</u>	<u>n/a</u>	<u>125 mL</u>	<u>500 g</u>	<u>5 kg</u>	<u>No</u>
	<u>Metal*</u>	<u>n/a</u>	<u>125 mL</u>	<u>500 g</u>		
<u>Base material Class 3 Packing Group II</u>	<u>Glass</u>	<u>1.0 L</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Plastics</u>	<u>5.0 L</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Metal</u>	<u>5.0 L</u>	<u>n/a</u>	<u>n/a</u>		
<u>Activator (Organic peroxide)</u>	<u>Plastics*</u>	<u>n/a</u>	<u>125 mL</u>	<u>500 g</u>		
	<u>Metal*</u>	<u>n/a</u>	<u>125 mL</u>	<u>500 g</u>		
<u>Base material Class 3 Packing Group III</u>	<u>Glass</u>	<u>2.5 L</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Plastics</u>	<u>10.0 L</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Metal</u>	<u>10.0 L</u>	<u>n/a</u>	<u>n/a</u>		

\*Including tubes.

The total quantity of kits per package is to be calculated on a one-to-one basis of their volume, i.e. 1 L equal to 1 kg.

#### **ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS**

The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of leakage (see 4;1.1.7).

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

<u>Boxes</u>	<u>Drums</u>	<u>Jerricans</u>
<u>Aluminium (4B)</u>	<u>Aluminium (1B1, 1B2)</u>	<u>Aluminium (3B1, 3B2)</u>
<u>Fibreboard (4G)</u>	<u>Fibre (1G)</u>	<u>Plastics (3H1, 3H2)</u>
<u>Natural wood (4C1, 4C2)</u>	<u>Other metal (1N1, 1N2)</u>	<u>Steel (3A1, 3A2)</u>
<u>Other metal (4N)</u>	<u>Plastics (1H1, 1H2)</u>	
<u>Plastics (4H1, 4H2)</u>	<u>Steel (1A1, 1A2)</u>	
<u>Plywood (4D)</u>		
<u>Reconstituted wood (4F)</u>		
<u>Steel (4A)</u>		

**Packing Instruction Y450**

Limited quantities

Passenger and cargo aircraft for UN 3527 (Packing Group II or III) only

**General requirements**

Part 4, Chapter 1 requirements must be met (except that 4:1.1.2, 1.1.9 c), 1.1.9 e), 1.1.16, 1.1.18 and 1.1.20 do not apply), including:

**1) Compatibility requirements**

- Substances must be compatible with their packagings as required by 4:1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion for substances with a Class 8 subsidiary risk.

**2) Closure requirements**

- Closures must meet the requirements of 4:1.1.4.

**3) Limited quantity requirements**

- Part 3, Chapter 4 requirements must be met, including:
  - the capability of the package to pass a 1.2 m drop test;
  - a 24-hour stacking test; and
  - inner packagings for liquids must be capable of passing a pressure differential test (4:1.1.6).

<b>COMBINATION PACKAGINGS</b>							<b>SINGLE PACKAGINGS</b>
<u>Packing conditions</u>	<u>Inner packaging (see 6:3.2)</u>	<u>Inner packaging quantity (per receptacle) — for base liquid material</u>	<u>Inner packaging quantity (per receptacle) — for liquid activator</u>	<u>Inner packaging quantity (per receptacle) — for solid activator</u>	<u>Total quantity per package</u>	<u>Total gross mass per package</u>	
<u>Activator (Organic peroxide)</u>	<u>Plastics*</u>	<u>n/a</u>	<u>30 mL</u>	<u>100 g</u>	<u>1 kg</u>	<u>30 kg</u>	<u>No</u>
	<u>Metal*</u>	<u>n/a</u>	<u>30 mL</u>	<u>100 g</u>			
<u>Base material Class 3 Packing Group II</u>	<u>Glass</u>	<u>1.0 L</u>	<u>n/a</u>	<u>n/a</u>			
	<u>Plastics</u>	<u>1.0 L</u>	<u>n/a</u>	<u>n/a</u>			
	<u>Metal</u>	<u>1.0 L</u>	<u>n/a</u>	<u>n/a</u>			
<u>Activator (Organic peroxide)</u>	<u>Plastics*</u>	<u>n/a</u>	<u>30 mL</u>	<u>100 g</u>			
	<u>Metal*</u>	<u>n/a</u>	<u>30 mL</u>	<u>100 g</u>			
<u>Base material Class 3 Packing Group III</u>	<u>Glass</u>	<u>2.5 L</u>	<u>n/a</u>	<u>n/a</u>			
	<u>Plastics</u>	<u>5.0 L</u>	<u>n/a</u>	<u>n/a</u>			
	<u>Metal</u>	<u>5.0 L</u>	<u>n/a</u>	<u>n/a</u>			

\*Including tubes.

The total quantity of kits per package is to be calculated on a one-to-one basis of their volume, i.e. 1 L equal to 1 kg.

**ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS**

The components may be placed in the same outer packaging provided that they will not interact dangerously in the event of leakage (see 4:1.1.7).

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

Boxes

Aluminium  
Fibreboard  
Natural wood  
Other metal  
Plastics  
Plywood  
Reconstituted wood  
Steel

Drums

Aluminium  
Fibre  
Other metal  
Plastics  
Steel

Jerricans

Aluminium  
Plastics  
Steel

**Packing Instruction 451**

Passenger and cargo aircraft — wetted explosives (Packing Group I)

...

**ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS**

- Packagings must be designed and constructed to prevent the loss of water or alcohol content or the content of the phlegmatizer.
- Packagings must be so constructed and closed so as to avoid an explosive over pressure or pressure build-up of more than 300 kPa (3 bar).
- The type of packaging and maximum permitted quantity per packaging are limited by the provisions of Part 2;1.5.2 and may be less than the limits shown above.
- Plastic or glass inner packagings must be packed in tightly closed metal or rigid plastic receptacles before packing in outer packagings. Inner packagings must be packed with absorbent material in sufficient quantity to absorb the contents in the event of leakage.

UN Model Regulations, P406, PP48, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1.1 c) of this report)

For UN 3474

Metal packagings must not be used. Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6:3, are not considered metal packagings.

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

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 (1H1, 1H2)  
Plywood (1D)  
Steel (1A2)

Jerricans

Aluminium (3B2)  
Other metal (3N2)  
Plastics (3H1, 3H2)  
Steel (3A2)

...

## Chapter 7

### CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

...

#### Packing Instructions 553 – 555

Cargo aircraft only

##### General requirements

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

##### 1) Compatibility requirements

- Substances must be compatible with their packagings as required by 4;1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion for substances with a Class 8 subsidiary risk.

##### 2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS					SINGLE PACKAGINGS
Packing instruction	Packing Group	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle)	Total quantity per package	
553	I	Glass	1.0 L	2.5 L	No
		Plastics	1.0 L		
		Metal	1.0 L		
554	II	Glass	2.5 L	5 L	No
		Plastics	2.5 L		
		Metal	2.5 L		
555	III	Glass	5.0 L	30 L	30 L
		Plastics	5.0 L		
		Metal	5.0 L		

UN Model Regulations, P502, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

##### ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

###### Packing Group I

- UN 1873 ~~only glass inner packagings are permitted.~~ parts of packagings which are in direct contact with perchloric acid must be constructed of glass or plastics.
- Inner packagings must be packed with sufficient absorbent material to absorb the entire contents of the inner packagings and placed in a rigid leakproof receptacle before packing in outer packagings.

###### Packing Group III

- Packagings must meet the Packing Group II performance requirements.

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

Aluminium (4B)  
 Fibreboard (4G)  
 Natural wood (4C1, 4C2)  
 Other metal (4N)  
 Plastics (4H1, 4H2)  
 Plywood (4D)  
 Reconstituted wood (4F)  
 Steel (4A)

*Drums*

Aluminium (1B1, 1B2)  
 Fibre (1G)  
 Other metal (1N1, 1N2)  
 Plastics (1H1, 1H2)  
 Steel (1A1, 1A2)

**ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS***Packing Group III*

— Packagings must meet the Packing Group II performance requirements.

**SINGLE PACKAGINGS FOR PACKING GROUP III (PI 555)***Composites*

All (see 6;3.1.18)

*Drums*

Aluminium (1B1)  
 Other metal (1N1)  
 Plastics (1H1)  
 Steel (1A1)

*Jerricans*

Aluminium (3B1)  
 Plastics (3H1)  
 Steel (3A1)

...

## Chapter 8

### CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

UN Model Regulations, P603, ST/SG/AC.10/42/Add.1, DGP-WG/15-WP/12 (see paragraph 3.2.2.1.2 of this report) and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

Move Packing Instruction 877 from Chapter 10 and renumber it 603

+

#### Packing Instruction ~~877~~603

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.

##### 2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

<i>UN number and name</i>	<i>Quantity per package — passenger</i>	<i>Quantity per package — cargo</i>
UN 3507 <b>Uranium hexafluoride, radioactive material, excepted package, non-fissile or fissile-excepted</b>	Less than 0.1 kg	Less than 0.1 kg

##### 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)

...

### Packing Instruction 620

...

#### Special packing provisions

- a) Shippers of infectious substances must ensure that packages are prepared in such a manner that they arrive at their destination in good condition and present no hazard to persons or animals during transport.
- b) The definition in 1;3, and the general packing requirements of 4;1, apply to infectious substances packages.
- c) An itemized list of contents must be enclosed between the secondary packaging and the outer packaging. When the infectious substances to be transported are unknown, but suspected of meeting the criteria for inclusion in Category A, the words "suspected Category A infectious substance" must be shown in parentheses following the proper shipping name on the itemized list of contents inside the outer packaging.
- d) Before an empty packaging is returned to the shipper, or sent elsewhere, it must be disinfected or sterilized to nullify any hazard, and any label or ~~marking~~ **mark** indicating that it had contained an infectious substance must be removed or obliterated.

---

UN Model Regulations, P650, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

---

### Packing Instruction 650

...

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

*Note.— When the shipper or consignee is also the "person responsible" as referred to in b), the name and address need be marked only once in order to satisfy the name and marking provisions in both a) and b).*
- 12) Clear instructions on filling and closing such packages must be provided to the shipper or to the person who prepares the package (e.g. patient) by packaging manufacturers and subsequent distributors to enable the package to be correctly prepared for transport.
- 13) Other dangerous goods must not be packed in the same packaging as Division 6.2 infectious substances unless they are necessary for maintaining the viability, stabilizing or preventing degradation or neutralizing the hazards of the infectious substances. A quantity of 30 ml or less of dangerous goods included in Class 3, 8 or 9 may be packed in each primary receptacle containing infectious substances provided these substances meet the requirements of 3;5. When these small quantities of dangerous goods are packed with infectious substances in accordance with this packing instruction no other requirements in these Instructions need be met.

**Additional requirements:**

- 1) Alternative packagings for the transport of animal material may be authorized by the competent authority in accordance with the provisions of 4;2.8.

...

## Chapter 11

## CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

...

UN Model Regulations, packing instruction P005, ST/SG/AC.10/42/Add.1, DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 d) of this report) and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

## Packing Instruction 950

Passenger and cargo aircraft for UN 3166 only

(See [Packing Instruction 220 for flammable gas-powered engines and machinery](#), [Packing Instruction 378 for flammable liquid-powered engines and machinery](#), [Packing Instruction 951 for flammable gas-powered vehicles and engines or](#), [Packing Instruction 952 for battery-powered equipment and vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels](#))

## General requirements

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

## Compatibility requirements

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

<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>
UN 3166 <del>Engines, internal combustion, flammable liquid powered or</del> <del>Vehicle, flammable liquid powered or Vehicle, fuel cell,</del> <del>flammable liquid powered or Engine, fuel cell, flammable</del> <del>powered</del>	No limit	No limit

## ADDITIONAL PACKING REQUIREMENTS

*Flammable liquid fuel tanks*

Except as otherwise provided for in this packing instruction, fuel tanks must be drained of fuel and tank caps fitted securely. Special precautions are necessary to ensure complete drainage of the fuel system of vehicles, ~~machines or equipment~~ incorporating internal combustion engines, such as lawn mowers and outboard motors, where such machines or equipment could possibly be handled in other than an upright position. When it is not possible to handle in other than an upright position, vehicles, except those with diesel engines, must be drained of fuel as far as practicable, and if any fuel remains, it must not exceed one-quarter of the tank capacity.

*Diesel engines*

Vehicles equipped with diesel engines are excepted from the requirement to drain the fuel tanks, provided that a sufficient ullage space has been left inside the tank to allow fuel expansion without leakage, and the tank caps are tightly closed. A careful check must be made to ensure there are no fuel leakages.

*Batteries*

All batteries must be installed and securely fastened in the battery holder of the vehicle, ~~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 meet the provisions of Part 2;9.3, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, ~~machine or equipment~~ and must be protected in such a manner so as to prevent damage and short circuits; and

- 3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

**Other operational equipment**

- 1) Dangerous goods required for the operation or safety of the vehicle, ~~machine or equipment~~, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the vehicle, ~~machine or equipment~~. Aircraft may also contain other articles and substances which would otherwise be classified as dangerous goods but which are installed in that aircraft in accordance with the pertinent airworthiness requirements and operating regulations. If fitted, life-rafts, emergency escape slides and other inflation devices must be protected such that they cannot be activated accidentally. Vehicles containing dangerous goods identified in Table 3-1 as forbidden on passenger aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.
- 2) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational systems must have such devices, equipment or systems disabled.

**Internal combustion or fuel cell engine shipped separately (not installed)**

- 1) When internal combustion engines or fuel cell engines are being shipped separately, all fuel, coolant or hydraulic systems remaining in or on the engine must be drained as far as practicable and all disconnected fluid pipes must be sealed with leakproof caps, which are positively retained.
- 2) This requirement also applies to vehicles, ~~machines or equipment~~ containing internal combustion engines or fuel cell engines which are being shipped in a dismantled state such that fuel lines have been disconnected.

UN Model Regulations, packing instruction P005, ST/SG/AC.10/42/Add.1, DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 d) of this report) and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

### Packing Instruction 951

Cargo aircraft only for UN 3166 only

(See [Packing Instruction 220 for flammable gas-powered engines and machinery](#), [Packing Instruction 378 for flammable liquid-powered engines and machinery](#), [Packing Instruction 950 for flammable liquid-powered vehicles, and engines](#) or [Packing Instruction 952 for battery-powered equipment and vehicles](#) or [Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels](#))

#### General requirements

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

#### Compatibility requirements

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

<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>
UN 3166 <del>Engines, internal combustion, flammable gas powered or Vehicle, flammable gas powered or Vehicle, fuel cell, flammable gas powered, or Engine, fuel cell, flammable gas powered</del>	Forbidden	No limit

#### ADDITIONAL PACKING REQUIREMENTS

##### *Flammable gas vessels*

- 1) for flammable gas-powered vehicles, ~~machines or equipment~~, pressurized vessels containing the flammable gas must be completely emptied of flammable gas. Lines from vessels to gas regulators, and gas regulators themselves, must also be drained of all trace of flammable gas. To ensure that these conditions are met, gas shut-off valves must be left open and connections of lines to gas regulators must be left disconnected upon delivery of the vehicle to the operator. Shut-off valves must be closed and lines reconnected at gas regulators before loading the vehicle aboard the aircraft;

or alternatively,

- 2) flammable gas-powered vehicles, ~~machines or equipment~~ that have pressure receptacles (fuel tanks) equipped with electrically operated valves that close automatically in case the power is disconnected, or with manual shut-off valves, may be transported under the following conditions:
  - i) the tank shut-off valves must be in the closed position and in the case of electrically operated valves, power to those valves must be disconnected;
  - ii) after closing the tank shut-off valves, the vehicle, ~~equipment or machinery~~ must be operated until it stops from lack of fuel before being loaded aboard the aircraft;
  - iii) in no part of the closed system must the remaining pressure of compressed gases exceed 5 per cent of the maximum allowable working pressure of the pressure receptacle (fuel tank) system, or more than 2 000 kPa (20 bar), whichever is the lower.

##### *Batteries*

All batteries must be installed and securely fastened in the battery holder of the vehicle, ~~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 meet the provisions of Part 2;9.3, 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.

**Other operational equipment**

- 1) Dangerous goods required for the operation or safety of the vehicle, ~~machine or equipment~~, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the vehicle, machine or equipment. Aircraft may also contain other articles and substances which would otherwise be classified as dangerous goods but which are installed in that aircraft in accordance with the pertinent airworthiness requirements and operating regulations. If fitted, life-rafts, emergency escape slides and other inflation devices must be protected such that they cannot be activated accidentally. Vehicles containing dangerous goods identified in Table 3-1 as forbidden on passenger aircraft may only be transported on cargo aircraft. Replacements for the dangerous goods permitted must not be carried under this packing instruction.
- 2) Vehicles equipped with theft-protection devices, installed radio communications equipment or navigational systems must have such devices, equipment or systems disabled.

**Internal combustion or fuel cell engine shipped separately (not installed)**

- 1) When internal combustion engines or fuel cell engines are being shipped separately, all fuel, coolant or hydraulic systems remaining in or on the engine must be drained as far as practicable and all disconnected fluid pipes must be sealed with leakproof caps, which are positively retained.
- 2) This requirement also applies to vehicles, machines or equipment containing internal combustion engines or fuel cell engines which are being shipped in a dismantled state such that fuel lines have been disconnected.

...

---

DGP-WG/14 Report (see paragraph 3.2.7.2 of DGP-WG/14-WP/32) and DGP-WG/15-WP/31, Revision No. 2 (see paragraph 3.2.7.4 of this report)

---

**Packing Instruction 954**

Passenger and cargo aircraft for UN 1845 only

...

Dry ice ~~used for other than dangerous goods~~ may be shipped in a unit load device ~~or other type of pallet~~ prepared by a single shipper provided that:

- a) the shipper has made prior arrangements with the operator;
- b) the unit load device does not contain dangerous goods other than UN 3373, **Biological substance, Category B** or ID 8000, **Consumer commodity**. Where the unit load device contains UN 3373 or ID 8000, the provisions of these Instructions that apply to those substances must be met in addition to the provisions set out in this packing instruction;
- b) the unit load device, ~~or other type of pallet~~, must allow the venting of the carbon dioxide gas to prevent a dangerous build-up of pressure (the marking requirements of 5;2 and the labelling requirements of 5;3 do not apply to the unit load device); and
- c) the shipper must provide the operator with written documentation or, where agreed with the operator, information by EDP or EDI techniques, stating the total quantity of the dry ice contained in the unit load device ~~or other type of pallet~~.

...

## Packing Instruction 956

Passenger and cargo aircraft for UN 1841, UN 1931, UN 3432, UN 2969, UN 3077, UN 3152 and UN 3335 only

...

UN Model Regulations, P906, ST/SG/AC.10/42/Add. and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

UN number and proper shipping name	COMBINATION PACKAGINGS				SINGLE PACKAGINGS	
	Inner packaging (see 6.3.2)	Inner packaging quantity (per receptacle)	Total quantity per package — passenger	Total quantity per package — cargo	Quantity — passenger	Quantity — cargo
UN 1841 <b>Acetaldehyde ammonia</b>	Glass	10.0 kg	200 kg	200 kg	200 kg	200 kg
	Fibre	50.0 kg				
	Metal	50.0 kg				
	Paper bag	50.0 kg				
	Plastics	50.0 kg				
	Plastic bag	50.0 kg				
UN 1931 <b>Zinc dithionite or Zinc hydrosulphite</b>	Glass	10.0 kg	100 kg	200 kg	100 kg	200 kg
	Fibre	50.0 kg				
	Metal	50.0 kg				
	Paper bag	50.0 kg				
	Plastics	50.0 kg				
	Plastic bag	50.0 kg				
UN 2969 <b>Castor beans or Castor flake or Castor meal or Castor pomace</b>	Glass	10.0 kg	No limit	No limit	No Limit	No Limit
	Fibre	50.0 kg				
	Metal	50.0 kg				
	Paper bag	50.0 kg				
	Plastics	50.0 kg				
	Plastic bag	50.0 kg				
UN 3077 <b>Environmentally hazardous substance, solid, n.o.s.</b>	Glass	10.0 kg	400 kg	400 kg	400 kg	400 kg
	Fibre	50.0 kg				
	Metal	50.0 kg				
	Paper bag	50.0 kg				
	Plastics	50.0 kg				
	Plastic bag	50.0 kg				
UN 3152 <b>Polyhalogenated biphenyls, solids or Polyhalogenated terphenyls, solids or Halogenated monomethyl-diphenylmethanes, solids</b>	Glass	10.0 kg	100 kg	200 kg	100 kg	200 kg
	Fibre	50.0 kg				
	Metal	50.0 kg				
	Paper bag	50.0 kg				
	Plastics	50.0 kg				
	Plastic bag	50.0 kg				
UN 3335 <b>Aviation regulated solid, n.o.s.</b>	Glass	10.0 kg	400 kg	400 kg	400 kg	400 kg
	Fibre	50.0 kg				
	Metal	50.0 kg				
	Paper bag	50.0 kg				
	Plastics	50.0 kg				
	Plastic bag	50.0 kg				
UN 3432 <b>Polychlorinated biphenyls, solid</b>	Glass	10.0 kg	100 kg	200 kg	100 kg	200 kg
	Fibre	50.0 kg				
	Metal	50.0 kg				
	Paper bag	50.0 kg				
	Plastics	50.0 kg				
	Plastic bag	50.0 kg				

...

## Packing Instruction 959

Passenger and cargo aircraft for UN 3245 only

### General requirements

Part 4, Chapters 1 and 2 requirements must be met, including:

#### 1) Compatibility requirements

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

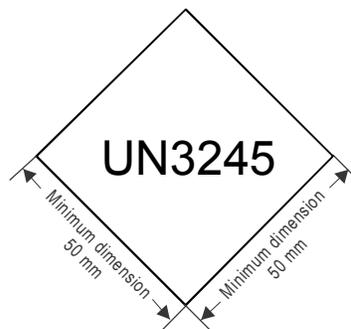
#### 2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

The following packagings are authorized:

- 1) Packagings meeting the provisions of 4;1.1.1, 4;1.1.3.1, 4;1.1.5 and 4;2 and so designed that they meet the construction requirements of 6;3. Outer packagings constructed of suitable material of adequate strength and designed in relation to the packaging capacity and its intended use must be used. Where this packing instruction is used for the transport of inner packagings of combination packagings, the packaging must be designed and constructed to prevent inadvertent discharge during normal conditions of transport.
- 2) Packagings, which need not conform to the packaging test requirements of Part 6, but conforming to the following:
  - a) an inner packaging comprising:
    - 1) primary receptacle(s) and a secondary packaging, the primary receptacle(s) or the secondary packaging must be leakproof for liquids or siftproof for solids;
    - 2) for liquids, absorbent material placed between the primary receptacle(s) and the secondary packaging. The absorbent material must be in a quantity sufficient to absorb the entire contents of the primary receptacle(s) so that any release of the liquid substance will not compromise the integrity of the cushioning material or of the outer packaging;
    - 3) if multiple fragile primary receptacles are placed in a single secondary packaging they must be individually wrapped or separated to prevent contact between them;
  - b) an outer packaging must be strong enough for its capacity, mass and intended use, and with a smallest external dimension of at least 100 mm.

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.



When packages are placed in an overpack, the package ~~markings~~ marks required by this packing instruction must either clearly be visible or the ~~markings~~ marks must be reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack".

≠

GMOs or GMMOs assigned to UN 3245 which are packed and marked in accordance with this packing instruction are not subject to any other requirement in these Instructions except for the following:

- 1) the name and address of the shipper and of the consignee must be provided on each package;
- 2) classification must be in accordance with 2;9.2.1 c);
- 3) the incident reporting requirements in 7;4.4 must be met;
- 4) the inspection for damage or leakage requirements in 7;3.1.3 and 7;3.1.4;
- 5) passengers and crew members are prohibited from transporting UN 3245 either as, or in, carry-on baggage or checked baggage or on their person.

#### ADDITIONAL PACKING REQUIREMENTS

- When dry ice or liquid nitrogen is used, all applicable requirements of these Instructions must be met. When used, ice or dry ice must be placed outside the secondary packagings or in the outer packaging or an overpack. Interior supports must be provided to secure the secondary packagings in the original position after the ice or dry ice has dissipated. If ice is used, the outside packaging or overpack must be leakproof. If dry ice is used, the requirements in Packing Instruction 954 must be met.
- The primary receptacle and the secondary packaging must maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.

...

### Packing Instruction 964

Passenger and cargo aircraft for UN 1941, UN 1990, UN 2315, UN 3151, UN 3082 and UN 3334 only

...

UN Model Regulations, P906, ST/SG/AC.10/42/Add. and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

COMBINATION PACKAGINGS					SINGLE PACKAGINGS	
<i>UN number and proper shipping name</i>	<i>Inner packaging (see 6;3.2)</i>	<i>Inner packaging quantity (per receptacle)</i>	<i>Total quantity per package — passenger</i>	<i>Total quantity per package — cargo</i>	<i>Passenger</i>	<i>Cargo</i>
UN 1941 <b>Dibromodifluoromethane</b>	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 1990 <b>Benzaldehyde</b>	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 2315 <b>Polychlorinated biphenyls, liquid</b>	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 3082 <b>Environmentally hazardous substance, liquid, n.o.s.</b>	Glass	10.0 L	450 L	450 L	450 L	450 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 3151 <b>Polyhalogenated biphenyls, liquids</b> or <b>Polyhalogenated terphenyls, liquids</b> or <b>Halogenated monomethyldiphenylmethanes, liquids</b>	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 3334 <b>Aviation regulated liquid, n.o.s.</b>	Glass	10.0 L	450 L	450 L	450 L	450 L
	Plastics	30.0 L				
	Metal	40.0 L				

...

### 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.

...

- k) Consumer commodities shipped according to these provisions may be shipped in a unit load device ~~or other type of pallet~~ prepared by a single shipper provided they contain no other dangerous goods. The shipper must provide the operator with written documentation stating the number of packages of consumer commodities contained in each unit load device ~~or other type of pallet~~.

...

...

## Packing Instruction 965

Passenger and cargo aircraft for UN 3480

---

UN Model Regulations, SP 188, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.4.1.1 d) of this report)

---

### 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.

[A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN Manual of Tests and Criteria is considered a "cell" and must be transported according to the requirements for "cells" for the purpose of this packing instruction.](#)

### 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

Each cell or battery must meet all the provisions of 2;9.3.

##### 1A.1 General requirements

Part 4;1 requirements must be met.

**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.

**Packing Instruction 965**

**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**

Quantities of lithium ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II 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 the provisions of Part 6.

Lithium ion cells or batteries shipped in accordance with the provisions of Section IB must be described on a dangerous goods transport document as set in Part 5;4. The packing instruction number "965" required by 5;4.1.5.8.1 a) must be supplemented with "IB". All other applicable provisions of Part 5;4 apply.

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 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;

**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).

**Table 965-IB**

<i>Contents</i>	<i>Net quantity per package</i>	
	<i>Passenger</i>	<i>Cargo</i>
Lithium ion cells and batteries	10 kg	10 kg

## Packing Instruction 965

### 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.

---

UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 (see paragraphs and 3.2.5.1.1 b) and c) of this report)

---

- Each package must be ~~labelled~~ **marked** with ~~a~~ **the appropriate** lithium battery ~~handling label~~ **mark** (Figure ~~5-32~~ **5-3**) in addition to the Class 9 hazard label.

*Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.*

---

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1.1 of this report)

---

- ~~— 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.~~

*~~Note.— This information may be provided on the dangerous goods transport document.~~*

### IB.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

## Packing Instruction 965

DGP-WG/15-WP/5 (see paragraph 3.5.1.4.1 of this report) and DGP-WG/15-WP/7 (see paragraph 3.5.1.1.1 of this report)

### II. SECTION II

~~With the exception of Part 1;2.3 (General — Transport of dangerous goods by post), 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents), 8;1.1 (Provisions concerning passengers and crew — 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, when complying with Section II of this Packing Instruction, are only subject to the following additional provisions of these Instructions:~~

- ~~— Part 1;2.3 (General — Transport of dangerous goods by post);~~
- ~~— Part 5;1.1 g) and j) (Shipper's responsibilities — General requirements);~~
- ~~— Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);~~
- ~~— Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and~~
- ~~— Paragraph 2 of this packing instruction.~~

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 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.

#### 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**

<i>Contents</i>	<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

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP-WG/15-WPs/14 and 15 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b) and c) of this report)

### 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 rigid 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~~ marked with ~~a~~ the appropriate lithium battery handling label mark (Figure-5-32 5-3).
  - the package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.

*Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.*

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report)

- ~~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 PI965" must be placed on the air waybill, when an air waybill is used.

DGP-WG/15-WP/7 (see paragraph 3.5.1.1.1 of this report)

- Packages and overpacks of lithium ion batteries prepared in accordance with the provisions of Section II must be offered to the operator separately from cargo which is not subject to these Instructions and must not be loaded into a unit load device before being offered to the operator.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report)

### II.3 Outer packagings

#### Boxes

Aluminium  
Fibreboard  
Natural wood  
Other metal  
Plastics  
Plywood  
Reconstituted wood  
Steel

#### Drums

Aluminium  
Fibre  
Other metal  
Plastics  
Plywood  
Steel

#### Jerricans

Aluminium  
Plastics  
Steel

~~Strong outer packagings~~

### Packing Instruction 965

DGP-WG/15-WP/7 (see paragraph 3.5.1.1.1 of this report) (pending outcome of working group on performance standards) and DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 b) of this report)

#### II.4 Overpacks

**[Not more than [four (4)] packages may be placed into an overpack and the overpack must not contain other packages containing dangerous goods].** When packages are placed in an overpack, the lithium battery-handling label mark required by this packing instruction must either be clearly visible or the label mark 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

---

UN Model Regulations, SP 188, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.4.1.1 d) of this report)

---

### 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.

[A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN Manual of Tests and Criteria is considered a "cell" and must be transported according to the requirements for "cells" for the purpose of this packing instruction.](#)

### 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

Each cell or battery must meet all the provisions of 2;9.3.

#### I.1 General requirements

Part 4;1 requirements must be met.

<i>UN number and proper shipping name</i>	<i>Package quantity (Section I)</i>	
	<i>Passenger</i>	<i>Cargo</i>
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

#### 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 packaging 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.
- The number of cells or batteries in each package must not exceed the appropriate number for the equipment's operation, plus two spares.
- 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.

## Packing Instruction 966

### 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)

DGP-WG/15-WP/5 (see paragraph 3.5.1.4.1 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 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 packed with equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:~~

- ~~— Part 1;2.3 (General — Transport of dangerous goods by post);~~
- ~~— Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);~~
- ~~— Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and~~
- ~~— Paragraph 2 of this packing instruction.~~

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 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.

#### 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

## Packing Instruction 966

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b and c) of this report):

### 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 rigid outer packaging; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong rigid 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 number of cells or batteries in each package must not exceed the appropriate number for the equipment's operation, 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~~ marked with ~~a~~ the appropriate lithium battery ~~handling label~~ mark (Figure 5-32 5-3).
  - the package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.

*Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.*

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report)

- ~~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.

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report):

### II.3 Outer packagings

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
<u>Aluminium</u>	<u>Aluminium</u>	<u>Aluminium</u>
<u>Fibreboard</u>	<u>Fibre</u>	<u>Plastics</u>
<u>Natural wood</u>	<u>Other metal</u>	<u>Steel</u>
<u>Other metal</u>	<u>Plastics</u>	
<u>Plastics</u>	<u>Plywood</u>	
<u>Plywood</u>	<u>Steel</u>	
<u>Reconstituted wood</u>		
<u>Steel</u>		

Strong outer packagings

DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 b) of this report)

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery ~~handling label~~ mark required by this packing instruction must either be clearly visible or the ~~label~~ mark 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

UN Model Regulations, SP 188, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.4.1.1 d) of this report)

**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.

A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN Manual of Tests and Criteria is considered a "cell" and must be transported according to the requirements for "cells" for the purpose of this packing instruction.

**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**

Each cell or battery must meet all the provisions of 2;9.3.

**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 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

**I.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

**I.3 Outer packagings**

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

## Packing Instruction 967

DGP-WG/15-WP/5 (see paragraph 3.5.1.4.1 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 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 contained in equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:~~

- ~~— Part 1;2.3 (General — Transport of dangerous goods by post);~~
- ~~— Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);~~
- ~~— Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and~~
- ~~— Paragraph 2 of this packing instruction.~~

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 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.

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. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport.

#### 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

## Packing Instruction 967

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b and c) of this report):

### 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 rigid 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 5-32) (except button cell batteries installed in equipment (including circuit boards)).~~ Each package must be marked with the appropriate lithium battery mark (Figure 5-3). The package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.
  - this requirement does not apply to:
    - packages containing only button cell batteries installed in equipment (including circuit boards); and
    - packages containing no more than four cells or two batteries installed in equipment, where there are not more than two packages in the consignment.

Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report)

- ~~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 repacking if necessary; and~~
  - ~~a telephone number for additional information.~~
- Where a consignment includes packages bearing the lithium battery handling label mark, 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.

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report):

### II.3 Outer packagings

#### Boxes

Aluminium  
Fibreboard  
Natural wood  
Other metal  
Plastics  
Plywood  
Reconstituted wood  
Steel

#### Drums

Aluminium  
Fibre  
Other metal  
Plastics  
Plywood  
Steel

#### Jerricans

Aluminium  
Plastics  
Steel

Strong outer packagings

DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 b) of this report)

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label mark required by this packing instruction must either be clearly visible or the label mark must be affixed on the outside of the overpack and the overpack must be marked with the word "Overpack".

## Packing Instruction 968

Cargo aircraft only for UN 3090

---

UN Model Regulations, SP 188, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.4.1.1 d) of this report)

---

### 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.

A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN *Manual of Tests and Criteria* is considered a "cell" and must be transported according to the requirements for "cells" for the purpose of this packing instruction.

### 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

Each cell or battery must meet all the provisions of 2;9.3.

##### IA.1 General requirements

Part 4;1 requirements must be met.

**Table 968-IA**

<i>UN number and proper shipping name</i>	<i>Net quantity per package</i>	
	<i>Passenger</i>	<i>Cargo</i>
UN 3090 <b>Lithium metal batteries</b>	Forbidden	35 kg

##### 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.

**Packing Instruction 968**

**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**

Quantities of lithium metal cells or batteries that exceed the allowance permitted in Section II, Table 968-II, 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 provisions of Part 6.

Lithium metal cells or batteries shipped in accordance with the provisions of Section IB must be described on a dangerous goods transport document as set in Part 5;4. The packing instruction number "968" required by 5;4.1.5.8.1 a) must be supplemented with "IB". All other applicable provisions of Part 5;4 apply.

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 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.

**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).

**Table 968-IB**

Contents	Net quantity per package	
	Passenger	Cargo
Lithium metal cells and batteries	Forbidden	2.5 kg

**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.

UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 (see paragraphs 3.2.5.1.1 b) and c) of this report)

- Each package must be ~~labelled~~ **marked** with ~~a the appropriate~~ **the appropriate** lithium battery ~~handling label mark~~ **handling label mark** (Figure 5-32 ~~5-3~~) in addition to the Class 9 hazard label and the cargo aircraft only label (Figure 5-26).

*Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.*

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report)

### Packing Instruction 968

- ~~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.~~

~~Note. This information may be provided on the dangerous goods transport document.~~

#### IB.3 Outer packagings

Boxes

Drums

Jerricans

Strong outer packagings

DGP-WG/15-WP/5 (see paragraph 3.5.1.4.1 of this report)

#### II. SECTION II

~~With the exception of Part 1;2.3 (General — Transport of dangerous goods by post), 5;1.1 g), 5;1.1 j) (Shipper's responsibilities — General requirements), 7;2.1 (Operator's responsibilities — Loading restrictions on the flight deck and for passenger aircraft), 7;2.4.1 (Operator's responsibilities — Loading of cargo aircraft), 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents), 8;1.1 (Provisions concerning passengers and crew — 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, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:~~

- ~~— Part 1;2.3 (General — Transport of dangerous goods by post);~~
- ~~— Part 5;1.1 g) and j) (Shipper's responsibilities — General requirements);~~
- ~~— Part 7;2.1 (Operator's responsibilities — Loading restrictions on the flight deck and for passenger aircraft);~~
- ~~— Part 7;2.4.1 (Operator's responsibilities — Loading of cargo aircraft);~~
- ~~— Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);~~
- ~~— Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and~~
- ~~— Paragraph 2 of this packing instruction.~~

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 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.

#### 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.

## Packing Instruction 968

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP-WG/15-WPs/14 and 15 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b) and c) of this report)

### 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 rigid 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~~ marked with ~~a~~ the appropriate lithium battery ~~handling label~~ mark (Figure 5-32 ~~5-3~~) and the cargo aircraft only label (Figure 5-26).
  - the package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.
  - the cargo aircraft only label must be located on the same surface of the package near the lithium battery ~~handling label~~ mark, if the package dimensions are adequate.

*Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.*

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report) and DGP-WG/15-WP/7 (see paragraph 3.5.1.1.1 of this report)

- ~~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 — cargo aircraft only" or "lithium metal batteries, in compliance with Section II of PI968 — CAO" must be placed on the air waybill, when an air waybill is used.
- ~~Consignments~~ Packages and overpacks of lithium metal batteries prepared in accordance with the provisions of Section II ~~must not be consolidated with other shipments of dangerous goods or non-dangerous goods~~ be offered to the operator separately from cargo which is not subject to these Instructions and must not be loaded into a unit load device before being offered to the operator.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report):

### II.3 Outer packagings

#### Boxes

Aluminium  
Fibreboard  
Natural wood  
Other metal  
Plastics  
Plywood  
Reconstituted wood  
Steel

#### Drums

Aluminium  
Fibre  
Other metal  
Plastics  
Plywood  
Steel

#### Jerricans

Aluminium  
Plastics  
Steel

Strong outer packagings

**Packing Instruction 968**

DGP-WG/15-WP/7 (see paragraph 3.5.1.1.1 of this report) (pending outcome of working group on performance standards) and DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 b) of this report)

**II.4 Overpacks**

Not more than [four (4)] packages may be placed into an overpack and the overpack must not contain other packages containing dangerous goods. When packages are placed in an overpack, the lithium battery-handling label, mark and the cargo aircraft only label (Figure 5-26) required by this packing instruction must either be clearly visible or the labels, mark and 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

UN Model Regulations, SP 188, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.4.1.1 d) of this report)

**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.

A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN Manual of Tests and Criteria is considered a "cell" and must be transported according to the requirements for "cells" for the purpose of this packing instruction.

**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**

Each cell or battery must meet all the provisions of 2;9.3.

**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 packaging 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.
- The number of cells or batteries in each package must not exceed the appropriate number for the equipment's operation, plus two spares.
- 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

#### *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)

---

DGP-WG/15-WP/5 (see paragraph 3.5.1.4.1 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 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 or lithium alloy cells and batteries packed with equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:~~

- ~~— Part 1;2.3 (General — Transport of dangerous goods by post);~~
- ~~— Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);~~
- ~~— Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and~~
- ~~— Paragraph 2 of this packing instruction.~~

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 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.

## 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).

Contents	Package quantity (Section II)	
	Passenger	Cargo
Net quantity of lithium metal cells or batteries per package	5 kg	5 kg

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 (see paragraphs 3.2.4.1 and 3.2.5.1.1 e) of this report):

### 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 rigid outer packaging; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong rigid 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 number of cells or batteries in each package must not exceed the appropriate number for the equipment's operation, 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~~ marked with ~~a~~ the appropriate lithium battery ~~handling label~~ mark (Figure 5-32 ~~5-3~~).
  - the package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.

Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report)

- ~~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.

## Packing Instruction 969

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report):

### II.3 Outer packagings

#### *Boxes*

Aluminium  
Fibreboard  
Natural wood  
Other metal  
Plastics  
Plywood  
Reconstituted wood  
Steel

#### *Drums*

Aluminium  
Fibre  
Other metal  
Plastics  
Plywood  
Steel

#### *Jerricans*

Aluminium  
Plastics  
Steel

Strong outer packagings

DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 b) of this report)

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery ~~handling label~~ **mark** required by this packing instruction must either be clearly visible or the ~~label~~ **mark** 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

UN Model Regulations, SP 188, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.4.1.1 d) of this report)

### 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.

A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN Manual of Tests and Criteria is considered a "cell" and must be transported according to the requirements for "cells" for the purpose of this packing instruction.

### 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

Each cell or battery must meet all the provisions of 2;9.3.

### 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.

### I.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

**Packing Instruction 970**

DGP-WG/15-WP/5 (see paragraph 3.5.1.4.1 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 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 or lithium alloy cells and batteries contained with equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:~~

- ~~— Part 1:2.3 (General — Transport of dangerous goods by post);~~
- ~~— Part 7:4.4 (Operator’s responsibilities — Reporting of dangerous goods accidents and incidents);~~
- ~~— Part 8:1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and~~
- ~~— Paragraph 2 of this packing instruction.~~

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 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.

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. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport.

**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

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b) and c) of this report):

### 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 rigid 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 5-32) (except button cell batteries installed in equipment (including circuit boards)).~~ Each package must be marked with the appropriate lithium battery mark (Figure 5-3). The package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.
  - this requirement does not apply to:
    - packages containing only button cell batteries installed in equipment (including circuit boards); and
    - packages containing no more than four cells or two batteries installed in equipment, where there are not more than two packages in the consignment.

Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 (see paragraph 3.2.4.1 of this report)

- ~~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~~ mark, the words "lithium ion 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.

DGP-WG/15-WP/6 (see paragraph 3.5.1.1.1 of this report):

### II.3 Outer packagings

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
<u>Aluminium</u>	<u>Aluminium</u>	<u>Aluminium</u>
<u>Fibreboard</u>	<u>Fibre</u>	<u>Plastics</u>
<u>Natural wood</u>	<u>Other metal</u>	<u>Steel</u>
<u>Other metal</u>	<u>Plastics</u>	
<u>Plastics</u>	<u>Plywood</u>	
<u>Plywood</u>	<u>Steel</u>	
<u>Reconstituted wood</u>		
<u>Steel</u>		

#### Strong outer packagings

DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 b) of this report)

### II.4 Overpacks

When packages are placed in an overpack, the lithium battery ~~handling label~~ mark required by this packing instruction must either be clearly visible or the ~~label~~ mark must be affixed on the outside of the overpack and the overpack must be marked with the word "Overpack".

...

UN Model Regulations, packing instruction P005, ST/SG/AC.10/42/Add.1, DGP-WG/15-WP/13 (see paragraph 3.2.3.2.1 d) of this report) and DGP-WG/15-WP/14 (see paragraph 3.2.4.1 of this report)

### Packing Instruction 972

Cargo aircraft only for UN 3530 only

(See Packing Instruction 220 for flammable gas-powered engines and machinery, Packing Instruction 378 for flammable liquid-powered engines and machinery, Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles, Packing Instruction 952 for battery-powered equipment and vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

#### General requirements

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

#### Compatibility requirements

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

<u>UN number and proper shipping name</u>	<u>Quantity — passenger</u>	<u>Quantity — cargo</u>
<u>UN 3530 Engine, internal combustion or Machinery, internal combustion</u>	<u>Forbidden</u>	<u>No limit</u>

If the engine or machinery is constructed and designed so that the means of containment containing the dangerous goods affords adequate protection, an outer packaging is not required.

Dangerous goods in engines or machinery must otherwise be packed in outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, and meeting the applicable requirements of 4.1.1.1, or they must be fixed in such a way that they will not become loose during normal conditions of transport, e.g. in cradles or crates or other handling devices.

In addition, the manner in which means of containment are contained within the engine or machinery, must be such that under normal conditions of transport, damage to the means of containment containing the dangerous goods is prevented; and in the event of damage to the means of containment containing liquid dangerous goods, no leakage of the dangerous goods from the engine or machinery is possible (a leakproof liner may be used to satisfy this requirement).

Means of containment containing dangerous goods must be so installed, secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the engine or machinery during normal conditions of transport. Cushioning material must not react dangerously with the content of the means of containment. Any leakage of the contents must not substantially impair the protective properties of the cushioning material.

Other dangerous goods (e.g. batteries, fire extinguishers, compressed gas accumulators or safety devices) required for the functioning or safe operation of the engine or machinery must be securely mounted in the engine or machine.

## Part 5

# SHIPPER'S RESPONSIBILITIES

...

## Chapter 1

### GENERAL

...

#### 1.1 GENERAL REQUIREMENTS

Before a person offers any package or overpack of dangerous goods for transport by air, that person must ensure that:

...

DGP-WG/15-WP/31, Revision No. 2 (see paragraph 3.2.7.4 of this report)

g) ~~the dangerous goods are not included in any freight container/unit load device except for radioactive material as specified in 7.2.9 (subject to the approval of the operator, this does not apply to a unit load device containing consumer commodities prepared according to Packing Instruction Y063 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), as specified in 7.1.4;~~

...

#### 1.2 GENERAL PROVISIONS FOR CLASS 7

...

##### 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.

---

DGP-WG/15-WP/2 and DGP-WG/15-WP/32 (see paragraph 3.2.5.2 of this report)

*Note.— DGP-WG/15 proposed adding the following note to the 2017-2018 Edition of the Technical Instructions provided there were no objections from TRAANSC and the UN Sub-Committee (the Secretary would seek comments from both groups at their summer sessions).*

---

*[ Note.— If the measured dose rate comprises more than one type of radiation, then the transport index should be based on the sum of all the dose rates from each type of radiation (see paragraph 523.1 of the IAEA Specific Safety Guide No. SSG-26 (2012 Edition)). ]*

...

---

The following amendment is made in accordance with UN Model Regulations ST/SG/AC.10/42/Add.1, which introduced consistent use of the terms “mark” and “marking”.

---

- h) before a package or overpack is reused, all inappropriate dangerous goods labels and ~~markings~~ **marks** are removed or completely obliterated;

---

UN Model Regulations, paragraph 5.1.2.2, ST/SG/AC.10/42/Add. and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

- i) each package contained within an overpack is properly packed, marked, labelled and is free of any indication that its integrity has been compromised and in all respects is properly prepared as required in these Instructions. The “overpack” ~~marking~~ **mark** 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

...

## 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;

---

The following amendment is made in accordance with UN Model Regulations ST/SG/AC.10/42/Add.1, which introduced consistent use of the terms “mark” and “marking”.

---

- it is marked with the word “Salvage” and the lettering of the “Salvage” ~~marking~~ **mark** 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.

— *Note.— The size requirement for the “Salvage” marking applies as from 1 January 2016.*

---

The following amendment is made in accordance with UN Model Regulations ST/SG/AC.10/42/Add.1, which introduced consistent use of the terms “mark” and “marking”.

---

### 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~~ **mark** indicating that it had contained an infectious substance must be removed or obliterated.

1.6.3 Freight containers as well as other 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.

...

---

The following amendments are made in accordance with UN Model Regulations ST/SG/AC.10/42/Add.1, which introduced consistent use of the terms “mark” and “marking”. “Package” is removed from the chapter title for the sake of consistency with Chapter 3 (Labelling) and 5.2 of the UN Model Regulations.

---

## Chapter 2

### ~~PACKAGE MARKINGS~~ **MARKING**

...

#### 2.1 THE REQUIREMENT TO MARK

Unless otherwise provided in these Instructions, packages of dangerous goods and overpacks containing dangerous goods offered for transport by air must be marked as required by this Chapter.

#### 2.2 ~~APPLICATION OF MARKINGS~~ **MARKS**

2.2.1 All ~~markings~~ **marks** must be so placed on the packagings that they are not covered or obscured by any part of or attachment to the packaging or any other label or ~~marking~~ **mark**.

---

UN Model Regulations, paragraph 5.2.1.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

2.2.2 All package ~~markings~~ **marks** required by 2.1:

- a) must be durable and printed or otherwise marked on, or affixed to, the external surface of the package;
- b) must be readily visible and legible;
- c) must be able to withstand open weather exposure without a substantial reduction in effectiveness;
- d) must be displayed on a background of contrasting colour; and
- e) must not be located with other package ~~markings~~ **marks** that could substantially reduce their effectiveness.

### 2.3 PROHIBITED-MARKING MARKS

Arrows for purposes other than indicating proper package orientation must not be displayed on a package containing liquid dangerous goods.

## 2.4 MARKING SPECIFICATIONS AND REQUIREMENTS

### 2.4.1 Marking with proper shipping name and UN or ID number

---

UN Model Regulations, paragraph 5.2.1.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

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, 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 mark~~ must be displayed on the article, on its cradle or on its handling, storage or launching device. A typical package ~~marking mark~~ would be:

"Corrosive liquid, acidic, organic, n.o.s. (caprylyl chloride) UN 3265".

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.*

### 2.4.2 Shipper and consignee identification

The name and address of the person who offers the dangerous goods for transport by air and of the consignee must be provided on each package and should be located on the same surface of the package near the proper shipping name ~~marking mark~~, if the package dimensions are adequate.

### 2.4.3 Special marking requirements for explosives

The proper shipping name required by 2.4.1 may be supplemented by additional descriptive text to indicate commercial or military names.

### 2.4.4 Packaging specification ~~markings marks~~

2.4.4.1 Each outer or single packaging used for dangerous goods, for which specification packaging is required in Part 4, must bear the ~~markings marks~~ appropriate to the contents as specified in Part 6, Chapter 2.

2.4.4.2 ~~Markings~~ **Marks** must be stamped, printed or otherwise marked on the package to provide adequate permanency.

### 2.4.5 Special marking requirements for radioactive material

2.4.5.1 The marking of excepted packages of radioactive material of Class 7 must be as required by 1.2.4.1.

2.4.5.2 Each package of gross mass exceeding 50 kg must have its permissible gross mass legibly and durably marked on the outside of the packaging.

2.4.5.3 Each package which conforms to:

- a) 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;
- b) a Type A package design must be legibly and durably marked on the outside of the packaging with "TYPE A";
- c) 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.

2.4.5.4 Each package which conforms to a design approved under one or more of 1.2.2.1, 6;7.21.1 to 6;7.21.4, 6;7.24.2.1 and 6.4.23.4 to 6.4.23.7 of the UN Model Regulations must be legibly and durably marked on the outside of the package with the following information:

- a) the identification mark allocated to that design by the competent authority;
- b) a serial number to uniquely identify each packaging which conforms to that design; and
- c) "Type B(U)", "Type B(M)" or "Type C" in the case of a Type B(U), Type B(M) or Type C package design.

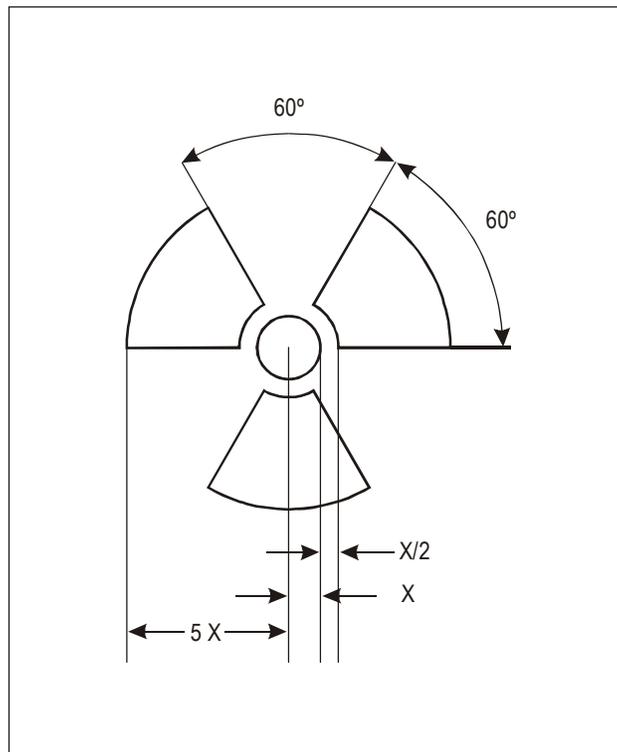
*Note.— Empty Type B(U) or Type B(M) packages, as specified in the Note to 2;7.2.4.1.1.7, shipped as industrial packages Type IP-1 must bear the appropriate specification-marking marks for a Type IP-1 in which case the appropriate specification-markings marks specified in 2.4.5.4 must be obliterated.*

2.4.5.5 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.

2.4.5.6 In all cases of international transport of packages requiring competent authority approval of design or shipment, for which different approval types apply in the different countries concerned by the shipment, the ~~marking mark~~ must be in accordance with the certificate of the country of origin of the design.

#### **2.4.6 Special marking requirements for refrigerated liquefied gas**

The upright position of each package must be indicated prominently by either the "Package orientation" label (Figure 5-27) or pre-printed package orientation labels meeting the same specification as either Figure 5-27 or ISO Standard 780:1997. The label must be affixed to or printed on at least two opposite vertical sides of the package with the arrows pointing in the correct direction. The wording "KEEP UPRIGHT" must be placed at 120° intervals around the package or on each side. Packages must also be clearly marked "DO NOT DROP — HANDLE WITH CARE".



**Figure 5-1. Basic trefoil symbol with proportions based on a central circle of radius  $X$ . The minimum allowable size of  $X$  must be 4 mm.**

#### **2.4.7 Special marking requirement for dry ice**

The net mass of solid carbon dioxide (dry ice) must be marked on any package containing such substance.

#### **2.4.8 Special marking requirement for biological substances, Category B**

Packages containing biological substances, Category B packed in accordance with Packing Instruction 650 must be marked "Biological substance, Category B".

#### **2.4.9 Special marking provisions for environmentally hazardous substances**

2.4.9.1 Unless otherwise specified in these Instructions, 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 and the packages must also bear a Class 9 hazard label.

---

UN Model Regulations, paragraph 5.2.1.6.3, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

2.4.9.2 The environmentally hazardous substance mark must be located adjacent to the ~~markings~~ marks required by 2.4.1.1. The requirements of 2.2.2 must be met.

2.4.9.3 The environmentally hazardous substance mark must be as shown in Figure 5-2. The ~~marking~~ mark must be in the form of a square set at an angle of  $45^\circ$  (diamond-shaped). The symbol (fish and tree) must be black on white or suitable contrasting background. The minimum dimensions must be 100 mm  $\times$  100 mm and the minimum width of line forming the diamond must be 2 mm. If the size of the package so requires, the dimensions/line thickness may be reduced, provided the

marking **mark** 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.*



**Figure 5-2. Symbol (fish and tree): black on white or suitable contrasting background**

#### 2.4.10 Marking of overpacks

---

UN Model Regulations, paragraph 5.1.2.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

2.4.10.1 Unless marks and labels representative of all dangerous goods in the overpack are visible, the overpack must be:

- a) marked with the word "OVERPACK". The lettering of the "OVERPACK" mark must be at least 12 mm high; and
- b) labelled and marked with the proper shipping name, UN number and other marks, as required for packages in accordance with this chapter and Chapter 3, for each item of dangerous goods contained in the overpack.

2.4.10.2 Labelling of overpacks containing radioactive material must be in accordance with 3.2.6 and 3.5.1.1 h) to i). ~~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).~~

2.4.10.3 Packaging specification ~~markings~~ **marks** must not be reproduced on the overpack.

---

The following amendment is made in accordance with UN Model Regulations ST/SG/AC.10/42/Add.1, which introduced consistent use of the terms "mark" and "marking".

---

2.4.10.4 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~~ **marks** representative of all dangerous goods in the overpack are visible. The lettering of the "Overpack" ~~marking~~ **mark** must be at least 12 mm high.

~~+ Note. The size requirement for the “Overpack” marking applies as from 1 January 2016.~~

#### **2.4.11 Additional ~~markings~~ marks of packages containing dangerous goods in limited quantities**

Provisions for the marking of packages containing dangerous goods in limited quantities are contained in 3;4.

#### **2.4.12 Specific provisions for dangerous goods packed in excepted quantities**

Provisions for the marking of packages containing dangerous goods in excepted quantities are contained in 3;5.

#### **2.4.13 ~~Markings~~ Marks required by other modes of transport**

---

The following amendment is made in accordance with UN Model Regulations ST/SG/AC.10/42/Add.1, which introduced consistent use of the terms “mark” and “marking”.

---

~~Markings~~ Marks required by other international or national transport regulations are permitted in addition to ~~markings~~ marks required by these Instructions, provided that they cannot be confused with or conflict with any ~~markings~~ marks prescribed by these Instructions, because of their colour, design or shape.

#### **2.4.14 Special marking requirement for chemical oxygen generators**

When chemical oxygen generators contained in protective breathing equipment (PBE) are being transported under Special Provision A144, the statement “Aircrew protective breathing equipment (smoke hood) in accordance with Special Provision A144” shall be marked adjacent to the proper shipping name on the package.

#### **2.4.15 Marking requirements for IBCs used to transport UN 3077**

Intermediate bulk containers must comply with the marking requirements applicable to other packagings, except that intermediate bulk containers of more than 450 L capacity must be marked with the proper shipping name and UN number, as required in 2.4.1, and the environmentally hazardous substance mark, on two opposite sides.

---

DGP-WG/15-WP/15 (see paragraphs 3.2.5.1.1 b) and c) of this report):

---

#### **2.4.16 Special marking requirements for lithium batteries**

2.4.16.1 Packages containing lithium cells or batteries prepared in accordance with Section II of Packing Instructions 965 to 970 and Section IB of Packing Instructions 965 and 968 must be marked as shown in Figure 5-3.

2.4.16.2 The mark must indicate:

a) the appropriate UN number as follows:

- 1) “UN 3090” for lithium metal cells or batteries;
- 2) “UN 3480” for lithium ion cells or batteries;
- 3) “UN 3091” for lithium metal cells or batteries contained in or packed with equipment; or
- 4) “UN 3481” for lithium metal cells or batteries contained in or packed with equipment;

Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers must be indicated on one or more marks.

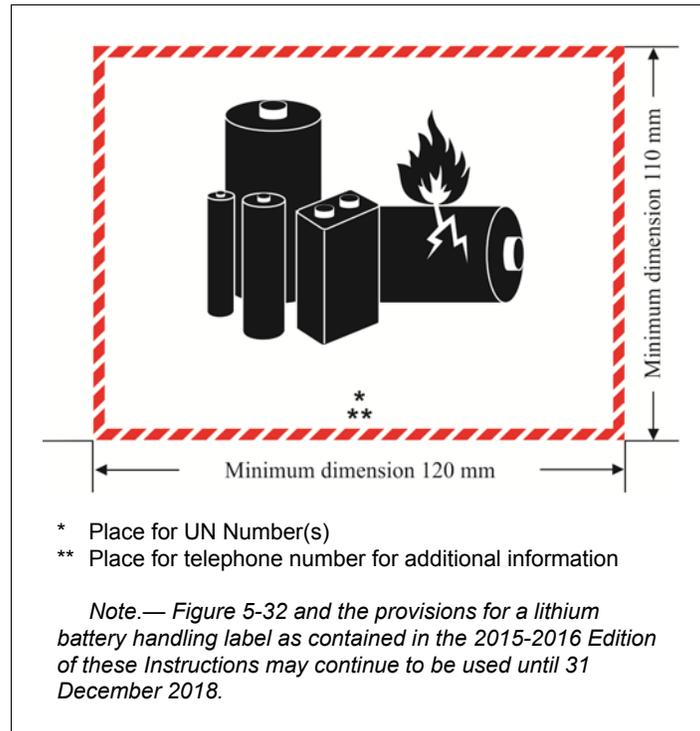
b) a telephone number for additional information.

2.4.16.3 The mark must be in the form of a rectangle with hatched edging. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion or lithium metal batteries or cells) must be black on white. The hatching must be red. The mark must be a minimum dimension of 120 mm wide × 110 mm high and the minimum width of the hatching must be 5 mm. If the size of the package so requires, the dimensions/line thickness may be reduced to not less than 105 mm wide × 74 mm high. Where dimensions are not specified, all features must be in approximate proportion to

those shown on the full-size mark (Figure 5-3).

2.4.16.4 Packages containing lithium batteries that meet the requirements of Section IB of Packing Instructions 965 or 968 must bear both the lithium battery mark (Figure 5-3) and the lithium battery Class 9 hazard label (Figure 5-26).

Insert new Figure 5-3:



**Figure 5-3. Lithium battery mark**

Renumber subsequent figures and update references accordingly

## 2.5 LANGUAGES TO BE USED

In addition to the languages which may be required by the State of Origin, English should be used.

...

...

## Chapter 3

### LABELLING

---

UN Model Regulations, paragraph 5.2.2.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

*Note 1.— These provisions relate essentially to danger labels. However, additional ~~marking marks~~ or symbols indicating precautions to be taken in handling or storing a package (e.g. a symbol representing an umbrella indicating that a package should be kept dry) may be displayed on a package as appropriate. For such purposes, it is preferable to use the symbols recommended by the International Organization for Standardization (ISO).*

*Note 2.— In 3.6 of this Chapter there are provisions concerning the placarding of large freight containers for radioactive material.*

*Note 3.— The provisions concerning the placarding of portable tanks are shown in the Supplement, Part S-4;12.4.*

#### 3.1 THE REQUIREMENT TO LABEL

3.1.1 Where articles or substances are specifically listed in the Dangerous Goods List (Table 3-1), a danger class label must be affixed for the hazard shown in column 3 of Table 3-1. A subsidiary risk label must also be affixed for any risk indicated by a class or division number in column 4 of Table 3-1. However, special provisions indicated in column 7 may also require a subsidiary risk label where no subsidiary risk is indicated in column 4 or may exempt from the requirement for a subsidiary risk label where such a risk is indicated in the Dangerous Goods List.

3.1.2 Labels identifying the primary and subsidiary risks of the dangerous goods must bear the class or division number as required in 3.5.1.

3.1.3 All labels must be able to withstand open weather exposure without a substantial reduction in effectiveness.

#### 3.2 APPLICATION OF LABELS

3.2.1 The labels required to be displayed on packages of dangerous goods are identified in the Dangerous Goods List for articles and substances specifically listed by name and for articles and substances not specifically listed by name which are covered by generic or n.o.s. entries.

3.2.2 Packages containing substances of Class 8 need not show a subsidiary risk label for Division 6.1 if the toxicity arises solely from the destructive effect on tissue. Substances of Division 4.2 need not show a subsidiary risk label for Division 4.1 if the substance is also a flammable solid.

3.2.3 Packages containing organic peroxides which meet the criteria for Class 8, Packing Group I or II must be labelled with a corrosive subsidiary risk label.

*Note.— Many liquid organic peroxide formulations are flammable; however, no subsidiary risk flammable label is required because the organic peroxide label itself is considered to imply that the product may be flammable.*

3.2.4 In addition to the primary hazard label (Figure ~~5-18~~ 5-19), infectious substances packages must bear any other label required by the nature of the contents. This is not required if a quantity of 30 ml or less of dangerous goods included in classes 3, 8 or 9 is packed in each primary receptacle containing infectious substances provided these substances meet the requirements of 3.5.1.2.

3.2.5 Packages containing radioactive material having additional hazardous characteristics must also be labelled to indicate those characteristics.

---

UN Model Regulations, paragraph 5.2.2.1.12.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

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 the labels conforming to Figures ~~5-19~~ 5-20, 5-20<sup>21</sup> and 5-24<sup>22</sup> according to the appropriate category. 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 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 2.7.2.3.5 must bear labels conforming to the model shown in Figure 5-22<sup>23</sup>; such labels, where applicable, must be affixed adjacent to the labels conforming to Figure ~~5-19~~ 5-20, 5-20<sup>21</sup>, or 5-24<sup>22</sup>, as applicable. Labels must not cover the ~~markings~~ marks specified in Chapter 2. Any labels which do not relate to the contents must be removed or covered.

3.2.7 Intermediate bulk containers must comply with the labelling requirements applicable to other packagings, except that intermediate bulk containers of more than 450 L capacity must be labelled on two opposite sides.

---

UN Model Regulations, paragraph 5.1.2.2.1.6 a) and b), ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

3.2.8 Except as provided in 3.5.1.1 d), each class hazard label must:

- a) be affixed to a background of contrasting colour or must have a dotted or solid line outer boundary;
- b) be located on the same surface of the package near the proper shipping name ~~marking~~ mark, if the package dimensions are adequate;
- c) be so placed on the packaging that they are not covered or obscured by any part of or attachment to the packaging or any other label or ~~marking~~ mark;
- d) when primary and subsidiary risk labels are required, be displayed next to each other; and
- e) be affixed at an angle of 45° (diamond shaped), unless the package dimensions are inadequate.

3.2.9 Labels must not be folded. Cylindrical packages must be of such dimensions that a label will not overlap itself. In the case of cylindrical packages containing radioactive materials, which require two identical labels, these labels must be centred on opposite points of the circumference and must not overlap each other. If the dimensions of the package are such that two identical labels cannot be affixed without overlapping each other, one label is acceptable provided it does not overlap itself.

3.2.10 Labels must be firmly affixed to or printed on the package of dangerous goods. Where a package is of such an irregular shape that a label cannot be affixed to or printed on a surface, it is acceptable to attach the label to the package by an adequately strong tag.

3.2.11 Since packages or consignments of magnetized material (Class 9) must bear the "Magnetized material" label (Figure ~~5-25~~ 27) as required by column 5 of Table 3-1, such packages or consignments do not need to bear the "Miscellaneous dangerous goods" label (Figure ~~5-24~~ 25).

3.2.12 In addition to the class hazard labels specified in 3.1, handling labels must also be affixed to packages of dangerous goods as follows:

- a) the "Cargo aircraft only" label (Figure ~~5-26~~ 28) must be affixed:
  - 1) when the package containing the dangerous goods may only be transported on a cargo aircraft. However, where the packing instruction number and the permitted quantity per package are identical for passenger and cargo aircraft, the "Cargo aircraft only" label should not be used;
  - 2) to each Type B(M) package of radioactive material and any freight container containing such a Type B(M) package;
  - 3) on the same surface of the package near the hazard labels;
- b) when required by the provisions of 4.1.1.13, either the "Package orientation" label (Figure ~~5-27~~ 29), or preprinted package orientation labels meeting the same specification as either Figure ~~5-27~~ 29 or ISO Standard 780:1997, must be affixed to or printed on at least two opposite vertical sides of the package with the arrows pointing in the correct direction. The words "Dangerous goods" may be inserted on the label below the line;

- c) for packages containing refrigerated liquefied gases, the “Cryogenic liquid” label (Figure 5-29~~31~~) must be affixed on all packages;
- d) for packages containing self-reactive substances of Division 4.1 or Division 5.2 organic peroxides, the “Keep away from heat” label (Figure 5-30~~32~~) must be affixed on all packages. This label should be affixed on the same surface of the package near the hazard label(s);
- e) for excepted packages of radioactive material the “Radioactive material, excepted package” handling label (Figure 5-34~~33~~) must be affixed;
- f) be affixed to a background of contrasting colour or must have a dashed or solid line outer boundary;

---

The following amendment is made in accordance with UN Model Regulations ST/SG/AC.10/42/Add.1, which introduced consistent use of the terms “mark” and “marking”.

---

- g) be so placed on the packaging that they are not covered or obscured by any part of or attachment to the packaging or any other label or ~~marking~~ mark.

3.2.13 Where a text is indicated in Figures 5-1 to 5-32~~33~~, an equivalent text in another language may be used.

3.2.14 Labels required by other international or national transport regulations are permitted in addition to labels required by these Instructions, provided that they cannot be confused with or conflict with any label prescribed by these Instructions, because of their colour, design or shape.

### 3.3 LABELLING OF OVERPACKS

3.3.1 An overpack must be labelled as required for packages by Chapter 3, for each item of dangerous goods contained in the overpack unless labels representative of all dangerous goods in the overpack are visible.

3.3.2 An overpack containing single packages with end closures containing liquid dangerous goods must be labelled with either the “Package Orientation” label (Figure 5-27), or pre-printed package orientation labels meeting the same specification as either Figure 5-27 or ISO Standard 780:1997, unless such labels are affixed to the package and are visible from the outside of the overpack. Such labels must be affixed to or printed on at least two opposite vertical sides of the overpack with the arrows pointing in the direction required to indicate the orientation of the overpack required to ensure that end closures are upward, notwithstanding that such single packages may also have side closures.

### 3.4 PROHIBITED LABELLING

Arrows for purposes other than indicating proper package orientation must not be displayed on a package containing liquid dangerous goods.

### 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 5-34 to 5-24~~26~~.

*Note.— Where appropriate, labels in Figures 5-34 to 5-24~~26~~ are shown with a dotted outer boundary as provided for in 3.5.1.1 a). This is not required when the label is applied on a background of contrasting colour.*

Class hazard labels must conform to the following specifications:

- a) Labels must be configured as described below (see Figure 5-34).
  - i) Labels must be displayed on a background of contrasting colour, or must have either a dotted or solid outer boundary line.
  - ii) The label must be in the form of a square set at an angle of 45° (diamond shaped). The minimum dimensions must be 100 mm × 100 mm and the minimum width of the line inside the edge forming the diamond must be 2

mm. The line inside the edge must be parallel and 5 mm from the outside of that line to the edge of the label. The line inside the edge on the upper half of the label must be the same colour as the symbol, and the line inside the edge on the lower half of the label must be the same colour as the class or division number in the bottom corner. 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 labels on cylinders must comply with 3.5.1.1 b).

~~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 1 January 2017.~~

UN Model Regulations, paragraph 5.2.2.2.1.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraphs 3.2.5.1.1 a) of this report)

- b) 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.

~~Note.— When the diameter of the cylinder is too small to permit the display of the reduced size labels on the non-cylindrical upper part of the cylinder, the reduced sized labels may be displayed on the cylindrical part.~~

- c) 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, as appropriate. **The lower half of the label must also contain the symbol in the case of the Class 9 for lithium cells and batteries (Figure 26).** 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.
- d) In addition, except 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.

UN Model Regulations, paragraph 5.2.2.2.1.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

It is suggested that new text in sub-paragraph e) may not be suitable, i.e. “no text other than the class mark”, since the class mark is not text. Additionally, the term “class mark” is not used anywhere else in the Instructions. DGP-WG/15 is invited to consider whether alternate wording would be more suitable.

- e) 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). **No text other than the class mark must be included in the bottom part of the Class 9 label for lithium cells and batteries (Figure 26).**
- f) 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;
  - 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.
- 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

- h) Each label conforming to the applicable Figure 5-49~~20~~, 5-29~~21~~ or 5-24~~22~~ 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 nuclides 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.)
- i) Each label conforming to Figure 5-22~~23~~ must be completed with the criticality safety index (CSI) as stated in the certificate of approval applicable in the States through or into which the consignment is transported and issued by the competent authority.
- j) For overpacks and freight containers, the label conforming to Figure 5-22~~23~~ must bear the sum of the criticality safety indexes of all the packages contained therein.
- k) In all cases of international transport of packages requiring competent authority approval of design or shipment, 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 5-4-~~5~~ to 5-24-~~26~~. 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 5-4-~~5~~ to 5-7-~~8~~ 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.*

### 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 5-25~~27~~ to 5-27-~~29~~ and Figures 5-29~~31~~ to 5-32~~33~~. 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 5-27~~29~~ or ISO Standard 780:1997.

---

UN Model Regulations, paragraph 5.2.1.9, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 b) of this report)

Requirement for a handling label now a requirement for a mark (see 5.2.4.16)

---

~~— 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 5-32, as required by the applicable packing instruction. The label must be a minimum dimension of 120 mm wide × 110 mm high except labels of 105 mm wide × 74 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, and a telephone number for additional information. 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 5-32 and a Class 9 hazard label (Figure 5-24).~~

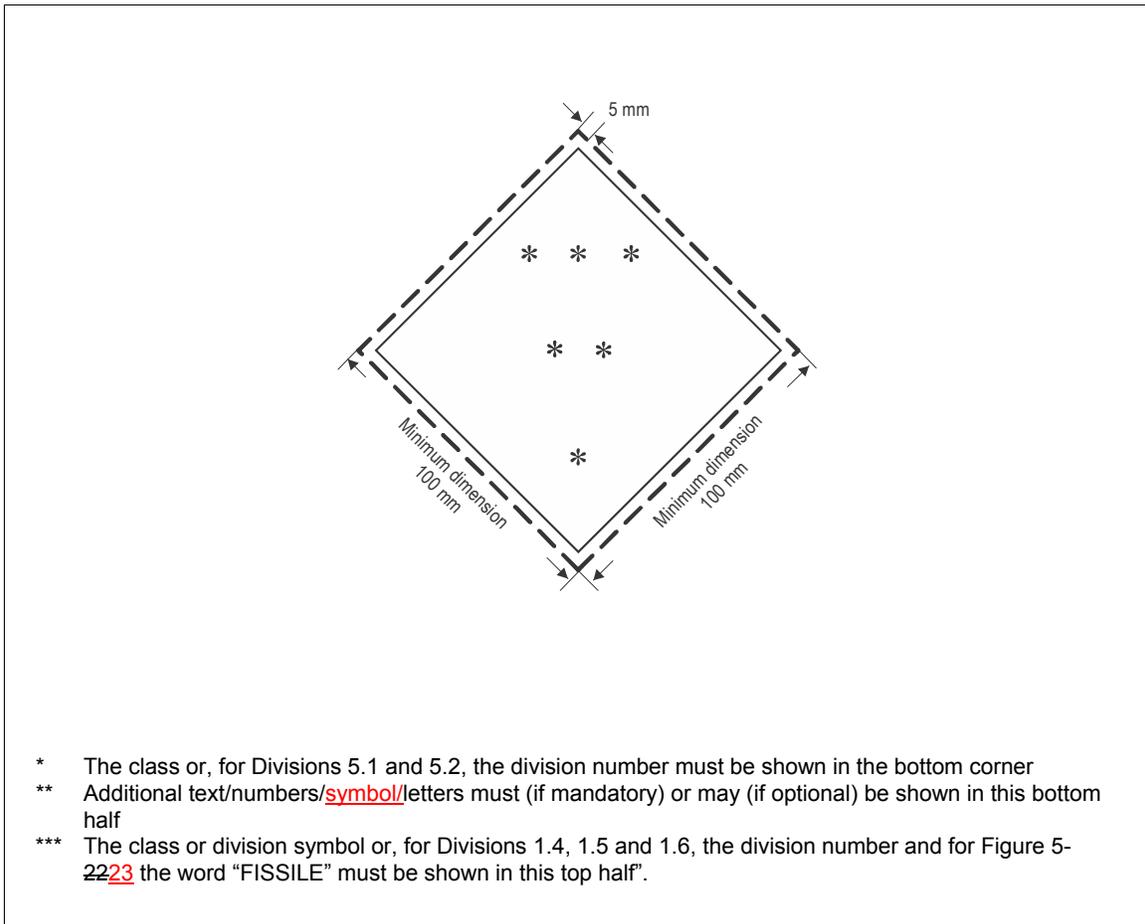
### 3.6 PLACARDING OF LARGE FREIGHT CONTAINERS CONTAINING RADIOACTIVE MATERIAL

#### 3.6.1 Special provisions for Class 7

3.6.1.1 Large freight containers carrying packages (other than excepted packages) and tanks must bear four placards which conform with Figure 5-28~~30~~. The placards must be affixed in a vertical orientation to each side wall and each end wall of the large freight container. Any placards which do not relate to the contents must be removed. Instead of using both labels and placards, it is permitted as an alternative to use enlarged labels only, as shown in Figures 5-19~~20~~, 5-20~~21~~ and 5-21~~22~~, and where appropriate Figure 5-22~~23~~, with dimensions as required for the placard in Figure 5-28~~30~~.

3.6.1.2 For Class 7, the placard must have minimum overall dimensions of 250 mm by 250 mm with a black line running 5 mm inside the edge and parallel with it, and must be otherwise as shown in Figure 5-28~~30~~. The number 7 must not be less than 25 mm high. The background colour of the upper half of the placard must be yellow and of the lower half white, the colour of the trefoil and the printing must be black. The use of the word "Radioactive" in the bottom half is optional to allow the use of this placard to display the appropriate United Nations number for the consignment.

...



- \* The class or, for Divisions 5.1 and 5.2, the division number must be shown in the bottom corner
- \*\* Additional text/numbers/symbol/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 5-2223 the word "FISSILE" must be shown in this top half.

Figure 5-34. Class/division label

UN Model Regulations, paragraph 5.2.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 c) of this report)

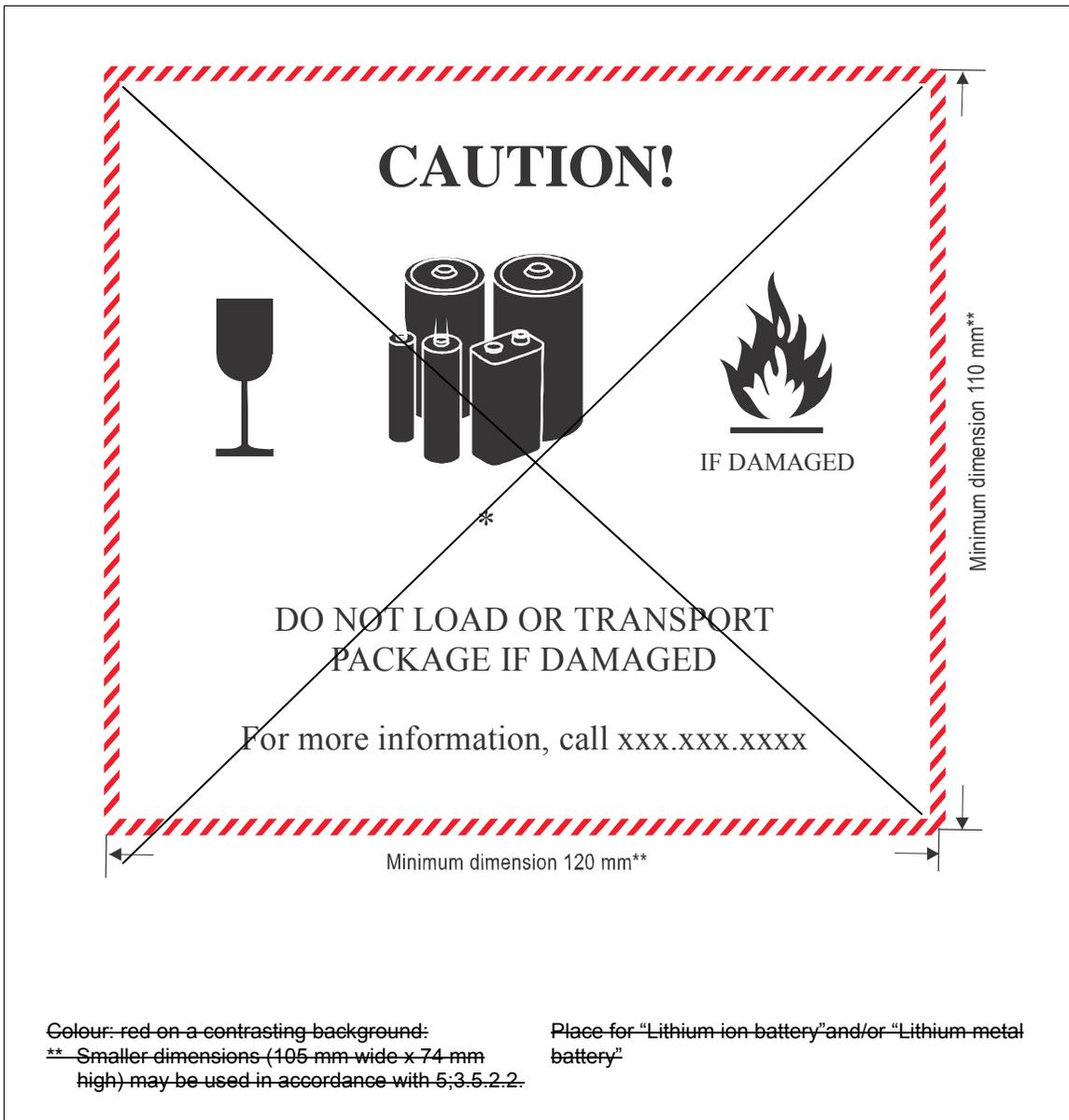


Figure 5-32. Lithium battery handling label

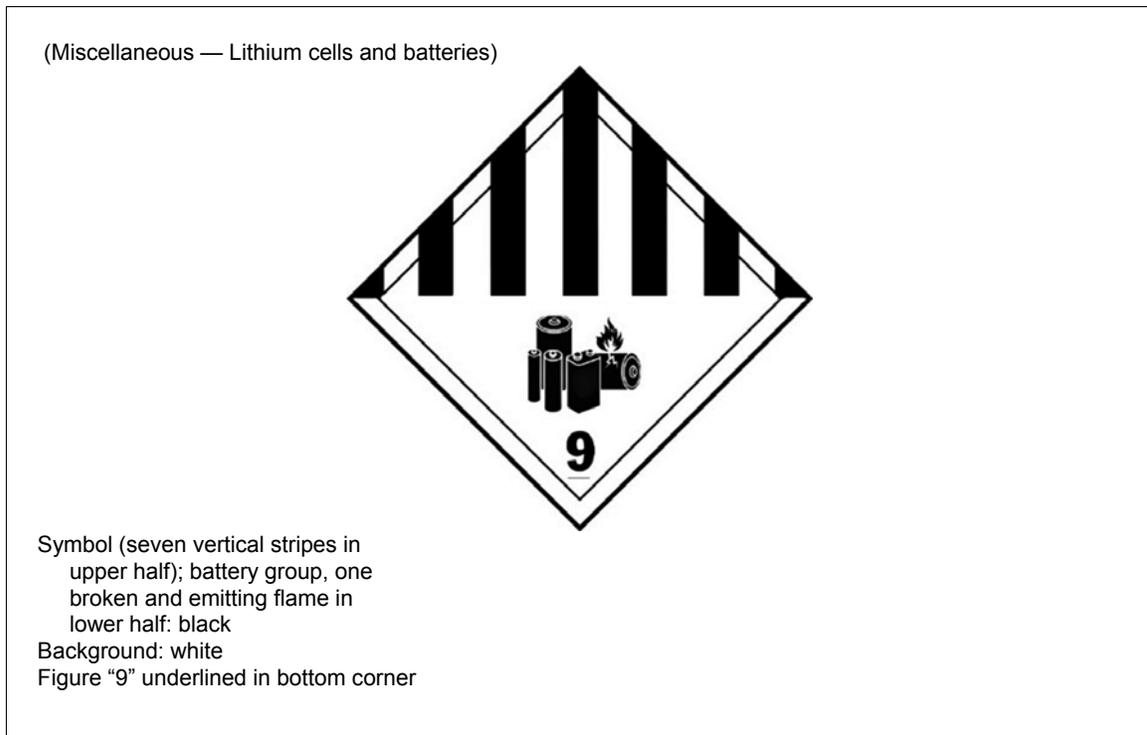
---

UN Model Regulations, paragraph 5.2.2.2.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1 of this report)

---

Insert the following new Figure 5-26:

---



**Figure 5-26. Miscellaneous dangerous goods — lithium batteries, Class 9**

---

*Renumber* subsequent figures accordingly and revise references throughout Technical Instructions as applicable.

---

...

## Chapter 4

### DOCUMENTATION

...

#### 4.1.5 Information required in addition to the dangerous goods description

...

---

DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 d) of this report):

---

##### 4.1.5.8 Additional requirements

4.1.5.8.1 The dangerous goods transport document must also contain:

- a) except for radioactive material, the packing instruction applied. For shipments of lithium batteries prepared in accordance with Section IB of Packing Instruction 965 or Packing Instruction 968, the letters "IB" must be added following the packing instruction number;
- b) when applicable, reference to Special Provision A1, A2, A4 ~~or~~ A5, A202 or A208;
- c) a statement indicating that the shipment is within the limitations prescribed for either passenger and cargo aircraft or cargo-only aircraft, as appropriate;

*Note.— To qualify as acceptable for transport aboard passenger aircraft, passenger aircraft packing instruction number(s) must be used, and the package must not bear the "Cargo aircraft only" label. To qualify as acceptable for transport aboard cargo-only aircraft, cargo aircraft packing instruction number(s) must be used, and the package must bear the "Cargo aircraft only" label; or passenger aircraft instruction number(s) must be shown and no "Cargo aircraft only" label applied. However, where the packing instruction number(s) and the permitted quantity per package are identical for passenger and cargo aircraft, the "Cargo aircraft only" label should not be used.*

- d) special handling information, when appropriate;
- e) an indication that an overpack has been used, when appropriate; and
- f) the "Q" value rounded up to the first decimal place, if substances are packed in accordance with 3;4.3.3 or 4;1.1.9 e).

---

DGP-WG/15-WP/10 (see paragraph 3.2.5.4 of this report):

---

4.1.5.8.2 For explosive substances, where Packing Instruction 101 has been adopted by an appropriate national authority, the State's distinguishing sign for motor vehicles in international traffic of the country for which the authority acts must be marked on the dangerous goods transport document as follows:

Packaging ~~authorized~~ approved by the competent authority of ...

*Note.— In this instance, the term "competent authority" is used for intermodal compatibility; it refers to the appropriate national authority.*

...

---

UN Model Regulations, paragraph 5.4.1.5.12, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/15 (see paragraph 3.2.5.1.1 d) of this report)

---

##### 4.1.5.9 Classification where new data is available (see Part 2;1.2)

For transport in accordance with 2;1.2, a statement to this effect must be included on the dangerous goods transport document, as follows "Classified in accordance with 2;1.2 of the Technical Instructions"

## Part 6

# PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

...

## Chapter 2

### MARKING OF PACKAGINGS OTHER THAN INNER PACKAGINGS

---

UN Model Regulations, paragraph 6.1.3, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

#### Introductory Notes

Note 1.— ~~The marking marks indicates~~ indicate that the packaging which bears ~~it~~ them ~~corresponds~~ correspond to a successfully tested design type and that it complies with the provisions of Chapters 3 and 4 which are related to the manufacture, but not to the use, of the packaging. In itself, therefore, the marks ~~does~~ do not necessarily confirm that the packaging may be used for any particular substance.

Note 2.— ~~The marking marks is~~ are intended to be of assistance to packaging manufacturers, reconditioners, packaging users, operators and appropriate authorities. In relation to the use of a new packaging, the original ~~marking marks is~~ are a means for its manufacturer(s) to identify the type and to indicate those performance test regulations that have been met.

Note 3.— ~~The marking marks does~~ do not always provide full details of the test levels, etc., and these may need to be taken further into account, e.g. by reference to a test certificate, test reports or register of successfully tested packagings. For example, a packaging having an X or Y ~~marking mark~~ mark may be used for substances to which a packing group having a lesser degree of danger has been assigned with the relevant maximum permissible value of the relative density, determined by taking into account the factor 1.5 or 2.25 indicated in the test requirements for packagings in Chapter 4 as appropriate, i.e. a Packing Group I packaging tested for products with a relative density of 1.2 could be used as a Packing Group II packaging for products with a relative density of 1.8 or a Packing Group III packaging for products with a relative density of 2.7, provided of course that all the performance criteria can still be met with the higher relative density.

## 2.1 MARKING REQUIREMENTS FOR PACKAGINGS OTHER THAN INNER PACKAGINGS

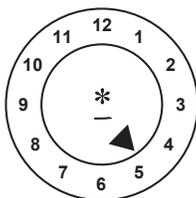
UN Model Regulations, paragraph 6.1.3.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

2.1.1 Each packaging intended for use according to these Instructions must bear ~~markings~~ **marks** 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~~ **marks**, 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~~ **marks** 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;

- b) the code designating the type of packaging according to 1.2;
- c) a code in two parts:
- 1) a letter designating the packing group(s) for which the design type has been successfully tested:
    - X for Packing Groups I, II and III
    - Y for Packing Groups II and III
    - Z for Packing Group III only;
  - 2) A) for single packagings intended to contain liquids: the relative density, rounded off to the first decimal, for which the design type has been tested; this may be omitted when the relative density does not exceed 1.2;
    - B) for packagings intended to contain solids or inner packagings: the maximum gross mass, in kilograms, at which the design type has been tested;
- d) 1) for single packagings intended to contain liquids: the hydraulic test pressure which the packaging was shown to withstand, in kPa rounded down to the nearest 10 kPa;
- 2) for packagings intended to contain solids or inner packagings: the letter "S";
- 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~~ **mark**. 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~~ **mark** 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.

---

UN Model Regulations, paragraph 6.1.3.2 to 6.1.3.11, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

2.1.2 In addition to the durable ~~markings~~ marks prescribed in 2.1.1, every new metal drum of a capacity greater than 100 L must bear the marks described in 2.1.1. a) to e) on the bottom, with an indication of the nominal thickness of at least the metal used in the body (in mm, to 0.1 mm), in a permanent form (e.g. embossed). When the nominal thickness of either head of a metal drum is thinner than that of the body, the nominal thicknesses of the top head, body and bottom head must be marked on the bottom in a permanent form (e.g. embossed), for example “1.0-1.2-1.0” or “0.9-1.0-1.0”. Nominal thicknesses of metal must be determined according to the appropriate ISO Standard, for example ISO 3574:1999 for steel. The marks indicated in 2.1.1 f) and g) must not be applied in a permanent form (e.g. embossed) except as provided for in 2.1.5.

2.1.3 Every packaging liable to undergo a reconditioning process other than those referred to in 2.1.2 must bear the marks indicated in 2.1.1 a) to e) in a permanent form. Marks are permanent if they are able to withstand the reconditioning process (e.g. embossed). For packagings other than metal drums of a capacity greater than 100 L, these permanent marks may replace the corresponding durable ~~markings~~ marks prescribed in 2.1.1.

2.1.4 For re-manufactured metal drums, if there is no change to the packaging type and no replacement or removal of integral structural components, the required ~~markings~~ marks need not be permanent (e.g. embossed). Every other re-manufactured metal drum must bear the ~~markings~~ marks indicated in 2.1.1 a) to e) in a permanent form (e.g. embossed) on the top head or side.

2.1.5 Metal drums made from materials (e.g. stainless steel) designed to be reused repeatedly may bear the ~~markings~~ marks indicated in 2.1.1 f) and g) in a permanent form (e.g. embossed).

2.1.6 Packagings manufactured with recycled plastic material as defined in 1;3 must be marked “REC”. This mark must be placed near the ~~marking~~ marks prescribed in 2.1.1.

2.1.7 ~~Marking~~ Marks must be applied in the sequence of the sub-paragraphs in 2.1.1; each ~~element of the marking~~ mark required in these sub-paragraphs and when appropriate sub-paragraphs h) to j) of 2.1.8 must be clearly separated, e.g. by a slash or space, so as to be easily identified; for examples see 2.1.10; 2.2.3; and 2.3. Any additional ~~markings~~ marks authorized by the appropriate national authority must still enable the ~~parts of the marking~~ other marks required in 2.1.1 to be correctly identified ~~with reference to 2.1.1~~.

2.1.8 After reconditioning a packaging, the reconditioner must apply to it, in sequence, ~~a durable marking~~ marks showing:

- h) the State in which the reconditioning was carried out, indicated by the distinguishing sign for motor vehicles in international traffic;
- i) the name of the reconditioner or other identification of the packaging specified by the appropriate national authority;
- j) the year of reconditioning; the letter “R”; and for every packaging successfully passing the leakproofness test in 4.4, the additional letter “L”.

2.1.9 When, after reconditioning, the ~~markings~~ marks required by 2.1.1 a) to d) no longer appear on the top head or the side of a metal drum, the reconditioner must apply them in a durable form followed by those required by 2.1.8. ~~The markings~~ These marks must not identify a greater performance capability than that for which the original design type had been tested and marked.

2.1.10 Examples of ~~for~~ for markings for NEW packagings:

*for a new fibreboard box*

 4G/Y145/S/02 as in 2.1.1 a), b), c)1), c)2)B), d)2) and e)  
NL/VL823 as in 2.1.1 f) and g)

*for a new steel drum to contain liquids*

 1A1/Y1.4/150/98 as in 2.1.1 a), b), c)1), c)2)A), d)1) and e)  
NL/VL824 as in 2.1.1 f) and g)

*for a new steel drum to contain solids, or inner packagings*

 1A2/Y150/S/01 as in 2.1.1 a), b), c)1), c)2)B), d)2) and e)  
NL/VL825 as in 2.1.1 f) and g)

for a new plastic box of equivalent specification

(u n)	4HW/Y136/S/98 NL/VL826	as in 2.1.1 a), b), c)1), c)2)B), d)2) and e) as in 2.1.1 f) and g)
----------	---------------------------	--

for a remanufactured steel drum to contain liquids

(u n)	1A2/Y100/01 USA/MM5	as in 2.1.1 a), b), c)1), c)2)A), d)1) and e) as in 2.1.1 f) and g)
----------	------------------------	--

2.1.11 Examples of **for** markings for RECONDITIONED packagings:

(u n)	1A1/Y1.4/150/97 NL/RB/01 RL	as in 2.1.1 a), b), c)1), c)2)A), d)1) and e) as in 2.1.8 h), i) and j)
----------	--------------------------------	--

(u n)	1A2/Y150/S/99 USA/RB/00 R	as in 2.1.1 a), b), c)1), c)2)B), d)2) and e) as in 2.1.8 h), i) and j)
----------	------------------------------	--

...

---

UN Model Regulations, paragraph 6.1.3.12, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 a) of this report)

---

### 2.3 PACKAGING MARKINGS FOR SALVAGE PACKAGINGS

Example of **for** marking for SALVAGE packagings:

(u n)	1A2T/Y300/S/01 USA/abc	as in 2.1.1 a), b), c)2)B), d)2) and e) as in 2.1.1 f) and g)
----------	---------------------------	--

*Note.* — ~~In the~~ **The marking, for which examples are** given in 2.1.10, 2.2.3 and 2.3, ~~the markings are shown, for convenience, in two lines; however, the markings can, may~~ be applied in a single line or in multiple lines provided they are given in the correct sequence **is respected**. **Additionally, the inclusion in the specification marking of the "/" symbol is optional.**

...

## Chapter 4

### PACKAGING PERFORMANCE TESTS

...

#### 4.1 PERFORMANCE AND FREQUENCY OF TESTS

...

---

UN Model Regulations, paragraph 6.1.5.1.6, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

4.1.6 Reserved.

*Note.* — ~~For the conditions for assembling~~ **using** different inner packagings in an outer packaging and permissible variations in inner packagings, see 4;1.1.10.1. **These conditions do not limit the use of inner packagings when applying 4.1.7.**

...

#### 4.5 INTERNAL PRESSURE (HYDRAULIC) TEST

4.5.1 Packagings to be tested: the internal pressure (hydraulic) test must be carried out on all design types of metal, plastic and composite packagings intended to contain liquids. This test is not required for the inner packagings of combination packagings. For the internal pressure requirements for inner packagings see 4;1.1.6.

4.5.2 Number of test samples: three test samples per design type and manufacturer.

---

UN Model Regulations, paragraph 6.1.5.5.4, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

4.5.3 Test method and pressure to be applied: metal packagings including their closures must be subjected to the test pressure for 5 minutes. Plastic packagings and composite packagings (plastic material) including their closures must be subjected to the test pressure for 30 minutes. This pressure is the one to be included in the ~~marking~~ **mark** required by 2.1.1 d). The manner in which the packagings are supported must not invalidate the test. The test pressure must be applied continuously and evenly: it must be kept constant throughout the test period. The hydraulic pressure (gauge) applied, as determined by any one of the following methods, must be:

- a) not less than the total gauge pressure measured in the packaging (i.e. the vapour pressure of the filling liquid and the partial pressure of the air or other inert gases minus 100 kPa) at 55°C, multiplied by a safety factor of 1.5. This total gauge pressure must be determined on the basis of a maximum degree of filling in accordance with Part 4;1.1.5 and a filling temperature of 15°C. The test pressure must be not less than 95 kPa (not less than 75 kPa for liquids in Packing Group III of Class 3 or Division 6.1); or
- b) not less than 1.75 times the vapour pressure at 50°C of the liquid to be transported, minus 100 kPa but with a minimum test pressure of 100 kPa; or
- c) not less than 1.5 times the vapour pressure at 55°C of the liquid to be transported, minus 100 kPa but with a minimum test pressure of 100 kPa.

...

## 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

*Note 1.— Aerosol dispensers, small receptacles containing gas (gas cartridges) and fuel cell cartridges containing liquefied flammable gas are not subject to the requirements of 6;5.1 to 6;5.3.*

*Note 2.— For open cryogenic receptacles the requirements of Packing Instruction 202 must be met.*

#### 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.

---

UN Model Regulations, paragraph 6.2.1.1.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

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 bear "UN" certification marking marks 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.

...

---

UN Model Regulations, paragraph 6.2.1.1.9, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

5.1.1.9 Additional requirements for the construction of pressure receptacles for acetylene

Cylinders for UN 1001— **Acetylene, dissolved** and UN 3374 — **Acetylene, solvent free** must be filled with a porous mass, uniformly distributed, of a type that conforms to the requirements and testing specified by a standard or technical code recognized by the appropriate national authority and which:

- a) is compatible with the cylinder and does not form harmful or dangerous compounds either with the acetylene or with the solvent in the case of UN 1001; and
- b) is capable of preventing the spread of decomposition of the acetylene in the porous mass.

In the case of UN 1001, the solvent must be compatible with the cylinders.

...

---

UN Model Regulations, paragraph 6.2.1.5.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

### 5.1.5 Initial inspection and testing

5.1.5.1 New cylinders, other than closed cryogenic receptacles and metal hydride storage systems, must be subjected to inspection and testing during and after manufacture in accordance with the applicable design standards including the following:

On an adequate sample of cylinders:

- a) testing of the mechanical characteristics of the material of construction;
- b) verification of the minimum wall thickness;
- c) verification of the homogeneity of the material for each manufacturing batch;
- d) inspection of the external and internal conditions of the cylinders;
- e) inspection of the neck threads;
- f) verification of the conformance with the design standard;

For all cylinders:

- g) a hydraulic pressure test. Cylinders must ~~withstand the test pressure without expansion greater than that allowed in the design specifications~~ meet the acceptance criteria specified in the design and construction technical standard or technical code;

*Note.— With the agreement of the appropriate national authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.*

- h) inspection and assessment of manufacturing defects and either repairing them or rendering the cylinders unserviceable. In the case of welded cylinders, particular attention must be paid to the quality of the welds;

- i) an inspection of the ~~markings~~ **marks** on the cylinders;
- j) in addition, cylinders intended for the transport of UN 1001 — **Acetylene, dissolved**, and UN 3374 — **Acetylene, solvent free**, must be inspected to ensure proper installation and condition of the porous mass and, if applicable, the quantity of solvent.

...

UN Model Regulations, paragraph 6.2.1.6.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

### 5.1.6 Periodic inspection and testing

5.1.6.1 Refillable cylinders must be subjected to periodic inspections and tests by a body authorized by the appropriate national authority, in accordance with the following:

- a) check of the external conditions of the cylinder and verification of the equipment and the external ~~markings~~ **marks**;
- b) check of the internal conditions of the cylinder (e.g. internal inspection, verification of minimum wall thickness);
- c) check of the threads if there is evidence of corrosion or if the fittings are removed;
- d) a hydraulic pressure test and, if necessary, verification of the characteristics of the material by suitable tests;

*Note 1.— With the agreement of the appropriate national authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.*

*Note 2.— With the agreement of the appropriate national authority, the hydraulic pressure test of cylinders may be replaced by an equivalent method based on acoustic emission testing or a combination of acoustic emission testing and ultrasound examination. ISO 16148:2006 may be used as a guide for acoustic emission testing procedures.*

*Note 3.— The hydraulic pressure test may be replaced by ultrasonic examination carried out in accordance with ISO 10461:2005 + A1:2006 for seamless aluminium alloy gas cylinders and in accordance with ISO 6406:2005 for seamless steel gas cylinders.*

- e) check of service equipment, other accessories and pressure-relief devices, if to be reintroduced into service.

*Note.— For the periodic inspection and test frequencies, see Packing Instruction 200 or, for a chemical under pressure, Packing Instruction 218.*

...

UN Model Regulations, paragraph 6.2.2.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraphs 3.2.6.1 and 3.2.6.1 b) of this report)

### 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:

Reference	Title	Applicable for manufacture
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>	Until 31 December 2018

ISO 9809-1:2010	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.	Until further notice
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.	Until 31 December 2018
ISO 9809-2:2010	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.	Until further notice
ISO 9809-3:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until 31 December 2018
ISO 9809-3:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until further notice
<a href="#">ISO 9809-4:2014</a>	<a href="#">Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa</a>	<a href="#">Until further notice</a>
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>	Until further notice <a href="#">Until 31 December 2020</a>
<a href="#">ISO ISO 7866: 2012+ Cor 1:2014</a>	<a href="#">Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing</a>  <i>Note.— Aluminium alloy 6351A or equivalent must not be used.</i>	<a href="#">Until further notice</a>
ISO 4706:2008	Gas cylinders — Refillable welded steel cylinders — Test pressure 60 bar and below.	Until further notice
ISO 18172-1:2007	Gas cylinders — Refillable welded stainless steel cylinders — Part 1: Test pressure 6 MPa and below.	Until further notice
ISO 20703:2006	Gas cylinders — Refillable welded aluminium-alloy cylinders — Design, construction and testing.	Until further notice
ISO 11118:1999	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	Until further notice
ISO 11119-1:2002	Gas cylinders of composite construction — Specification and test methods — Part 1: Hoop wrapped composite gas cylinders.	Until further notice <a href="#">Until 31 December 2020</a>
<a href="#">ISO 11119-1:2012</a>	<a href="#">Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 L</a>	<a href="#">Until further notice</a>
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.	Until further notice <a href="#">Until 31 December 2020</a>
<a href="#">ISO 11119-2:2012 + Amd 1:2014</a>	<a href="#">Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners</a>	<a href="#">Until further notice</a>
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.	Until further notice <a href="#">Until 31 December 2020</a>
<a href="#">ISO 11119-3:2013</a>	<a href="#">Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with non-load-sharing metallic or non-metallic liners</a>	<a href="#">Until further notice</a>

*Note 1.— In the above-referenced standards, composite cylinders must be designed for ~~unlimited service life~~ [a design life of not less than fifteen years](#).*

*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.~~ [Composite cylinders with a design life longer than fifteen years must not be filled after fifteen years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme must be part of the initial design type approval and must specify inspections and tests to demonstrate that cylinders manufactured accordingly remain safe to the end of their design life. The service life test programme and the results must be approved by the competent authority of the country of approval that is responsible for the initial approval of the cylinder design. The service life of a composite cylinder must not be extended beyond its initial approved design life.](#)*

...

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).*

...

---

UN Model Regulations, paragraph 6.2.2.1.3, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

For the porous mass in the cylinder:

Reference	Title	Applicable for manufacture
ISO 3807-1:2000	Cylinders for acetylene — Basic requirements — Part 1: Cylinders without fusible plugs.	Until further notice <u>Until 31 December 2020</u>
ISO 3807-2:2000	Cylinders for acetylene — Basic requirements — Part 2: Cylinders with fusible plugs.	Until further notice <u>Until 31 December 2020</u>
<u>ISO 3807:2013</u>	<u>Gas cylinders — Acetylene cylinders — Basic requirements and type testing</u>	Until further notice

...

---

UN Model Regulations, paragraph 6.2.2.2, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

### 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:

Reference	Title	Applicable for manufacture
ISO 11114-1:2012	Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials.	Until further notice
ISO 11114-2:2000 <u>ISO 11114-2:2013</u>	<del>Transportable gas</del> Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials.	Until further notice

---

UN Model Regulations, paragraph 6.2.2.3, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

### 5.2.3 Service equipment

The following standards apply to closures and their protection:

Reference	Title	Applicable for manufacture
ISO 11117:1998	Gas cylinders — Valve protection caps and valve guards for industrial and medical gas cylinders — Design, construction and tests.	Until 31 December 2014
ISO 11117:2008+ Cor 1:2009	Gas cylinders — Valve protection caps and valve guards — Design, construction and tests.	Until further notice
ISO 10297:1999	Gas cylinders – Refillable gas cylinder valves – Specification and type testing.	Until 31 December 2008
ISO 10297:2006	Gas cylinders — Refillable gas cylinder valves — Specification and type testing.	Until further notice <b>Until 31 December 2020</b>
<b>ISO 10297:2014</b>	<b>Gas cylinders — Cylinder valves — Specification and type testing</b>	<b>Until further notice</b>
ISO 13340:2001	Transportable gas cylinders — Cylinder valves for non-refillable cylinders — Specification and prototype testing.	Until further notice

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.	Until further notice

UN Model Regulations, paragraph 6.2.2.4, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

#### 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:

Reference	Title	Applicable for manufacture
ISO 6406:2005	Seamless steel gas cylinders — Periodic inspection and testing.	Until further notice
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>	Until further notice
ISO 10461:2005/A1:2006	Seamless aluminium-alloy gas cylinders — Periodic inspection and testing.	Until further notice
ISO 10462:2005	Transportable cylinders for dissolved acetylene — Periodic inspection and maintenance.	Until further notice <b>Until 31 December 2018</b>
<b>ISO 10462:2013</b>	<b>Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance.</b>	<b>Until further notice</b>
ISO 11513:2011	Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection.	Until further notice
ISO 11623:2002	Transportable gas cylinders — Periodic inspection and testing of composite gas cylinders.	Until further notice
ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	Until further notice

*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.*

### 5.2.5 Conformity assessment system and approval for manufacture of cylinders and closed cryogenic receptacles

---

UN Model Regulations, paragraph 6.2.2.5.2.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

#### 5.2.5.2 General requirements

##### 5.2.5.2.1 Appropriate national authority

5.2.5.2.1.1 The appropriate national authority that approves the cylinder and closed cryogenic receptacle must approve the conformity assessment system for the purpose of ensuring that cylinders and closed cryogenic receptacles conform to the requirements of these Instructions. In instances where the appropriate national authority that approves a cylinder and closed cryogenic receptacle is not the appropriate national authority in the country of manufacture, the marks of the approval country and the country of manufacture must be indicated in the cylinder and closed cryogenic receptacle ~~marking marks~~ (see 5.2.7 and 5.2.8). The appropriate national authority of the country of approval must supply to its counterpart in a country of use, upon request, evidence demonstrating compliance to this conformity assessment system.

...

##### 5.2.5.5 Production inspection and certification

...

---

UN Model Regulations, paragraph 6.2.2.5.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

5.2.5.5.4 The manufacturer must, after approval by the inspection body, make a declaration of conformity with the certified design type. The application of the cylinder and closed cryogenic receptacle certification ~~marking marks~~ must be considered a declaration that the cylinder and closed cryogenic receptacle comply with the applicable cylinder and closed cryogenic receptacle standards, the requirements of this conformity assessment system and these Instructions. The inspection body must affix or delegate the manufacturer to affix the cylinder and closed cryogenic receptacle certification ~~marking marks~~ and the registered mark of the inspection body to each approved cylinder or closed cryogenic receptacle.

5.2.5.5.5 A certificate of compliance, signed by the inspection body and the manufacturer, must be issued before the cylinders and closed cryogenic receptacles are filled.

##### 5.2.5.6 Records

Design type approval and certificate of compliance records must be retained by the manufacturer and the inspection body for not less than 20 years.

### 5.2.6 Approval system for periodic inspection and test of cylinders and closed cryogenic receptacles

#### 5.2.6.1 Definitions

For the purposes of this section:

**Approval system:** means a system for the appropriate national authority approval of a body performing the periodic inspection and test of cylinders and closed cryogenic receptacles (hereinafter referred to as "periodic inspection and test body"), including approval of that body's quality system.

---

UN Model Regulations, paragraph 6.2.2.6.2.1, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

#### 5.2.6.2 General requirements

##### 5.2.6.2.1 Appropriate national authority

5.2.6.2.1.1 The appropriate national authority must establish an approval system for the purpose of ensuring that the periodic inspection and test of cylinders and closed cryogenic receptacles conform to the requirements of these Instructions. In instances where the appropriate national authority that approves the body performing periodic inspection and test of a cylinder and closed cryogenic receptacle is not the appropriate national authority of the country approving the manufacture of the cylinder, the marks of the approval country of periodic inspection and test must be indicated in the cylinder and closed cryogenic receptacle ~~marking~~ marks (see 5.2.7).

...

---

UN Model Regulations, paragraph 6.2.2.6.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

#### 5.2.6.5 Periodic inspection and test and certification

5.2.6.5.1 The application of the periodic inspection and test ~~marking~~ marks to a cylinder and closed cryogenic receptacle must be considered a declaration that the cylinder and closed cryogenic receptacle complies with the applicable cylinder and closed cryogenic receptacle standards and the requirements of these Instructions. The periodic inspection and test body must affix the periodic inspection and test ~~marking~~ marks, including its registered mark, to each approved cylinder and closed cryogenic receptacle (see 5.2.7.8).

5.2.6.5.2 A record certifying that a cylinder and closed cryogenic receptacle have passed the periodic inspection and test must be issued by the periodic inspection and test body before the cylinder and closed cryogenic receptacle are filled.

...

---

UN Model Regulations, paragraph 6.2.2.7.4, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

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;
- ≠ 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 11114-1:2012):
  - q) For composite cylinders having a limited design life, the letters "FINAL" followed by the design life shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/");
  - r) For composite cylinders having a limited design life greater than fifteen years and for composite cylinders and tubes having non-limited design life, the letters "SERVICE" followed by the date fifteen years from the date of manufacture (initial inspection) shown as the year (four digits) followed by the month (two digits) separated by a slash (i.e. "/").

Note.— Once the initial design type has passed the service life test programme requirements in accordance with 5.2.1.1 Note 2, future production no longer requires this initial service life mark. The initial service life mark must be made unreadable on cylinders of a design type that has met the service life test programme requirements.

---

UN Model Regulations, paragraph 6.2.2.7.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

5.2.7.5 The above marks must be placed in three groups:

- a) Manufacturing marks must be the top grouping and must appear consecutively in the sequence given in 5.2.7.4 except for the marks described in 5.2.7.4 q) and r) which must be adjacent to the periodic inspection and test marks of 5.2.7.8;
- b) The operational marks in 5.2.7.3 must be the middle grouping and the test pressure f) which must be immediately preceded by the working pressure (i) when the latter is required;
- c) Certification marks must be the bottom grouping and must appear in the sequence given in 5.2.7.2.

The following is an example of the markings applied to a cylinder:

m) 25E	n) D MF	o) 765432	p) H	
i) PW200PH	f) 300BAR	g) 62.1KG	j) 50L	h) 5.8MM
<div style="display: inline-block; border: 1px solid black; border-radius: 50%; padding: 2px; text-align: center;">                     u n                 </div> a)	b) ISO 9809-1	c) F	d) IB	e) 2000/12

5.2.7.6 Other marks are allowed in areas other than the side wall, provided they are made in low stress areas and are not of a size and depth that will create harmful stress concentrations. In the case of closed cryogenic receptacles, such marks may be on a separate plate attached to the outer jacket. Such marks must not conflict with required marks.

5.2.7.7 Cylinders of composite construction with limited life must be marked with the letters "FINAL" followed by the expiry date, the year (four digits) and the month (two digits).

---

UN Model Regulations, paragraph 6.2.2.7.7, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

5.2.7.8 In addition to the preceding marks, each refillable cylinder and closed cryogenic receptacle that meets the periodic inspection and test requirements of 5.2.4 must be marked indicating:

- a) the character(s) identifying the country authorizing the body performing the periodic inspection and test. This marking mark is not required if this body is approved by the appropriate national authority of the country approving manufacture;
- b) the registered mark of the body authorized by the appropriate national authority for performing the periodic inspection and test;
- c) the date of the periodic inspection and test, the year (two digits) followed by the month (two digits) separated by a slash (i.e. "/"). Four digits may be used to indicate the year.

The above marks must appear consecutively in the sequence given.

5.2.7.9 For acetylene cylinders, with the agreement of the national authority, the date of the most recent periodic inspection and the stamp of the body performing the periodic inspection and test may be engraved on a ring held on the cylinder by the valve. The ring must be configured so that it can be removed only by disconnecting the valve from the cylinder.

### 5.2.8 Marking of non-refillable UN cylinders and closed cryogenic receptacles

5.2.8.1 Non-refillable UN cylinders and closed cryogenic receptacles must be marked clearly and legibly with certification and gas or cylinder and closed cryogenic receptacle specific marks. These marks must be permanently affixed (e.g. stencilled, stamped, engraved or etched) on the cylinder. Except when stencilled, the marks must be on the shoulder, top end or neck of the cylinder and closed cryogenic receptacle or on a permanently affixed component of the cylinder and closed cryogenic receptacle (e.g. welded collar). Except for the "UN" mark and the "DO NOT REFILL" mark, the minimum size of the marks must be 5 mm for cylinders and closed cryogenic receptacles with a diameter greater than or equal to

140 mm and 2.5 mm and closed cryogenic receptacles for cylinders with a diameter less than 140 mm. The minimum size of the “UN” mark must be 10 mm for cylinders and closed cryogenic receptacles with a diameter greater than or equal to 140 mm and 5 mm for cylinders and closed cryogenic receptacles with a diameter less than 140 mm. The minimum size of the “DO NOT REFILL” mark must be 5 mm.

5.2.8.2 The marks listed in 5.2.7.2 to 5.2.7.4 must be applied with the exception of g), h) and m). The serial number o) may be replaced by the batch number. In addition, the words “DO NOT REFILL” in letters of at least 5 mm in height are required.

---

UN Model Regulations, paragraph 6.2.2.8.3, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

5.2.8.3 The requirements of 5.2.7.5 must apply.

*Note.— Non-refillable cylinders and closed cryogenic receptacles may, on account of their size, substitute ~~this marking by a label~~ a label for these permanent marks.*

5.2.8.4 Other marks are allowed provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks must not conflict with required marks.

### 5.2.9 Marking of UN metal hydride storage systems

...

5.2.9.3 Other marks are allowed in areas other than the side wall, provided they are made in low stress areas and are not of a size and depth that will create harmful stress concentrations. Such marks must not conflict with required marks.

---

UN Model Regulations, paragraph 6.2.2.9.4, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

5.2.9.4 In addition to the preceding marks, each metal hydride storage system that meets the periodic inspection and test requirements of 5.2.4 must be marked indicating:

- a) the character(s) identifying the country authorizing the body performing the periodic inspection and test, as indicated by the distinguishing sign of motor vehicles in international traffic. This ~~marking mark~~ is not required if this body is approved by the appropriate national authority of the country approving manufacture;
- b) the registered mark of the body authorized by the appropriate national authority for performing periodic inspection and test;
- c) the date of the periodic inspection and test, the year (two digits), followed by the month (two digits) and separated by a slash (i.e. “/” ). Four digits may be used to indicate the year.

The above marks must appear consecutively in the sequence given.

...

## Chapter 6

### PACKAGINGS FOR INFECTIOUS SUBSTANCES OF CATEGORY A

...

#### 6.4 MARKING

---

UN Model Regulations, paragraph 6.3.4, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

*Note 1.— ~~The marking marks~~ indicates that the packaging which bears ~~it~~ them corresponds to a successfully tested design type and that it complies with the provisions of this chapter which are related to the manufacture, but not to the use, of the packaging.*

*Note 2.— ~~The marking is~~ marks are intended to be of assistance to packaging manufacturers, reconditioners, packaging users, operators and appropriate authorities.*

*Note 3.— ~~The marking does~~ marks do not always provide full details of the test levels, etc., and these may need to be taken further into account, e.g. by reference to a test certificate, test reports or register of successfully tested packagings.*

6.4.1 Each packaging intended for use according to these Instructions must bear ~~markings~~ marks 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~~ marks, or a duplicate thereof, must appear on the top or on a side of the packaging. Letters, numerals and symbols must be at least 12 mm high, except for packagings of 30 L or 30 kg capacity or less, when they must be at least 6 mm in height and for packagings of 5 L or 5 kg or less, when they must be of an appropriate size.

6.4.2 A packaging that meets the requirements of this section and of 6.5 shall be marked with:

- a) the United Nations packaging symbol; 

This symbol must not be used for any purpose other than certifying that a packaging complies with the relevant requirements in Chapters 1 to 6;

- b) the code designating the type of packaging according to the requirements of 6;1.2;
- c) the text "CLASS 6.2";
- d) the last two digits of the year of manufacture of the packaging;
- e) the State authorizing the allocation of the mark, indicated by the distinguishing sign for motor vehicles in international traffic;
- f) the name of the manufacturer or other identification of the packaging specified by the competent authority; and
- g) for packagings meeting the requirements of 6.5.1.6, the letter "U", inserted immediately following the ~~marking~~ mark required in b) above.

6.4.3 ~~Markings~~ Marks must be applied in the sequence of the sub-paragraphs in 6.4.2; each ~~element of the marking~~ mark required in these sub-paragraphs must be clearly separated, e.g. by a slash or space, so as to be easily identified. For an example see 6.4.4. Any additional markings authorized by a competent authority must still enable the ~~parts of the marking~~ marks required in 6.4.1 to be correctly identified ~~with reference to 6.4.1~~.

6.4.4 Example of a marking:

 4G/CLASS 6.2/06 as in 6.4.2 a), b), c) and d)  
S/SP-9989-ERIKSSON as in 6.4.2 e) and f)

---

UN Model Regulations, paragraph 6.3.5, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/16 (see paragraph 3.2.6.1 of this report)

---

## 6.5 TEST REQUIREMENTS FOR PACKAGINGS

### 6.5.1 Performance and frequency of tests

...

6.5.1.6 Primary receptacles of any type may be assembled within a secondary packaging and transported without testing in the rigid outer packaging under the following conditions:

- a) The rigid outer packaging combination must have been successfully tested in accordance with 6.5.2.2 with fragile (e.g. glass) primary receptacles.
- b) The total combined gross mass of primary receptacles must not exceed one-half the gross mass of primary receptacles used for the drop test in a) above.
- c) The thickness of cushioning between primary receptacles and between primary receptacles and the outside of the secondary packaging must not be reduced below the corresponding thicknesses in the originally tested packaging; and if a single primary receptacle was used in the original test, the thickness of cushioning between primary receptacles must not be less than the thickness of cushioning between the outside of the secondary packaging and the primary receptacle in the original test. When either fewer or smaller primary receptacles are used (as compared to the primary receptacles used in the drop test), sufficient additional cushioning material must be used to take up the void spaces.
- d) The rigid outer packaging must have successfully passed the stacking test in 4.6 while empty. The total mass of identical packages must be based on the combined mass of packagings used in the drop test in a) above.
- e) For primary receptacles containing liquids, an adequate quantity of absorbent material to absorb the entire liquid content of the primary receptacles must be present.
- f) If the rigid outer packaging is intended to contain primary receptacles for liquids and is not leakproof, or is intended to contain primary receptacles for solids and is not siftproof, a means of containing any liquid or solid contents in the event of leakage must be provided in the form of a leakproof liner, plastic bag or other equally effective means of containment.
- g) In addition to the ~~markings~~ **marks** prescribed in 6.4.2 a) to f), packagings must be marked in accordance with 6.4.2 g).

...

## Part 7

# OPERATOR'S RESPONSIBILITIES

...

---

DGP-WG/14 Report (see paragraph 3.2.7.2 of DGP-WG/14-WP/32)

---

## Chapter 1

### ACCEPTANCE PROCEDURES

...

#### 1.2 ACCEPTANCE OF DANGEROUS GOODS BY OPERATORS

1.2.1 An operator must not accept for transport aboard an aircraft a package or overpack containing dangerous goods or a freight container containing radioactive material or a unit load device ~~or other type of pallet~~ containing the dangerous goods as described in 1.4.1 b) and c) unless:

- a) it is accompanied by two copies of the dangerous goods transport document; or
- b) the information applicable to the consignment is provided in electronic form; or
- c) it is accompanied, where permitted, by alternative documentation.

...

#### 1.3 THE ACCEPTANCE CHECK

1.3.1 Before a consignment consisting of a package or overpack containing dangerous goods, a freight container containing radioactive material or a unit load device ~~or other type of pallet~~ containing dangerous goods as described in 1.4 is first accepted for carriage by air, the operator must, by use of a checklist, verify the following:

...

*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.*

...

---

DGP-WG/14 Report (see paragraph 3.2.7.2 of DGP-WG/14-WP/32) and DGP-WG/15-WP/31, Revision No. 2 (see paragraph 3.2.7.4 of this report)

---

#### 1.4 ACCEPTANCE OF FREIGHT CONTAINERS AND UNIT LOAD DEVICES

1.4.1 An operator must not accept from a shipper a freight container or a unit load device containing dangerous goods other than:

- a) a freight container for radioactive material (see 6;7.1);

- b) a unit load device ~~or other type of pallet~~ containing consumer commodities prepared according to Packing Instruction Y963;
- c) a unit load device ~~or other type of pallet~~ containing dry ice used as a refrigerant for other than dangerous goods prepared according to Packing Instruction 954 provided that the unit load device does not contain dangerous goods other than UN 3373, Biological substance, Category B or ID 8000, Consumer commodity or goods not subject to these Instructions; or
- d) a unit load device ~~or other type of pallet~~ containing magnetized material.

1.4.2 When an operator accepts a unit load device ~~or other type of pallet~~ containing consumer commodities or dry ice as permitted by 1.4.1, the operator must attach an identification tag as required by 2.8.1 to the unit load device.

...

---

DGP-WG/14 Report (see paragraph 3.2.7.2 of DGP-WG/14-WP/32)

---

## Chapter 2

### STORAGE AND LOADING

...

#### 2.11 LOADING OF DRY ICE

...

2.11.2 Where dry ice is contained in a unit load device ~~or other type of pallet~~ prepared by a single shipper in accordance with Packing Instruction 954 and the operator, after acceptance, adds additional dry ice, then the operator must ensure that the information provided to the pilot-in-command reflects that revised quantity of dry ice.

*Note.— For arrangements between the shipper and operator see Packing Instruction 954.*

...

## Chapter 4

### PROVISION OF INFORMATION

...

#### 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:

...

4.1.1.1 Except as otherwise provided, the information required by 4.1.1 must include the following:

...

---

DGP-WG/15-WP/23 (see paragraph 3.2.7.3 of this report)

---

- f) the net quantity, or gross mass if applicable, of each package, except that this does not apply to radioactive material or other dangerous goods where the net quantity or gross mass is not required on the dangerous goods transport document (see 5;4.1.4) or, when applicable, alternative written documentation. For a consignment consisting of multiple packages containing dangerous goods bearing the same proper shipping name and UN number or ID number, only the total quantity and an indication of the quantity of the largest and smallest package at each loading location need to be provided. ~~For unit load devices or other types of pallets containing consumer commodities accepted from a single shipper, the number of packages and the average gross mass need to be provided.~~ For consumer commodities, the information provided may be either the gross mass of each package or the average gross mass of the packages as shown on the dangerous goods transport document;

...

#### 4.11 RETENTION OF DOCUMENTS OR INFORMATION

...

4.11.2 For each package or overpack containing danwgerous goods or freight container containing radioactive material or unit load device ~~or other type of pallet~~ containing dangerous goods as described in 1.4 that was not accepted by an operator due to an error or omission by the shipper in packaging, labelling, marking or documentation, a copy of the documentation as well as the acceptance checklist (when this is in a form which requires physical completion) should be retained for a minimum period of three months after the completion of the acceptance checklist.

*Note.— Where the documents are kept electronically or in a computer system, they should be capable of being reproduced in a printed manner.*

...

DGP-WG/15-WP/24 (see paragraph 3.2.8.2 of this report) and DGP-WG/15-WP/36 (see paragraph 3.2.8.5 of report)

New Item 19) to be incorporated in 2015-2016 Edition by way of an addendum.

## Part 8

### PROVISIONS CONCERNING PASSENGERS AND CREW

...

**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						
...						
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						
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	No	a) carried by passengers for medical use; <b>and</b> b) <del>each installed or spare battery</del> <b>batteries or cells</b> 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; e) <del>spare batteries must be individually protected so as to prevent short circuits (by placement in original retail packaging or by otherwise insulating terminals, e.g. by taping over exposed terminals or placing each battery in a separate plastic bag or protective pouch); and</del> d) <del>no more than two spare batteries exceeding 2 grams lithium content for lithium metal or a watt-hour rating exceeding 100 Wh for lithium ion may be carried by a passenger.</del>
.....						

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 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	<p><u>a) carried by passengers for medical use;</u></p> <p><u>b) batteries or cells must be of a type which meets the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and</u></p> <p><u>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).</u></p>
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	<p><u>a) carried by passengers for medical use; and</u></p> <p><u>b) batteries or cells must be of a type which meets the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3.</u></p>
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	No	Yes	Yes	Yes	No	<p><u>a) carried by passengers for medical use;</u></p> <p><u>b) batteries or cells must be of a type which meets the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;</u></p> <p><u>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</u></p> <p><u>d) no more than two spare batteries exceeding 2 grams lithium content for lithium metal or a watt-hour rating exceeding 100 Wh for lithium ion may be carried</u></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			
Consumer articles						
...						
19) <u>Battery powered portable electronic smoking devices (e.g. e-cigarettes, e-cigs, e-cigars, e-pipes, personal vaporizers, electronic nicotine delivery systems)</u>	No	Yes	Yes	No	No	<p>a) <u>carried by passengers or crew for personal use;</u></p> <p>b) <u>spare batteries must be individually protected so as to prevent short circuits (by placement in original retail packaging or by otherwise insulating terminals, e.g. by taping over exposed terminals or placing each battery in a separate plastic bag or protective pouch);</u></p> <p>c) <u>each battery must not exceed the following:</u></p> <ul style="list-style-type: none"> <li>— <u>for lithium metal batteries, a lithium content of <del>not more than</del> 2 grams; or</u></li> <li>— <u>for lithium ion batteries, a Watt-hour rating of <del>not more than</del> 100 Wh;</u></li> </ul> <p>d) <u>each lithium battery must be of a type which meets the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and</u></p> <p>e) <u>recharging of the devices and/or batteries on board the aircraft is not permitted.</u></p>
19) Portable electronic devices (such as watches, calculating machines, cameras, cellular phones, laptop computers, camcorders)						
Portable electronic devices <del>(including medical devices)</del> containing lithium metal or lithium ion cells or batteries (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)	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 <del>not more than</del> 2 grams; or</li> <li>— for lithium ion batteries, a Watt-hour rating of <del>not more than</del> 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 UN <i>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 (including medical devices) containing lithium metal or lithium ion cells or batteries	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 <b>not more than</b> 2 grams; or</li> <li>— for lithium ion batteries, a Watt-hour rating of <b>not more than</b> 100 Wh; and</li> </ul> <p>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.</p>
Portable electronic devices containing lithium ion batteries exceeding a Watt-hour rating of 100 Wh but not exceeding 160 Wh	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 UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3.</p>
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	<p>a) carried by passengers or crew for personal use;</p> <p>b) no more than two individually protected spare batteries per person;</p> <p>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</p> <p>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.</p>

...

-----

**ATTACHMENT A****PROPOSED AMENDMENTS TO TABLE 3-1 — UN NUMBER ORDER**

The format for displaying the amendments to Table 3-1 is as follows:

**Modified entries**

- both the original and the modified entry are printed;
- both modified and non-modified fields are printed;
- the original entry is printed in a shaded box with an asterisk in the left margin;
- check boxes are printed above the field(s) which have been modified;
- the modified entry is shown without shading below the original entry; and
- the “≠” symbol is printed in the left margin.

**Deleted entries**

- deleted entries are displayed in a shaded box with an asterisk in the left margin;
- check boxes are shown above each field; and
- the “>” symbol is displayed in the left margin below the shaded box to indicate that the entry will be deleted.

**New entries**

New entries are shown without shading with the “+” symbol in the left margin.



Table 3-1. Dangerous Goods List

Name 1	UN No. 2	Class or division 3	Subsidiary risk 4	Labels 5	State variations 6	Special provisions 7	UN packing group 8	Excepted quantity 9	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction 10	Max. net quantity per package 11	Packing instruction 12	Max. net quantity per package 13
+ Rocket motors †	0510	1.4C		Explosive 1.4				E0	FORBIDDEN		130	75 kg
* Argon, compressed	1006	2.2		Gas non-flammable		☑ A69		E1	200	75 kg	200	150 kg
≠ Argon, compressed	1006	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* Butadienes, stabilized	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1		E0	FORBIDDEN		200	150 kg
≠ Butadienes, stabilized	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Butadienes and hydrocarbon mixture, stabilized, containing more than 40% butadienes	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1		E0	FORBIDDEN		200	150 kg
≠ Butadienes and hydrocarbon mixture, stabilized, containing more than 40% butadienes	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Carbon dioxide	1013	2.2		Gas non-flammable		☑		E1	200	75 kg	200	150 kg
≠ Carbon dioxide	1013	2.2		Gas non-flammable		A202		E1	200	75 kg	200	150 kg
* Helium, compressed	1046	2.2		Gas non-flammable		☑ A69		E1	200	75 kg	200	150 kg
≠ Helium, compressed	1046	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* Hydrogen cyanide, stabilized containing less than 3% water	1051	6.1	3			☑			FORBIDDEN		FORBIDDEN	
≠ Hydrogen cyanide, stabilized containing less than 3% water	1051	6.1	3			A209			FORBIDDEN		FORBIDDEN	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only		
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package	
1	2	3	4	5	6	7	8	9	10	11	12	13	
* Krypton, compressed	1056	2.2		Gas non-flammable		☑ A69			E1	200	75 kg	200	150 kg
≠ Krypton, compressed	1056	2.2		Gas non-flammable		A69 A202			E1	200	75 kg	200	150 kg
* Methylacetylene and propadiene mixture, stabilized †	1060	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1			E0	FORBIDDEN	200	150 kg	
≠ Methylacetylene and propadiene mixture, stabilized †	1060	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209			E0	FORBIDDEN	200	150 kg	
* Neon, compressed	1065	2.2		Gas non-flammable		☑ A69			E1	200	75 kg	200	150 kg
≠ Neon, compressed	1065	2.2		Gas non-flammable		A69 A202			E1	200	75 kg	200	150 kg
* Nitrogen, compressed	1066	2.2		Gas non-flammable		☑ A69			E1	200	75 kg	200	150 kg
≠ Nitrogen, compressed	1066	2.2		Gas non-flammable		A69 A202			E1	200	75 kg	200	150 kg
* Tetrafluoroethylene, stabilized	1081	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1			E0	FORBIDDEN	200	150 kg	
≠ Tetrafluoroethylene, stabilized	1081	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209			E0	FORBIDDEN	200	150 kg	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only		
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package	
													10
* Trifluorochloroethylene, stabilized	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A2				FORBIDDEN		FORBIDDEN	
≠ Trifluorochloroethylene, stabilized	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN		FORBIDDEN	
* Refrigerant gas R 1113	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A2				FORBIDDEN		FORBIDDEN	
≠ Refrigerant gas R 1113	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN		FORBIDDEN	
* Vinyl bromide, stabilized	1085	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1		E0		FORBIDDEN	200	150 kg	
≠ Vinyl bromide, stabilized	1085	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0		FORBIDDEN	200	150 kg	
* Vinyl chloride, stabilized	1086	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3 US 4	<input checked="" type="checkbox"/> A1		E0		FORBIDDEN	200	150 kg	
≠ Vinyl chloride, stabilized	1086	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3 US 4	A1 A209		E0		FORBIDDEN	200	150 kg	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* Vinyl methyl ether, stabilized	1087	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1			E0	FORBIDDEN	200	150 kg
≠ Vinyl methyl ether, stabilized	1087	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209			E0	FORBIDDEN	200	150 kg
* Acrolein, stabilized	1092	6.1	3			<input checked="" type="checkbox"/>				FORBIDDEN	FORBIDDEN	
≠ Acrolein, stabilized	1092	6.1	3			A209				FORBIDDEN	FORBIDDEN	
* Acrylonitrile, stabilized	1093	3	6.1	Liquid flammable & Toxic		<input checked="" type="checkbox"/>		I	E0	FORBIDDEN	361	30 L
≠ Acrylonitrile, stabilized	1093	3	6.1	Liquid flammable & Toxic		A209	I		E0	FORBIDDEN	361	30 L
* Crotonaldehyde, stabilized	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	<input checked="" type="checkbox"/> A2				FORBIDDEN	FORBIDDEN	
≠ Crotonaldehyde, stabilized	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	A2 A209				FORBIDDEN	FORBIDDEN	
* Crotonaldehyde	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	<input checked="" type="checkbox"/> A2				FORBIDDEN	FORBIDDEN	
≠ Crotonaldehyde	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	A2 A209				FORBIDDEN	FORBIDDEN	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Divinyl ether, stabilized	1167	3		Liquid flammable		☑	I	E3	351	1 L	361	30 L
≠ Divinyl ether, stabilized	1167	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L
* Ethyleneimine, stabilized	1185	6.1	3			☑			FORBIDDEN		FORBIDDEN	
≠ Ethyleneimine, stabilized	1185	6.1	3			A209			FORBIDDEN		FORBIDDEN	
* Isoprene, stabilized	1218	3		Liquid flammable		☑	I	E3	351	1 L	361	30 L
≠ Isoprene, stabilized	1218	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L
* Methyl isopropenyl ketone, stabilized	1246	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Methyl isopropenyl ketone, stabilized	1246	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Methyl methacrylate monomer, stabilized	1247	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Methyl methacrylate monomer, stabilized	1247	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Methyl vinyl ketone, stabilized	1251	6.1	3 8			☑			FORBIDDEN		FORBIDDEN	
≠ Methyl vinyl ketone, stabilized	1251	6.1	3 8			A209			FORBIDDEN		FORBIDDEN	
* Vinyl acetate, stabilized	1301	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Vinyl acetate, stabilized	1301	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Vinyl ethyl ether, stabilized	1302	3		Liquid flammable		☑	I	E3	351	1 L	361	30 L
≠ Vinyl ethyl ether, stabilized	1302	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L
* Vinylidene chloride, stabilized	1303	3		Liquid flammable		☑	I	E3	351	1 L	361	30 L
≠ Vinylidene chloride, stabilized	1303	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Vinyl isobutyl ether, stabilized	1304	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Vinyl isobutyl ether, stabilized	1304	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Allyl isothiocyanate, stabilized	1545	6.1	3	Toxic & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1	II	E0	FORBIDDEN		661	60 L
≠ Allyl isothiocyanate, stabilized	1545	6.1	3	Toxic & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209	II	E0	FORBIDDEN		661	60 L
* Cyanogen chloride, stabilized	1589	2.3	8		AU 1 CA 7 IR 3 NL 1 US 3	☑ A2			FORBIDDEN		FORBIDDEN	
≠ Cyanogen chloride, stabilized	1589	2.3	8		AU 1 CA 7 IR 3 NL 1 US 3	A2 A209			FORBIDDEN		FORBIDDEN	
* Hydrogen cyanide, stabilized containing less than 3% water and absorbed in a porous inert material	1614	6.1				☑			FORBIDDEN		FORBIDDEN	
≠ Hydrogen cyanide, stabilized containing less than 3% water and absorbed in a porous inert material	1614	6.1				A209			FORBIDDEN		FORBIDDEN	
* Allyltrichlorosilane, stabilized	1724	8	3	Corrosive & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1	II	E0	FORBIDDEN		876	30 L
≠ Allyltrichlorosilane, stabilized	1724	8	3	Corrosive & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209	II	E0	FORBIDDEN		876	30 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only			
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package		
									10	11	12	13		
* Sulphur trioxide, stabilized	1829	8			AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A2				FORBIDDEN		FORBIDDEN		
≠ Sulphur trioxide, stabilized	1829	8			AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN		FORBIDDEN		
* Vinyl fluoride, stabilized	1860	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1		E0		FORBIDDEN	200	150 kg		
≠ Vinyl fluoride, stabilized	1860	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0		FORBIDDEN	200	150 kg		
* Ethyl acrylate, stabilized	1917	3		Liquid flammable		<input checked="" type="checkbox"/>	II	E2	353 Y341	5 L 1 L	364	60 L		
≠ Ethyl acrylate, stabilized	1917	3		Liquid flammable			II	E2	353 Y341	5 L 1 L	364	60 L		
* Methyl acrylate, stabilized	1919	3		Liquid flammable		<input checked="" type="checkbox"/>	II	E2	353 Y341	5 L 1 L	364	60 L		
≠ Methyl acrylate, stabilized	1919	3		Liquid flammable			II	E2	353 Y341	5 L 1 L	364	60 L		
* Propyleneimine, stabilized	1921	3	6.1	Liquid flammable & Toxic	US 4	<input checked="" type="checkbox"/>	I	E0			FORBIDDEN	361	30 L	
≠ Propyleneimine, stabilized	1921	3	6.1	Liquid flammable & Toxic	US 4		I	E0			FORBIDDEN	361	30 L	
* Aerosols, non-flammable	1950	2.2		Gas non-flammable				E0		<input checked="" type="checkbox"/>	203 or 204 Y203 or Y204	75 kg 30 kg G	<input checked="" type="checkbox"/> 203 or 204	150 kg
≠ Aerosols, non-flammable	1950	2.2		Gas non-flammable				E0			203 Y203	75 kg 30 kg G	203	150 kg

## Chapter 2

3-2-11

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Aerosols, non-flammable (tear gas devices)	1950	2.2	6.1	Gas non-flammable & Toxic	AU 1 CA 7 IR 3 NL 1 US 3	A1 A145 A167		E0	FORBIDDEN		212	50 kg
≠ Aerosols, non-flammable (tear gas devices)	1950	2.2	6.1	Gas non-flammable & Toxic	AU 1 CA 7 IR 3 NL 1 US 3	A1 A145 A167		E0	FORBIDDEN		203	50 kg
* Compressed gas, n.o.s.*	1956	2.2		Gas non-flammable		<input checked="" type="checkbox"/>		E1	200	75 kg	200	150 kg
≠ Compressed gas, n.o.s.*	1956	2.2		Gas non-flammable		A202		E1	200	75 kg	200	150 kg
* Chloroprene, stabilized	1991	3	6.1	Liquid flammable & Toxic		<input checked="" type="checkbox"/>	I	E0	FORBIDDEN		361	30 L
≠ Chloroprene, stabilized	1991	3	6.1	Liquid flammable & Toxic		A209	I	E0	FORBIDDEN		361	30 L
* Celluloid, in blocks, rods, rolls, sheets, tubes, etc. (except scrap)	2000	4.1		Solid flammable		<input checked="" type="checkbox"/>	III	E1	456	25 kg	456	100 kg
≠ Celluloid, in blocks, rods, rolls, sheets, tubes, etc. (except scrap)	2000	4.1		Solid flammable		A3 A48 A205	III	E1	456	25 kg	456	100 kg
* Xenon	2036	2.2		Gas non-flammable		<input checked="" type="checkbox"/>		E1	200	75 kg	200	150 kg
≠ Xenon	2036	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* Styrene monomer, stabilized	2055	3		Liquid flammable		<input checked="" type="checkbox"/>	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Styrene monomer, stabilized	2055	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Propadiene, stabilized	2200	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1		E0	FORBIDDEN		200	150 kg
≠ Propadiene, stabilized	2200	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Polymeric beads, expandable, evolving flammable vapour †	2211	9		Miscellaneous		<input checked="" type="checkbox"/> A38	III	E1	957	100 kg	957	200 kg
≠ Polymeric beads, expandable, evolving flammable vapour †	2211	9		Miscellaneous		A204	III	E1	957	100 kg	957	200 kg
* Paraformaldehyde	2213	4.1		Solid flammable		<input checked="" type="checkbox"/>	III	E1	446 Y443	25 kg 10 kg	449	100 kg
≠ Paraformaldehyde	2213	4.1		Solid flammable		A3	III	E1	446 Y443	25 kg 10 kg	449	100 kg
* Acrylic acid, stabilized	2218	8	3	Corrosive & Liquid flammable		<input checked="" type="checkbox"/>	II	E2	851 Y840	1 L 0.5 L	855	30 L
≠ Acrylic acid, stabilized	2218	8	3	Corrosive & Liquid flammable		A209	II	E2	851 Y840	1 L 0.5 L	855	30 L
* n-Butyl methacrylate, stabilized	2227	3		Liquid flammable		<input checked="" type="checkbox"/>	III	E1	355 Y344	60 L 10 L	366	220 L
≠ n-Butyl methacrylate, stabilized	2227	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Bicyclo [2.2.1] hepta-2-5-diene, stabilized	2251	3		Liquid flammable		<input checked="" type="checkbox"/>	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Bicyclo [2.2.1] hepta-2-5-diene, stabilized	2251	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* 2,5-Norbornadiene, stabilized	2251	3		Liquid flammable		<input checked="" type="checkbox"/>	II	E2	353 Y341	5 L 1 L	364	60 L
≠ 2,5-Norbornadiene, stabilized	2251	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* Ethyl methacrylate, stabilized	2277	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Ethyl methacrylate, stabilized	2277	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Isobutyl methacrylate, stabilized	2283	3		Liquid flammable		☑	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Isobutyl methacrylate, stabilized	2283	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Butyl acrylates, stabilized	2348	3		Liquid flammable		☑	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Butyl acrylates, stabilized	2348	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Butyl vinyl ether, stabilized	2352	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Butyl vinyl ether, stabilized	2352	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Dipropylamine	2383	3	8	Liquid flammable & Corrosive		☑	II	E2	352 Y340	1 L 0.5 L	363	5 L
≠ Dipropylamine	2383	3	8	Liquid flammable & Corrosive		A209	II	E2	352 Y340	1 L 0.5 L	363	5 L
* Methacrylaldehyde, stabilized	2396	3	6.1	Liquid flammable & Toxic		☑	II	E2	352 Y341	1 L 1 L	364	60 L
≠ Methacrylaldehyde, stabilized	2396	3	6.1	Liquid flammable & Toxic		A209	II	E2	352 Y341	1 L 1 L	364	60 L
* Ethylacetylene, stabilized	2452	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1		E0	FORBIDDEN		200	150 kg
≠ Ethylacetylene, stabilized	2452	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* Diketene, stabilized	2521	6.1	3			☑			FORBIDDEN		FORBIDDEN	
≠ Diketene, stabilized	2521	6.1	3			A209			FORBIDDEN		FORBIDDEN	
* Isobutyl acrylate, stabilized	2527	3		Liquid flammable		☑	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Isobutyl acrylate, stabilized	2527	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Methacrylic acid, stabilized	2531	8		Corrosive		☑	II	E2	851 Y840	1 L 0.5 L	855	30 L
≠ Methacrylic acid, stabilized	2531	8		Corrosive		A209	II	E2	851 Y840	1 L 0.5 L	855	30 L
* Acrolein dimer, stabilized	2607	3		Liquid flammable		☑	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Acrolein dimer, stabilized	2607	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Vinyltoluenes, stabilized	2618	3		Liquid flammable		☑	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Vinyltoluenes, stabilized	2618	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* N-Aminoethylpiperazine	2815	8	☑	☑ Corrosive			III	E1	852 Y841	5 L 1 L	856	60 L
≠ N-Aminoethylpiperazine	2815	8	6.1	☑ Corrosive & Toxic			III	E1	852 Y841	5 L 1 L	856	60 L
* Vinyl butyrate, stabilized	2838	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Vinyl butyrate, stabilized	2838	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Radioactive material, uranium hexafluoride, fissile	2977	7	☑	☑ Radioactive & Corrosive					See Part 2;7 and Part 4;9			
≠ Radioactive material, uranium hexafluoride, fissile	2977	7	6.1 8	☑ Radioactive & Toxic & Corrosive					See Part 2;7 and Part 4;9			

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only			
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package		
									10	11	12	13		
* <b>Radioactive material, uranium hexafluoride, non-fissile or fissile excepted</b>	2978	7	8	Radioactive & Corrosive	CA 1	A139				See Part 2;7	and Part 4;9			
≠ <b>Radioactive material, uranium hexafluoride, non-fissile or fissile excepted</b>	2978	7	6.1 8	Radioactive & Toxic & Corrosive	CA 1	A139				See Part 2;7	and Part 4;9			
* <b>1,2-Butylene oxide, stabilized</b>	3022	3		Liquid flammable					II	E2	353 Y341	5 L 1 L	364	60 L
≠ <b>1,2-Butylene oxide, stabilized</b>	3022	3		Liquid flammable		A209			II	E2	353 Y341	5 L 1 L	364	60 L
* <b>Vinylpyridines, stabilized</b>	3073	6.1	3 8	Toxic & Liquid flammable & Corrosive					II	E4	653 Y640	1 L 0.5 L	660	30 L
≠ <b>Vinylpyridines, stabilized</b>	3073	6.1	3 8	Toxic & Liquid flammable & Corrosive		A209			II	E4	653 Y640	1 L 0.5 L	660	30 L
* <b>Methacrylonitrile, stabilized</b>	3079	6.1	3										FORBIDDEN	FORBIDDEN
≠ <b>Methacrylonitrile, stabilized</b>	3079	6.1	3			A209							FORBIDDEN	FORBIDDEN
* <b>Lithium metal batteries (including lithium alloy batteries) †</b>	3090	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164 A183 A201				E0			FORBIDDEN	See 968
≠ <b>Lithium metal batteries (including lithium alloy batteries) †</b>	3090	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164 A183 A201 A206				E0			FORBIDDEN	See 968

Name 1	UN No. 2	Class or division 3	Subsidiary risk 4	Labels 5	State variations 6	Special provisions 7	UN packing group 8	Excepted quantity 9	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction 10	Max. net quantity per package 11	Packing instruction 12	Max. net quantity per package 13
* Lithium metal batteries contained in equipment (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	<input checked="" type="checkbox"/> A48 A99 A154 A164 A181 A185		E0	970	5 kg	970	35 kg
≠ Lithium metal batteries contained in equipment (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	A48 A88 A99 A154 A164 A181 A185 A206		E0	970	5 kg	970	35 kg
* Lithium metal batteries packed with equipment (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	<input checked="" type="checkbox"/> A99 A154 A164 A181 A185		E0	969	5 kg	969	35 kg
≠ Lithium metal batteries packed with equipment (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164 A181 A185 A206		E0	969	5 kg	969	35 kg
<input checked="" type="checkbox"/> * Polyhalogenated biphenyls, liquid	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
≠ Polyhalogenated biphenyls, liquids	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
<input checked="" type="checkbox"/> * Polyhalogenated terphenyls, liquid	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
≠ Polyhalogenated terphenyls, liquids	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
+ Halogenated monomethyldiphenylmethanes, liquids	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
<input checked="" type="checkbox"/>												
* Polyhalogenated biphenyls, solid	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
≠ Polyhalogenated biphenyls, solids	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
<input checked="" type="checkbox"/>												
* Polyhalogenated terphenyls, solid	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
≠ Polyhalogenated terphenyls, solids	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
+ Halogenated monomethyldiphenylmethanes, solids	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
* Vehicle, flammable gas powered	3166	9		Miscellaneous		<input checked="" type="checkbox"/> A67 A70 A87 A118 A120 A134		E0	FORBIDDEN		951	No limit
≠ Vehicle, flammable gas powered	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A203 A207		E0	FORBIDDEN		951	No limit
* Vehicle, flammable liquid powered	3166	9		Miscellaneous		<input checked="" type="checkbox"/> A67 A70 A87 A118 A120 A134		E0	950	No limit	950	No limit
≠ Vehicle, flammable liquid powered	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A203 A207		E0	950	No limit	950	No limit

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Vehicle, fuel cell, flammable gas powered †	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A176		E0	FORBIDDEN		951	No limit
≠ Vehicle, fuel cell, flammable gas powered †	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A176 A203 A207		E0	FORBIDDEN		951	No limit
* Vehicle, fuel cell, flammable liquid powered †	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A176		E0	950	No limit	950	No limit
≠ Vehicle, fuel cell, flammable liquid powered †	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A176 A203 A207		E0	950	No limit	950	No limit
☑ * Polyester resin kit †	3269	3		Liquid flammable		A66 A163	II III	E0 E0	370 Y370 370 Y370	5 kg 1 kg 10 kg 5 kg	370 370	5 kg 10 kg
≠ Polyester resin kit , liquid base material †	3269	3		Liquid flammable		A66 A163	II III	E0 E0	370 Y370 370 Y370	5 kg 1 kg 10 kg 5 kg	370 370	5 kg 10 kg

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous	US 3	<input checked="" type="checkbox"/> A88 A99 A154 A164 A183		E0	See 965		See 965	
≠ Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous	US 3	A88 A99 A154 A164 A183 A206		E0	See 965		See 965	
* Lithium ion batteries contained in equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	<input checked="" type="checkbox"/> A48 A99 A154 A164 A181 A185		E0	967	5 kg	967	35 kg
≠ Lithium ion batteries contained in equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	A48 A88 A99 A154 A164 A181 A185 A206		E0	967	5 kg	967	35 kg
* Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	<input checked="" type="checkbox"/> A88 A99 A154 A164 A181 A185		E0	966	5 kg	966	35 kg
≠ Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	A88 A99 A154 A164 A181 A185 A206		E0	966	5 kg	966	35 kg

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted	3507	8	7	Corrosive		A139 A194	I	E0	See 877		See 877	
≠ Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted	3507	6.1	7 8	Toxic & Corrosive		A139 A194	I	E0	See 603		See 603	
+ Polyester resin kit, solid base material	3527	4.1		Solid flammable		A66 A163	II III	E0 E0	450 Y450 450 Y450	5 kg 1 kg 10 kg 5 kg	450 450	5 kg 10 kg
* Engine, internal combustion, flammable liquid powered	3166	9		Miscellaneous		A67 A70 A87 A134		E0	950	No limit	950	No limit
≠ Engine, internal combustion, flammable liquid powered	3528	3		Liquid flammable		[A208]		E0	378	No limit	378	No limit
* Engine, fuel cell, flammable liquid powered †	3166	9		Miscellaneous		A67 A70 A87 A134 A176		E0	950	No limit	950	No limit
≠ Engine, fuel cell, flammable liquid powered †	3528	3		Liquid flammable		[A176] [A134] [A87] [A70] [A67] [A208]		E0	378	No limit	378	No limit
+ Machinery, internal combustion, flammable liquid powered	3528	3		Liquid flammable		[A208] [A134] [A87] [A70] [A67]		E0	[378]	[No limit]	[378]	[No limit]
+ Machinery, fuel cell, flammable liquid powered	3528	3		Liquid flammable		[A208] [A176] [A134] [A87] [A70] [A67]		E0	[378]	[No limit]	[378]	[No limit]

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
* Engine, internal combustion, flammable gas powered	3166	9		Miscellaneous		A67 A70 A87 A134		E0	FORBIDDEN		951	No limit
≠ Engine, internal combustion, flammable gas powered	3529	2.1		Gas flammable		[A176] [A208]		E0	FORBIDDEN		220	No limit
* Engine, fuel cell, flammable gas powered †	3166	9		Miscellaneous		A67 A70 A87 A134 A176		E0	FORBIDDEN		951	No limit
≠ Engine, fuel cell, flammable gas powered †	3529	2.1		Gas flammable		[A176] [A208]		E0	FORBIDDEN		220	No limit
+ Machinery, internal combustion, flammable gas powered	3529	2.1		Gas flammable		[A208]		E0	FORBIDDEN		220	No limit
+ Machinery, fuel cell, flammable gas powered	3529	2.1		Gas flammable		[A208]		E0	FORBIDDEN		220	No limit
+ Engine, internal combustion	3530	9		Miscellaneous		[A208]		E0	972	[No limit]	972	[No limit]
+ Machinery, internal combustion	3530	9		Miscellaneous		[A208]		E0	972	[No limit]	972	[No limit]
+ Polymerizing substance, solid, stabilized, n.o.s.*	3531	4.1		Solid flammable		A209	III	E0	446 Y443	25 kg 10 kg	449	100 kg
+ Polymerizing substance, liquid, stabilized, n.o.s.*	3532	4.1		Solid flammable		A209	III	E0	446 Y443	25 kg 10 kg	449	100 kg
+ Polymerizing substance, solid, temperature controlled, n.o.s.*	3533	4.1				A209		E0	FORBIDDEN		FORBIDDEN	
+ Polymerizing substance, liquid, temperature controlled, n.o.s.*	3534	4.1				A209		E0	FORBIDDEN		FORBIDDEN	

**ATTACHMENT B****PROPOSED AMENDMENTS TO TABLE 3-1 — ALPHABETICAL ORDER**

The format for displaying the amendments to Table 3-1 is as follows:

**Modified entries**

- both the original and the modified entry are printed;
- both modified and non-modified fields are printed;
- the original entry is printed in a shaded box with an asterisk in the left margin;
- check boxes are printed above the field(s) which have been modified;
- the modified entry is shown without shading below the original entry; and
- the “≠” symbol is printed in the left margin.

**Deleted entries**

- deleted entries are displayed in a shaded box with an asterisk in the left margin;
- check boxes are shown above each field; and
- the “>” symbol is displayed in the left margin below the shaded box to indicate that the entry will be deleted.

**New entries**

New entries are shown without shading with the “+” symbol in the left margin.



Table 3-1. Dangerous Goods List

Name 1	UN No. 2	Class or division 3	Subsidiary risk 4	Labels 5	State variations 6	Special provisions 7	UN packing group 8	Excepted quantity 9	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction 10	Max. net quantity per package 11	Packing instruction 12	Max. net quantity per package 13
* Acrolein dimer, stabilized	2607	3		Liquid flammable		☑	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Acrolein dimer, stabilized	2607	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Acrolein, stabilized	1092	6.1	3			☑			FORBIDDEN		FORBIDDEN	
≠ Acrolein, stabilized	1092	6.1	3			A209			FORBIDDEN		FORBIDDEN	
* Acrylic acid, stabilized	2218	8	3	Corrosive & Liquid flammable		☑	II	E2	851 Y840	1 L 0.5 L	855	30 L
≠ Acrylic acid, stabilized	2218	8	3	Corrosive & Liquid flammable		A209	II	E2	851 Y840	1 L 0.5 L	855	30 L
* Acrylonitrile, stabilized	1093	3	6.1	Liquid flammable & Toxic		☑	I	E0	FORBIDDEN		361	30 L
≠ Acrylonitrile, stabilized	1093	3	6.1	Liquid flammable & Toxic		A209	I	E0	FORBIDDEN		361	30 L
* Aerosols, non-flammable	1950	2.2		Gas non-flammable		A98 A145 A167		E0	☑ 203 or 204 Y203 or Y204	75 kg 30 kg G	☑ 203 or 204	150 kg
≠ Aerosols, non-flammable	1950	2.2		Gas non-flammable		A98 A145 A167		E0	203 Y203	75 kg 30 kg G	203	150 kg
* Aerosols, non-flammable (tear gas devices)	1950	2.2	6.1	Gas non-flammable & Toxic	AU 1 CA 7 IR 3 NL 1 US 3	A1 A145 A167		E0	FORBIDDEN		☑ 212	50 kg
≠ Aerosols, non-flammable (tear gas devices)	1950	2.2	6.1	Gas non-flammable & Toxic	AU 1 CA 7 IR 3 NL 1 US 3	A1 A145 A167		E0	FORBIDDEN		203	50 kg

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* Allyl isothiocyanate, stabilized	1545	6.1	3	Toxic & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1	II	E0	FORBIDDEN		661	60 L
≠ Allyl isothiocyanate, stabilized	1545	6.1	3	Toxic & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209	II	E0	FORBIDDEN		661	60 L
* Allyltrichlorosilane, stabilized	1724	8	3	Corrosive & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1	II	E0	FORBIDDEN		876	30 L
≠ Allyltrichlorosilane, stabilized	1724	8	3	Corrosive & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209	II	E0	FORBIDDEN		876	30 L
* N-Aminoethylpiperazine	2815	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Corrosive			III	E1	852 Y841	5 L 1 L	856	60 L
≠ N-Aminoethylpiperazine	2815	8	6.1	Corrosive & Toxic			III	E1	852 Y841	5 L 1 L	856	60 L
* Argon, compressed	1006	2.2		Gas non-flammable		<input checked="" type="checkbox"/> A69		E1	200	75 kg	200	150 kg
≠ Argon, compressed	1006	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* Bicyclo [2.2.1] hepta-2-5-diene, stabilized	2251	3		Liquid flammable		<input checked="" type="checkbox"/>	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Bicyclo [2.2.1] hepta-2-5-diene, stabilized	2251	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
* Butadienes and hydrocarbon mixture, stabilized, containing more than 40% butadienes	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1		E0	FORBIDDEN		200	150 kg
≠ Butadienes and hydrocarbon mixture, stabilized, containing more than 40% butadienes	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Butadienes, stabilized	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1		E0	FORBIDDEN		200	150 kg
≠ Butadienes, stabilized	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Butyl acrylates, stabilized	2348	3		Liquid flammable			III	E1	355 Y344	60 L 10 L	366	220 L
≠ Butyl acrylates, stabilized	2348	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* 1,2-Butylene oxide, stabilized	3022	3		Liquid flammable			II	E2	353 Y341	5 L 1 L	364	60 L
≠ 1,2-Butylene oxide, stabilized	3022	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* n-Butyl methacrylate, stabilized	2227	3		Liquid flammable			III	E1	355 Y344	60 L 10 L	366	220 L
≠ n-Butyl methacrylate, stabilized	2227	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Butyl vinyl ether, stabilized	2352	3		Liquid flammable			II	E2	353 Y341	5 L 1 L	364	60 L
≠ Butyl vinyl ether, stabilized	2352	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L

## Chapter 2

## 3-2-7

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only		
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package	
1	2	3	4	5	6	7	8	9	10	11	12	13	
* Carbon dioxide	1013	2.2		Gas non-flammable		☑			E1	200	75 kg	200	150 kg
≠ Carbon dioxide	1013	2.2		Gas non-flammable		A202			E1	200	75 kg	200	150 kg
* Celluloid, in blocks, rods, rolls, sheets, tubes, etc. (except scrap)	2000	4.1		Solid flammable		☑ A3 A48	III		E1	456	25 kg	456	100 kg
≠ Celluloid, in blocks, rods, rolls, sheets, tubes, etc. (except scrap)	2000	4.1		Solid flammable		A3 A48 A205	III		E1	456	25 kg	456	100 kg
* Chloroprene, stabilized	1991	3	6.1	Liquid flammable & Toxic		☑	I		E0	FORBIDDEN		361	30 L
≠ Chloroprene, stabilized	1991	3	6.1	Liquid flammable & Toxic		A209	I		E0	FORBIDDEN		361	30 L
* Compressed gas, n.o.s.*	1956	2.2		Gas non-flammable		☑			E1	200	75 kg	200	150 kg
≠ Compressed gas, n.o.s.*	1956	2.2		Gas non-flammable		A202			E1	200	75 kg	200	150 kg
* Crotonaldehyde	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	☑ A2				FORBIDDEN		FORBIDDEN	
≠ Crotonaldehyde	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	A2 A209				FORBIDDEN		FORBIDDEN	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* Crotonaldehyde, stabilized	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	<input checked="" type="checkbox"/> A2				FORBIDDEN	FORBIDDEN	
≠ Crotonaldehyde, stabilized	1143	6.1	3		AU 1 CA 7 IR 3 NL 1 US 3 US 4	A2 A209				FORBIDDEN	FORBIDDEN	
* Cyanogen chloride, stabilized	1589	2.3	8		AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A2				FORBIDDEN	FORBIDDEN	
≠ Cyanogen chloride, stabilized	1589	2.3	8		AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN	FORBIDDEN	
* Diketene, stabilized	2521	6.1	3			<input checked="" type="checkbox"/>				FORBIDDEN	FORBIDDEN	
≠ Diketene, stabilized	2521	6.1	3			A209				FORBIDDEN	FORBIDDEN	
* Dipropylamine	2383	3	8	Liquid flammable & Corrosive		<input checked="" type="checkbox"/>	II	E2	352 Y340	1 L 0.5 L	363	5 L
≠ Dipropylamine	2383	3	8	Liquid flammable & Corrosive		A209	II	E2	352 Y340	1 L 0.5 L	363	5 L
* Divinyl ether, stabilized	1167	3		Liquid flammable		<input checked="" type="checkbox"/>	I	E3	351	1 L	361	30 L
≠ Divinyl ether, stabilized	1167	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L
* Engine, fuel cell, flammable gas powered †	<input checked="" type="checkbox"/> 3166	<input checked="" type="checkbox"/> 9		<input checked="" type="checkbox"/> Miscellaneous		<input checked="" type="checkbox"/> A67 A70 A87 A134 A176		E0		FORBIDDEN	<input checked="" type="checkbox"/> 951	No limit
≠ Engine, fuel cell, flammable gas powered †	3529	2.1		Gas flammable		[A176] [A208]		E0		FORBIDDEN	220	No limit

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Engine, fuel cell, flammable liquid powered †	3166	9		Miscellaneous		A67 A70 A87 A134 A176		E0	950	No limit	950	No limit
≠ Engine, fuel cell, flammable liquid powered †	3528	3		Liquid flammable		[A176] [A134] [A87] [A70] [A67] [A208]		E0	378	No limit	378	No limit
+ Engine, internal combustion	3530	9		Miscellaneous		[A208]		E0	972	[No limit]	972	[No limit]
* Engine, internal combustion, flammable gas powered	3166	9		Miscellaneous		A67 A70 A87 A134		E0	FORBIDDEN		951	No limit
≠ Engine, internal combustion, flammable gas powered	3529	2.1		Gas flammable		[A176] [A208]		E0	FORBIDDEN		220	No limit
* Engine, internal combustion, flammable liquid powered	3166	9		Miscellaneous		A67 A70 A87 A134		E0	950	No limit	950	No limit
≠ Engine, internal combustion, flammable liquid powered	3528	3		Liquid flammable		[A208]		E0	378	No limit	378	No limit
* Ethylacetylene, stabilized	2452	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1		E0	FORBIDDEN		200	150 kg
≠ Ethylacetylene, stabilized	2452	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Ethyl acrylate, stabilized	1917	3		Liquid flammable			II	E2	353 Y341	5 L 1 L	364	60 L
≠ Ethyl acrylate, stabilized	1917	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Ethyleneimine, stabilized	1185	6.1	3			✓				FORBIDDEN		FORBIDDEN
≠ Ethyleneimine, stabilized	1185	6.1	3			A209				FORBIDDEN		FORBIDDEN
* Ethyl methacrylate, stabilized	2277	3		Liquid flammable		✓	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Ethyl methacrylate, stabilized	2277	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
+ Halogenated monomethyldiphenylmethanes, liquids	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
+ Halogenated monomethyldiphenylmethanes, solids	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
* Helium, compressed	1046	2.2		Gas non-flammable		✓		E1	200	75 kg	200	150 kg
≠ Helium, compressed	1046	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* Hydrogen cyanide, stabilized containing less than 3% water	1051	6.1	3			✓				FORBIDDEN		FORBIDDEN
≠ Hydrogen cyanide, stabilized containing less than 3% water	1051	6.1	3			A209				FORBIDDEN		FORBIDDEN
* Hydrogen cyanide, stabilized containing less than 3% water and absorbed in a porous inert material	1614	6.1				✓				FORBIDDEN		FORBIDDEN
≠ Hydrogen cyanide, stabilized containing less than 3% water and absorbed in a porous inert material	1614	6.1				A209				FORBIDDEN		FORBIDDEN
* Isobutyl acrylate, stabilized	2527	3		Liquid flammable		✓	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Isobutyl acrylate, stabilized	2527	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Isobutyl methacrylate, stabilized	2283	3		Liquid flammable		✓	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Isobutyl methacrylate, stabilized	2283	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Isoprene, stabilized	1218	3		Liquid flammable		✓	I	E3	351	1 L	361	30 L
≠ Isoprene, stabilized	1218	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* <b>Krypton, compressed</b>	1056	2.2		Gas non-flammable		<input checked="" type="checkbox"/> A69		E1	200	75 kg	200	150 kg
≠ <b>Krypton, compressed</b>	1056	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* <b>Lithium ion batteries</b> (including lithium ion polymer batteries)	3480	9		Miscellaneous	US 3	<input checked="" type="checkbox"/> A88 A99 A154 A164 A183		E0	See 965		See 965	
≠ <b>Lithium ion batteries</b> (including lithium ion polymer batteries)	3480	9		Miscellaneous	US 3	A88 A99 A154 A164 A183 A206		E0	See 965		See 965	
* <b>Lithium ion batteries contained in equipment</b> (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	<input checked="" type="checkbox"/> A48 A99 A154 A164 A181 A185		E0	967	5 kg	967	35 kg
≠ <b>Lithium ion batteries contained in equipment</b> (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	A48 A88 A99 A154 A164 A181 A185 A206		E0	967	5 kg	967	35 kg
* <b>Lithium ion batteries packed with equipment</b> (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	<input checked="" type="checkbox"/> A88 A99 A154 A164 A181 A185		E0	966	5 kg	966	35 kg
≠ <b>Lithium ion batteries packed with equipment</b> (including lithium ion polymer batteries)	3481	9		Miscellaneous	US 3	A88 A99 A154 A164 A181 A185 A206		E0	966	5 kg	966	35 kg

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only		
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package	
1	2	3	4	5	6	7	8	9	10	11	12	13	
* <b>Lithium metal batteries</b> (including lithium alloy batteries) †	3090	9		Miscellaneous	US 2 US 3	<input checked="" type="checkbox"/> A88 A99 A154 A164 A183 A201			E0	FORBIDDEN	See 968		
≠ <b>Lithium metal batteries</b> (including lithium alloy batteries) †	3090	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164 A183 A201 A206			E0	FORBIDDEN	See 968		
* <b>Lithium metal batteries contained in equipment</b> (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	<input checked="" type="checkbox"/> A48 A99 A154 A164 A181 A185			E0	970	5 kg	970	35 kg
≠ <b>Lithium metal batteries contained in equipment</b> (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	A48 A88 A99 A154 A164 A181 A185 A206			E0	970	5 kg	970	35 kg
* <b>Lithium metal batteries packed with equipment</b> (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	<input checked="" type="checkbox"/> A99 A154 A164 A181 A185			E0	969	5 kg	969	35 kg
≠ <b>Lithium metal batteries packed with equipment</b> (including lithium alloy batteries) †	3091	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164 A181 A185 A206			E0	969	5 kg	969	35 kg
+ <b>Machinery, fuel cell, flammable gas powered</b>	3529	2.1		Gas flammable		[A208]			E0	FORBIDDEN	220	No limit	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
+ Machinery, fuel cell, flammable liquid powered	3528	3		Liquid flammable		[A208] [A176] [A134] [A87] [A70] [A67]		E0	[378]	[No limit]	[378]	[No limit]
+ Machinery, internal combustion	3530	9		Miscellaneous		[A208]		E0	972	[No limit]	972	[No limit]
+ Machinery, internal combustion, flammable gas powered	3529	2.1		Gas flammable		[A208]		E0	FORBIDDEN		220	No limit
+ Machinery, internal combustion, flammable liquid powered	3528	3		Liquid flammable		[A208] [A134] [A87] [A70] [A67]		E0	[378]	[No limit]	[378]	[No limit]
* Methacrylaldehyde, stabilized	2396	3	6.1	Liquid flammable & Toxic		<input checked="" type="checkbox"/>	II	E2	352 Y341	1 L 1 L	364	60 L
≠ Methacrylaldehyde, stabilized	2396	3	6.1	Liquid flammable & Toxic		A209	II	E2	352 Y341	1 L 1 L	364	60 L
* Methacrylic acid, stabilized	2531	8		Corrosive		<input checked="" type="checkbox"/>	II	E2	851 Y840	1 L 0.5 L	855	30 L
≠ Methacrylic acid, stabilized	2531	8		Corrosive		A209	II	E2	851 Y840	1 L 0.5 L	855	30 L
* Methacrylonitrile, stabilized	3079	6.1	3			<input checked="" type="checkbox"/>			FORBIDDEN		FORBIDDEN	
≠ Methacrylonitrile, stabilized	3079	6.1	3			A209			FORBIDDEN		FORBIDDEN	
* Methylacetylene and propadiene mixture, stabilized †	1060	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1		E0	FORBIDDEN		200	150 kg
≠ Methylacetylene and propadiene mixture, stabilized †	1060	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Methyl acrylate, stabilized	1919	3		Liquid flammable		<input checked="" type="checkbox"/>	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Methyl acrylate, stabilized	1919	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Methyl isopropenyl ketone, stabilized	1246	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Methyl isopropenyl ketone, stabilized	1246	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Methyl methacrylate monomer, stabilized	1247	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Methyl methacrylate monomer, stabilized	1247	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Methyl vinyl ketone, stabilized	1251	6.1	3 8			☑			FORBIDDEN		FORBIDDEN	
≠ Methyl vinyl ketone, stabilized	1251	6.1	3 8			A209			FORBIDDEN		FORBIDDEN	
* Neon, compressed	1065	2.2		Gas non-flammable		☑		E1	200	75 kg	200	150 kg
≠ Neon, compressed	1065	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* Nitrogen, compressed	1066	2.2		Gas non-flammable		☑		E1	200	75 kg	200	150 kg
≠ Nitrogen, compressed	1066	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg
* 2,5-Norbornadiene, stabilized	2251	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ 2,5-Norbornadiene, stabilized	2251	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Paraformaldehyde	2213	4.1		Solid flammable		☑	III	E1	446 Y443	25 kg 10 kg	449	100 kg
≠ Paraformaldehyde	2213	4.1		Solid flammable		A3	III	E1	446 Y443	25 kg 10 kg	449	100 kg

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
<input checked="" type="checkbox"/> * Polyester resin kit †	3269	3		Liquid flammable		A66 A163	II III	E0 E0	370 Y370 370 Y370	5 kg 1 kg 10 kg 5 kg	370 370	5 kg 10 kg
≠ Polyester resin kit , liquid base material †	3269	3		Liquid flammable		A66 A163	II III	E0 E0	370 Y370 370 Y370	5 kg 1 kg 10 kg 5 kg	370 370	5 kg 10 kg
+ Polyester resin kit, solid base material	3527	4.1		Solid flammable		A66 A163	II III	E0 E0	450 Y450 450 Y450	5 kg 1 kg 10 kg 5 kg	450 450	5 kg 10 kg
<input checked="" type="checkbox"/> * Polyhalogenated biphenyls, liquid	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
≠ Polyhalogenated biphenyls, liquids	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
<input checked="" type="checkbox"/> * Polyhalogenated biphenyls, solid	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
≠ Polyhalogenated biphenyls, solids	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
<input checked="" type="checkbox"/> * Polyhalogenated terphenyls, liquid	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
≠ Polyhalogenated terphenyls, liquids	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
<input checked="" type="checkbox"/> * Polyhalogenated terphenyls, solid	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
≠ Polyhalogenated terphenyls, solids	3152	9		Miscellaneous		A11 A95	II	E2	956	100 kg	956	200 kg
<input checked="" type="checkbox"/> * Polymeric beads, expandable, evolving flammable vapour †	2211	9		Miscellaneous		A38	III	E1	957	100 kg	957	200 kg
≠ Polymeric beads, expandable, evolving flammable vapour †	2211	9		Miscellaneous		A204	III	E1	957	100 kg	957	200 kg
+ Polymerizing substance, liquid, stabilized, n.o.s.*	3532	4.1		Solid flammable		A209	III	E0	446 Y443	25 kg 10 kg	449	100 kg
+ Polymerizing substance, liquid, temperature controlled, n.o.s.*	3534	4.1				A209		E0	FORBIDDEN		FORBIDDEN	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
+ Polymerizing substance, solid, stabilized, n.o.s.*	3531	4.1		Solid flammable		A209	III	E0	446 Y443	25 kg 10 kg	449	100 kg
+ Polymerizing substance, solid, temperature controlled, n.o.s.*	3533	4.1				A209		E0	FORBIDDEN		FORBIDDEN	
* Propadiene, stabilized	2200	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1		E0	FORBIDDEN		200	150 kg
≠ Propadiene, stabilized	2200	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Propyleneimine, stabilized	1921	3	6.1	Liquid flammable & Toxic	US 4	<input checked="" type="checkbox"/>	I	E0	FORBIDDEN		361	30 L
≠ Propyleneimine, stabilized	1921	3	6.1	Liquid flammable & Toxic	US 4	A209	I	E0	FORBIDDEN		361	30 L
* Radioactive material, uranium hexafluoride, non-fissile or fissile excepted	2978	7	<input checked="" type="checkbox"/> 8	<input checked="" type="checkbox"/> Radioactive & Corrosive	CA 1	A139					See Part 2;7 and Part 4;9	
≠ Radioactive material, uranium hexafluoride, non-fissile or fissile excepted	2978	7	6.1 8	Radioactive & Toxic & Corrosive	CA 1	A139					See Part 2;7 and Part 4;9	
* Radioactive material, uranium hexafluoride, fissile	2977	7	<input checked="" type="checkbox"/> 8	<input checked="" type="checkbox"/> Radioactive & Corrosive							See Part 2;7 and Part 4;9	
≠ Radioactive material, uranium hexafluoride, fissile	2977	7	6.1 8	Radioactive & Toxic & Corrosive							See Part 2;7 and Part 4;9	
* Refrigerant gas R 1113	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A2					FORBIDDEN	FORBIDDEN
≠ Refrigerant gas R 1113	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	A2 A209					FORBIDDEN	FORBIDDEN

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only		
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package	
									1	2	3	4	5
+ Rocket motors †	0510	1.4C		Explosive 1.4					E0	FORBIDDEN		130	75 kg
* Styrene monomer, stabilized	2055	3		Liquid flammable		☑	III		E1	355 Y344	60 L 10 L	366	220 L
≠ Styrene monomer, stabilized	2055	3		Liquid flammable		A209	III		E1	355 Y344	60 L 10 L	366	220 L
* Sulphur trioxide, stabilized	1829	8			AU 1 CA 7 IR 3 NL 1 US 3	☑ A2				FORBIDDEN		FORBIDDEN	
≠ Sulphur trioxide, stabilized	1829	8			AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN		FORBIDDEN	
* Tetrafluoroethylene, stabilized	1081	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1			E0	FORBIDDEN		200	150 kg
≠ Tetrafluoroethylene, stabilized	1081	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209			E0	FORBIDDEN		200	150 kg
* Trifluorochloroethylene, stabilized	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	☑ A2				FORBIDDEN		FORBIDDEN	
≠ Trifluorochloroethylene, stabilized	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN		FORBIDDEN	

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted	3507	8	7	Corrosive		A139 A194	I	E0	See 877		See 877	
≠ Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted	3507	6.1	7 8	Toxic & Corrosive		A139 A194	I	E0	See 603		See 603	
* Vehicle, flammable gas powered	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134		E0	FORBIDDEN		951	No limit
≠ Vehicle, flammable gas powered	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A203 A207		E0	FORBIDDEN		951	No limit
* Vehicle, flammable liquid powered	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134		E0	950	No limit	950	No limit
≠ Vehicle, flammable liquid powered	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A203 A207		E0	950	No limit	950	No limit

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Vehicle, fuel cell, flammable gas powered †	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A176		E0	FORBIDDEN		951	No limit
≠ Vehicle, fuel cell, flammable gas powered †	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A176 A203 A207		E0	FORBIDDEN		951	No limit
* Vehicle, fuel cell, flammable liquid powered †	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A176		E0	950	No limit	950	No limit
≠ Vehicle, fuel cell, flammable liquid powered †	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A176 A203 A207		E0	950	No limit	950	No limit
* Vinyl acetate, stabilized	1301	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Vinyl acetate, stabilized	1301	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Vinyl bromide, stabilized	1085	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1		E0	FORBIDDEN		200	150 kg
≠ Vinyl bromide, stabilized	1085	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Vinyl butyrate, stabilized	2838	3		Liquid flammable		<input checked="" type="checkbox"/>	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Vinyl butyrate, stabilized	2838	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Vinyl chloride, stabilized	1086	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3 US 4	<input checked="" type="checkbox"/> A1		E0	FORBIDDEN		200	150 kg
≠ Vinyl chloride, stabilized	1086	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3 US 4	A1 A209		E0	FORBIDDEN		200	150 kg
* Vinyl ethyl ether, stabilized	1302	3		Liquid flammable		<input checked="" type="checkbox"/>	I	E3	351	1 L	361	30 L
≠ Vinyl ethyl ether, stabilized	1302	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L
* Vinyl fluoride, stabilized	1860	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A1		E0	FORBIDDEN		200	150 kg
≠ Vinyl fluoride, stabilized	1860	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
* Vinylidene chloride, stabilized	1303	3		Liquid flammable		☑	I	E3	351	1 L	361	30 L
≠ Vinylidene chloride, stabilized	1303	3		Liquid flammable		A209	I	E3	351	1 L	361	30 L
* Vinyl isobutyl ether, stabilized	1304	3		Liquid flammable		☑	II	E2	353 Y341	5 L 1 L	364	60 L
≠ Vinyl isobutyl ether, stabilized	1304	3		Liquid flammable		A209	II	E2	353 Y341	5 L 1 L	364	60 L
* Vinyl methyl ether, stabilized	1087	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	☑ A1		E0	FORBIDDEN		200	150 kg
≠ Vinyl methyl ether, stabilized	1087	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209		E0	FORBIDDEN		200	150 kg
* Vinylpyridines, stabilized	3073	6.1	3 8	Toxic & Liquid flammable & Corrosive		☑	II	E4	653 Y640	1 L 0.5 L	660	30 L
≠ Vinylpyridines, stabilized	3073	6.1	3 8	Toxic & Liquid flammable & Corrosive		A209	II	E4	653 Y640	1 L 0.5 L	660	30 L
* Vinyltoluenes, stabilized	2618	3		Liquid flammable		☑	III	E1	355 Y344	60 L 10 L	366	220 L
≠ Vinyltoluenes, stabilized	2618	3		Liquid flammable		A209	III	E1	355 Y344	60 L 10 L	366	220 L
* Xenon	2036	2.2		Gas non-flammable		☑ A69		E1	200	75 kg	200	150 kg
≠ Xenon	2036	2.2		Gas non-flammable		A69 A202		E1	200	75 kg	200	150 kg

APPENDIX B

CONSOLIDATION OF AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL  
INSTRUCTIONS AGREED AT DGP-WG/14 AND DGP-WG/15

Part S-3

DANGEROUS GOODS LIST,  
SPECIAL PROVISIONS AND QUANTITY LIMITATIONS

(ADDITIONAL INFORMATION  
FOR PART 3 OF THE  
TECHNICAL INSTRUCTIONS)

...

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

UN Model Regulations, SP 379, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/17 (see paragraph 3.3.1.2 of this report)

<b>Ammonia, anhydrous</b>	1005	2.3	8	AU 1 CA 7 IR 3 NL 1 US 3	A2 <u>A329</u>			See	210	See	210
<b>Adsorbed gas, toxic, corrosive, n.o.s.*</b>	3516	2.3	8	<u>AU 1</u> <u>CA 7</u> <u>IR 3</u> <u>NL 1</u> <u>US 3</u>	A2 <u>A329</u>			See	210	See	210

...

## Chapter 6

### SPECIAL PROVISIONS

...

**Table S-3-4. Special Provisions**

*Supplementary special provisions*

...

---

DGP-WG/15-WP/1 (see paragraph 3.2.3.1 of this report)

---

- A302 For the purpose of providing life support for aquatic animals during transport, the appropriate authority of the States of Origin, ~~of Destination~~ and of the Operator may approve the carriage of cylinders containing oxygen compressed, UN 1072 and air, compressed UN 1002, with the valve(s) open to supply a controlled quantity of oxygen or air through a regulator into water containing the aquatic animals. The cylinder or cylinder valve must be fitted with a self-sealing device to prevent uncontrolled release of oxygen or air should the regulator malfunction or be broken or damaged. The oxygen or air cylinder must meet those parts of Packing Instruction 200 which apply, except for the need for valves to be closed. In addition, the following conditions apply as a minimum:
- the water container with the attached oxygen and/or air cylinder (transportation unit) must be engineered and constructed to withstand all anticipated loads. No more than two cylinders of which a maximum is one cylinder of oxygen are permitted;
  - the water container must be tilt-tested at an angle of 45° in four directions from the upright for a 10-minute minimum duration in each direction with the oxygen supply operating, without leakage of water;
  - the oxygen or air cylinder and regulator must be restrained and protected within the equipment;
  - the oxygen or air regulator used must have a maximum flow rate of not more than five litres per minute;
  - the oxygen or air flow rate to the container must be limited to that sufficient to provide life support to the aquatic animals;
  - the quantity of oxygen or air provided must not exceed 150 per cent of the oxygen or air required for the normal duration of air transport; and
  - only one cylinder may be carried for each 15 cubic metres of gross cargo hold volume. In no circumstances may the rate of oxygen or air flow from the cylinder exceed one litre per minute per five cubic metres of gross cargo hold volume.
- ...
- A324 For the purpose of transporting a symbolic flame, the appropriate authority of the States of Origin, ~~of destination~~ and of the Operator may approve the carriage of lamps fuelled by UN 1223 — **Kerosene**, or UN 3295 — **Hydrocarbons, liquid, n.o.s.**, carried by a passenger as carry-on baggage only. Lamps must be of a "Davy" type or similar apparatus. In addition, the following conditions apply as a minimum:
- no more than four lamps may be carried on board the aircraft;
  - lamps may contain no more fuel than the quantity adequate for the duration of the flight and the fuel must be contained in a leakproof reservoir;
  - lamps must be adequately secured;
  - while on board the aircraft, the lamps must be under the constant supervision of an accompanying person, who must not be a member of the operating crew;
  - lamps may be lit by the accompanying person, but must not be refilled on board the aircraft;
  - at least one fire extinguisher must be kept within reach of the accompanying person at all times. The accompanying person must be trained in the use of the extinguisher;
  - the crew members of the aircraft must be given a verbal briefing about the carriage of the lamps and the pilot-in-command must be provided with a copy of the approval; and
  - Part 7;4.1.1.1 b), c), e), 4.3, 4.4 and 4.8 of the Technical Instructions must apply.

...

---

UN Model Regulations, SP 370, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/17 (see paragraph 3.3.1.2 of this report)

---

A326 (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 4~~ gives a positive result when tested in accordance with Test Series 2 (see UN *Manual of Tests and Criteria*, Part I). See also UN 1942.

---

The substances that this special provision is assigned to (UN 1005 — **Ammonia, anhydrous** and UN 3516 — **Adsorbed gas, toxic, corrosive, n.o.s.**) are forbidden from transport by air on passenger and cargo aircraft. They may be transported on cargo aircraft with prior approval (A2). Should:

- a) the substances be permitted under the conditions of this special provision (in which case the special provision would appear in the Technical Instructions) (if yes, on passenger and cargo aircraft or on cargo aircraft only?); or
  - b) the substances remain forbidden/forbidden, but States may consider providing the exception in this special provision under an approval to transport on cargo aircraft; or
  - c) the special provision not be provided for air transport?
- 

A329 (379) Anhydrous ammonia adsorbed or absorbed on a solid contained in ammonia dispensing systems or cylinders intended to form part of such systems are not be subject to the other provisions of the Technical Instructions if the following conditions are observed:

- a) the adsorption or absorption presents the following properties:
  - 1) the pressure at a temperature of 20°C in the cylinder is less than 0.6 bar;
  - 2) the pressure at a temperature of 35°C in the cylinder is less than 1 bar;
  - 3) the pressure at a temperature of 85°C in the cylinder is less than 12 bar.
- b) the adsorbent or absorbent material must not have dangerous properties listed in Classes 1 to 8;
- c) the maximum contents of a cylinder must be 10 kg of ammonia; and
- d) cylinders containing adsorbed or absorbed ammonia must meet the following conditions:
  - 1) cylinders must be made of a material compatible with ammonia as specified in ISO 11114-1:2012;
  - 2) cylinders and their means of closure must be hermetically sealed and able to contain the generated ammonia;
  - 3) each cylinder must be able to withstand the pressure generated at 85°C with a volumetric expansion no greater than 0.1%;
  - iv) each cylinder must be fitted with a device that allows for gas evacuation once pressure exceeds 15 bar without violent rupture, explosion or projection; and
  - v) each cylinder must be able to withstand a pressure of 20 bar without leakage when the pressure relief device is deactivated.

When carried in an ammonia dispenser, the cylinders must be connected to the dispenser in such a way that the assembly is guaranteed to have the same strength as a single-cylinder.

The properties of mechanical strength mentioned in this special provision must be tested using a prototype of a cylinder and/or dispenser filled to nominal capacity, by increasing the temperature until the specified pressures are reached.

The test results must be documented, must be traceable and must be communicated to the relevant authorities upon request.

...

## Part S-4

# PACKING INSTRUCTIONS

## (ADDITIONAL INFORMATION FOR PART 4 OF THE TECHNICAL INSTRUCTIONS)

...

### Chapter 3

#### CLASS 1 — EXPLOSIVES

112	PACKING INSTRUCTION 112	112
...		
c) for solid dry powder 1.1D		
<i>Inner packagings</i>	<i>Intermediate packagings</i>	<i>Outer packagings</i>
<b>Bags</b> paper, multiwall, water-resistant plastics woven plastics	<b>Bags (for 1050 only)</b> paper, multiwall, water-resistant with inner lining plastics	<b>Boxes</b> 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)
<b>Receptacles</b> fibreboard metal plastics wood	<b>Receptacles</b> metal plastics wood	<b>Drums</b> aluminium (1B1, 1B2) fibre (1G) other metal (1N1, 1N2) steel (1A1, 1A2)

**PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:**

- For UN 0004, 0076, 0078, 0154, 0216, 0219 and 0386, packagings must be lead-free.
- For UN 0209, bags, sift-proof (5H2) are recommended for flake or prilled TNT in the dry state and a maximum net mass of 30 kg.

---

UN Model Regulations, P112(c), PP48, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/17 (see paragraph 3.3.1.2 of this report)

The text of UN PP48 does not currently appear in Packing Instruction 112 c) of the Technical Instructions. ST/SG/AC.10/42/Add.1 adds a second sentence to PP48. The provision, including the new second sentence, is proposed for addition to the Technical Instructions for the sake of alignment with the UN Model Regulations.

- 
- For UN 0504, metal packagings must not be used. Packagings of other material with a small amount of metal, for example metal closures or other metal fittings such as those mentioned in 6.3, are not considered metal packagings.
  - Inner packagings are not required if drums are used as the outer packaging.
  - These packages must be sift-proof.

...

## Chapter 11

### CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

UN Model Regulations, packing instruction P910, ST/SG/AC.10/42/Add.1 and DGP-WG/15-WP/13 (see paragraph 3.2.3.6.1.1 f) of this report)

#### Packing Instruction 910

Cargo aircraft only

##### Introduction

This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells and batteries and to pre-production prototypes of cells and batteries when these prototypes are transported for testing.

##### General requirements

Part 4, Chapter 1 requirements must be met.

##### ADDITIONAL PACKING REQUIREMENTS

---

Special Provision A88 currently requires packaging to meet Packing Group I criteria:

---

[— Packagings must meet the Packing Group II performance requirements.]

- Cells and batteries must be protected against short circuit. Protection against short circuits includes, but is not limited to,
  - individual protection of the battery terminals;
  - inner packaging to prevent contact between cells and batteries;
  - batteries with recessed terminals designed to protect against short circuits, or
  - the use of a non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.

Cells and batteries, including when packed with equipment

- 1) Batteries and cells, including equipment, of different sizes, shapes or masses must be packaged in an outer packaging of a tested design listed below type provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;
- 2) Each cell or battery must be individually packed in an inner packaging and placed inside an outer packaging;
- 3) Each inner packaging must be completely surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat;
- 4) Appropriate measures must be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may be used to meet this requirement;
- 5) Non-combustibility must be assessed according to a standard recognized in the State where the packaging is designed or manufactured;
- 6) A cell or battery with a net mass of more than 30 kg must be limited to one cell or battery per outer packaging.

Cells and batteries contained in equipment

- 1) Equipment of different sizes, shapes or masses must be packaged in an outer packaging of a tested design type listed below provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;
- 2) The equipment must be constructed or packaged in such a manner as to prevent accidental operation during transport;
- 3) Appropriate measures must be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it must be non-combustible and non-conductive; and
- 4) Non-combustibility must be assessed according to a standard recognized in the State where the packaging is designed or manufactured.

---

Special Provision A88 does provide for unpackaged equipment or batteries:

---

- 5) The equipment or the batteries may be transported unpackaged under conditions specified by the appropriate national authority. Additional conditions that may be considered in the approval process include, but are not limited to:
  - a) The equipment or the battery must be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet for subsequent manual or mechanical handling; and
  - b) The equipment or the battery must be fixed in cradles or crates or other handling devices in such a way that it will not become loose during normal conditions of transport.

---

Special Provision A88 currently allows for a metal, plastic or plywood drum or a metal, plastic or wooden box:

---

**OUTER PACKAGINGS**

Boxes

- Steel (4A)
- Aluminium (4B)
- Other metal (4N)
- Natural wood (4C1, 4C2)
- Plywood (4D)
- Reconstituted wood (4F)
- Fibreboard (4G)
- Plastics (4H1, 4H2)

Drums

- Steel (1A2)
- Aluminium (1B2)
- Other metal (1N2)
- Plastics (1H2)
- Plywood (1D)
- Fibre (1G)

Jerricans

- Steel (3A2)
- Aluminium (3B2)
- Plastics (3H2)

...

---

DGP-WG/15-WP/28 (see paragraph 3.2.1.3 of this report):

---

## **Part S-7**

# **STATE'S RESPONSIBILITIES WITH RESPECT TO OPERATORS**

...

## **Chapter 5**

### **INSPECTIONS**

...

#### **5.6 TRAINING PROGRAMMES**

5.6.1 The Technical Instructions require that the operator's training programmes for all staff be approved [by the State of the Operator](#). The inspection is to confirm that training meets the requirements of the Technical Instructions.

...

-----

APPENDIX C

CONSOLIDATION OF AMENDMENTS TO THE EMERGENCY RESPONSE GUIDANCE  
AGREED AT DGP-WG/14 AND DGP-WG/15

Section 4

CHART OF DRILLS AND  
LIST OF DANGEROUS GOODS WITH  
DRILL REFERENCE NUMBERS

---

Amend Tables 4-2 and 4-3 as indicated:

---

<i>UN No.</i>	<i>Drill Code</i>	<i>Proper shipping name</i>
0510	<u>1L</u>	<u>Rocket motors</u>
2815	<del>8L</del> 8P	N-Aminoethylpiperazine
2977	<del>7C</del> 7CP	Radioactive material, uranium hexafluoride, fissile
2978	<del>7C</del> 7CP	Radioactive material, uranium hexafluoride
3507	<del>8L</del> 6C	Uranium hexafluoride, radioactive material, excepted package
<del>3166</del> 3528	<del>9L</del> 3L	Engine, internal combustion, flammable liquid powered
<del>3166</del> 3528	<del>9L</del> 3L	Engine, fuel cell, flammable liquid powered
<u>3528</u>	<u>3L</u>	<u>Machinery, fuel cell, flammable liquid powered</u>
<u>3528</u>	<u>3L</u>	<u>Machinery, internal combustion, flammable liquid powered</u>
<del>3166</del> 3529	<del>9L</del> 10L	Engine, internal combustion, flammable gas powered
<del>3166</del> 3529	<del>9L</del> 10L	Engine, fuel cell, flammable gas powered
<u>3529</u>	<u>10L</u>	<u>Machinery, fuel cell, flammable gas powered</u>
<u>3529</u>	<u>10L</u>	<u>Machinery, internal combustion, flammable gas powered</u>
<u>3530</u>	<u>9L</u>	<u>Machinery, internal combustion</u>
<u>3530</u>	<u>9L</u>	<u>Engine, internal combustion</u>
<u>3531</u>	<u>3L</u>	<u>Polymerizing substance, solid, stabilized, n.o.s.*</u>
<u>3532</u>	<u>3L</u>	<u>Polymerizing substance, liquid, stabilized, n.o.s.*</u>
<u>3533</u>	<u>3L</u>	<u>Polymerizing substance, solid, temperature controlled, n.o.s.*</u>
<u>3534</u>	<u>3L</u>	<u>Polymerizing substance, liquid, temperature controlled, n.o.s.*</u>

-----



## APPENDIX D

### TERMS OF REFERENCE DANGEROUS GOODS PANEL (DGP) WORKING GROUP ON PERFORMANCE-BASED STANDARDS FOR THE SAFE AIR TRANSPORT OF LITHIUM BATTERIES

#### 1. INTRODUCTION

1.1 The ICAO Second International Multidisciplinary Lithium Battery Transport Coordination Meeting held in Cologne Germany from 9 to 11 September 2014 recommended several mitigating measures be taken to reduce the risk of a fire involving significant quantities of lithium cells/batteries (UN 3090 and UN 3480) that may exceed the fire suppression capability of the aircraft and could lead to a catastrophic failure of the airframe. The relevant recommendations considered by the 2015 Dangerous Goods Panel (DGP) Working Group Meeting (DGP-WG/15) included:

- a) Recommendation 2/14 — Performance based provision to limit the probability of propagation of thermal runaway between cells:

That a performance based provision be developed that would limit the probability of propagation of thermal runaway between cells to an acceptable level of risk.

- b) Recommendation 3/14 — State of charge level of all cells:

That all lithium-ion cells for shipment be limited to a state of charge of no more than 30% as an interim means to reduce the probability of propagation of thermal runaway between cells.

- c) Recommendation 8/14 — Performance based packaging of lithium batteries:

That further research and testing be completed as soon as possible on packagings for lithium batteries, that may include the use of cooling agents such as gel packs as a means to add additional protective layers to mitigate the risks associated with the carriage of lithium batteries.

#### 2. PROBLEM STATEMENT

2.1 The 2015 Dangerous Goods Panel Working Group meeting (DGP-WG/15) endorsed the problem statement from the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting (reproduced below) and established a working group to develop a performance standard focused on the cell/battery and packaging to improve lithium battery safety when transported in aircraft cargo compartments. The purpose of this document is to set forth the terms of reference for the informal working group.

“A fire involving significant quantities of lithium batteries (UN 3090 and UN 3480) may exceed the fire suppression capability of the aircraft and could lead to a catastrophic failure of the airframe.”

### 3. **GOAL**

3.1 To develop performance-based standards based on the principle that hazardous effects will be contained within the package.

### 4. **ORGANIZATION**

4.1 The informal working group will be open to all interested parties. The dangerous goods panel member nominated by the United States will serve as chair. Participation in the group will be comprised of members from States, international organizations, and their advisors whose charter is to provide subject matter expertise on aircraft cargo compartment fire safety and the safe shipment of lithium batteries in aircraft.

### 5. **OBJECTIVES**

5.1 The main objectives are to:

- a) Consider performance-based standards to address Recommendations 2/14, 3/14, and 8/14 of the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting and to prevent or minimize any hazardous effects outside the package. Consideration should include performance-based standards that may lead to possible off-the-shelf package solutions.
- b) Define the scope and application of the standard (e.g. cells, batteries, packaging material, outer packaging).
- c) Review the effects of the performance with aircraft systems/equipment ability to mitigate the resultant effects.
- d) Submit the output to the DGP.

### 6. **OUTPUTS**

6.1 The group will provide the following results:

- a) Recommend performance-based standards for the safe carriage of lithium cells and batteries in aircraft cargo compartments.
- b) Report to the Dangerous Goods Panel to explain the rationale behind the proposed standard(s).

7. **REFERENCES**

Annex 18 — *The Safe Transport of Dangerous Goods by Air*

Annex 8 — *Airworthiness of Aircraft*

Annex 6 — *Operation of Aircraft*

[Report of the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting](#)

*Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284, 2015-2016 Edition)

Relevant meeting materials

— END —