

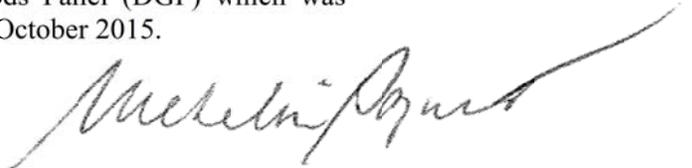
**TWENTY-FIFTH MEETING OF THE
DANGEROUS GOODS PANEL (DGP) (2015)**

LETTER OF TRANSMITTAL

To: President, Air Navigation Commission

From: Chairperson, Dangerous Goods Panel (DGP) (2015)

I have the honour to submit the report of the twenty-fifth meeting of the Dangerous Goods Panel (DGP) which was held in Montréal, from 19 to 30 October 2015.

A handwritten signature in black ink, appearing to read 'Micheline Paquette', with a long, sweeping flourish extending to the right.

Micheline Paquette
Chairperson

Montréal, 30 October 2015

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* Recommendations annotated “RSPP” relate to proposals for amendment of Standards, Recommended Practices and Procedures for Air Navigation Services or guidance material in an Annex.

DANGEROUS GOODS PANEL (DGP)**TWENTY-FIFTH MEETING****Montréal, 19 to 30 October 2015****HISTORY OF THE MEETING****1. DURATION**

1.1 The twenty-fifth meeting of the Dangerous Goods Panel (DGP) was opened by Mr. Farid Zizi, President of the Air Navigation Commission (ANC) in Montréal, at 1000 hours on 19 October 2015. The meeting ended on 30 October 2015.

2. ATTENDANCE

2.1 The meeting was attended by members and observers nominated by twenty-two Contracting States and five international organizations, as well as by advisers and others as shown in the list below :

Members	Advisers	Nominated By
B. Firkins		Australia
B. Carrara	H. Guedes	Brazil
M. Paquette	D. Evans T. Howard P. Juneau	Canada
Q. Xu	J. Abouchaar C. Chan Y. Li Z. Qiu	China
P. Tatin	M. Plassart	France
H. Brockhaus	U. Wienecke	Germany
P. Privitera	C. Carboni A. Pellas M. Tortorici	Italy

Members	Advisers	Nominated By
H. Sugimoto	A. Awano Y. Funai N. Iki K. Maeda I. Uehara S. Yabe K. Yanagawa	Japan
T. Muller	D. Kampman C. Van Zijl K. Vermeersch	Netherlands
S-Won Park	J. Kye-Woong	Republic of Korea
D. Mirko	D. Kurdchenko I. Manakhov	Russian Federation
P. Ros		Spain
H. Al Muhairi.	K. Al Balooshi. P. Balasubramanian A. Wagih	United Arab Emirates
R. McLachlan	D. Warden	United Kingdom
A. Stubblefield	J. Gardlin M. Givens R. Hill S. Kelley J. McLaughlin R. Meidl D. Pfund H. Webster	United States
D. Brennan	P. Oppenheimer D. Tindley	International Air Transport Association (IATA)
P. Rohrbach	D. Ferguson	International Coordinating Council of Aerospace Industries Associations (ICCAIA)
M. Rogers	S. Schwartz	International Federation of Air Line Pilots' Associations (IFALPA)
Advisers		
N. McCulloch	A. Altemos G. Leach	Dangerous Goods Advisory Council (DGAC)
M. Samaan		World Health Organization (WHO)

Observers

M. Boehm	Austria
F. Carroll	Bahamas
J.W. Bengtsson	Denmark
S. Shikongo	Namibia
C. Gundu	
N. Lum	Singapore
T. Zembe	South Africa
L. Gqeke	
N. Hagmann	Switzerland
G. Kerchner	The Rechargeable Battery Association (PRBA)
C. Chanson	RECHARGE — The European Association for Advanced Rechargeable Batteries
B. Bonnardel Azzarelli	World Nuclear Transport Institute (WNTI)
L. Calleja-Barcena	European Aviation Safety Agency (EASA)
R. McClelland	Global Express Association (GEA)
A. McCulloch	
M. Petzinger	
J. Wyatt	

3. OFFICERS AND SECRETARIAT

3.1 Mrs. Micheline Paquette (Canada) was elected Chairperson of the meeting and Mr. Ben Firkins (Australia) was elected Vice-Chairperson.

3.2 The Secretary of the meeting was Dr. Katherine Rooney, Chief of the Cargo Safety Section, who was assisted by Dr. Rose-Marie Heftberger and Ms. Lynn McGuigan, Technical Officers of the same section.

4. AGENDA OF THE MEETING

4.1 The agenda for the meeting shown hereunder was approved by the Air Navigation Commission on 5 June 2015.

- Agenda Item 1: Development of proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*
- Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2017-2018 Edition
- Agenda Item 3: Development of recommendations for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2017-2018 Edition
- 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
- Agenda Item 5: Development of a comprehensive strategy to mitigate risks associated with the transport of lithium batteries including development of performance-based packaging standards and efforts to facilitate compliance
- Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:
 - 6.1: Development of a global framework for the sharing of dangerous goods incident and accident information
 - 6.2: Development of competency-based training provisions for dangerous goods
 - 6.3: Development of guidance material on countering the potential use of dangerous goods in an act of unlawful interference
 - 6.4: Consideration of transitional measures for amendments to the Technical Instructions
- Agenda Item 7: Other business

5. WORKING ARRANGEMENTS

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

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

6.1 The President welcomed the panel to Montreal and to ICAO Headquarters. He noted that the Dangerous Goods Panel was unique in that its formal panel meetings lasted two weeks as opposed to all other ANC panels which normally met for one week in a formal setting. He hoped that the two weeks would allow for the development of good relationships that would help strengthen discussions on what he knew were going to be some controversial issues. He acknowledged that the agenda for the meeting was substantial and noted that the second week of the meeting would be primarily devoted to discussions on lithium batteries.

6.2 He stated that since the panel's twenty-fourth meeting, there had been a number of changes in membership. The Secretary reported that Mr. Mariano Gelsomino and Mr. Chris Glasow left the panel and were replaced by Mr. Paolo Privitera nominated by Italy and Ms. Angela Stubblefield nominated by the United States. In addition, the Commission had approved the nomination of a new member: Mr. Paul Rohrbach nominated by the International Coordinating Council of Aerospace Industries Associations (ICCAIA). These changes left the panel with eighteen members nominated by fifteen Contracting States and three international organizations. The President welcomed the new members and expressed his appreciation to those who had left.

6.3 The President reminded participants that they were meeting as a panel of experts and that everyone was there in their own personal capacity with views that might not necessarily be those of their administrations or organizations. Participants were nominated by governments or organizations and accepted by the Air Navigation Commission as experts based on their qualifications and as such were expected to express their own professional opinions. The intent of this approach was to enable participants to argue on the technical depth and substance of subject matter without resorting to negotiating positions. The success of any ICAO panel meeting was determined by the ability of the participants to settle technical issues in a cooperative manner; although consensus was not an absolute requirement, it was without any doubt a warranty of success.

6.4 The President announced that a celebration would be held on 5 November 2015 to commemorate the ANC's 200th Session. The Walter Binaghi Air Navigation Commission Laurel Award would be presented during this event to the chairman of the Separation and Airspace Safety Panel (SASP) for his leadership and technical contribution to the panel he had chaired for many years. He also announced that a commemorative brochure had been published by the ANC which outlined the work and accomplishments of each ANC panel. These gestures were an opportunity for the Commission to remind States how important the work of its experts was to international civil aviation.

6.5 Referring to the discussions which would take place on lithium batteries, the President acknowledged that the subject had been a controversial one for many years and that there had been a lack of consensus on many of the panel's recommendations. He emphasized that the Commission would be expecting the rationale and opinions of both the minority and the majority reflected in the report to enable the Commission to develop its own comprehensive and concrete recommendations which it would bring to the Council.

6.6 The President informed the panel of a new centralized website for all ANC panels which he hoped would facilitate the work of each individual panel and also encourage cross-panel collaboration. He noted that the DGP's recently-revised terms of reference were available on the site along with the terms of reference for all other ANC panels. He encouraged panel members to use the site and to provide

any comments on ways it could be improved. He also informed the meeting that a new guidance document was being prepared on developing Standards which had been circulated among various panels for comment. He was confident this document would provide a consistent approach for all technical experts to use in developing well-formulated Standards. He stressed that when developing new Standards and Recommended Practices, the panel consider the feasibility of implementation and impact on States.

6.7 Referring to the twenty-fourth meeting of the panel which was held in October 2013, he stated that the Commission had considered the report and recommended that the Council adopt all the panel's recommendations. The Council had adopted Amendment 12 to Annex 18 on 2 March 2015, it became effective on 13 July 2015 and would become applicable on 12 November 2015. He acknowledged that Commissioners did have reservations with respect to the panel's recommendations related to lithium batteries in that although they addressed a known risk posed by lithium metal batteries on passenger aircraft, Commissioners were looking for a more comprehensive strategy that would address risks posed by all batteries on both passenger and cargo aircraft. He emphasized that the driving force of the panel's work was not the need to transport lithium batteries but rather the need to transport them safely. The ANC was looking for a strategy that would address current risks and also provide for a systematic way forward. He noted he was encouraged by the recommendations made by the Third International Multidisciplinary Lithium Battery Transport Coordination Meeting with regard to packaging performance standards and saw these standards as a way forward. He recognized that the DGP was faced with unique challenges in that cargo introduced risks from outside the aviation system. The aviation industry could therefore not address the lithium battery issue alone, it needed help from the battery industry.

6.8 The President declared open the twenty-fifth meeting of the Dangerous Goods Panel and wished the panel success in its work and a pleasant stay in Montréal.

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

**1.1 STOWAGE OF TOXIC AND INFECTIOUS SUBSTANCES
(DGP/25-WP/30)**

1.1.1 Recognizing that the segregation requirements for toxic and infectious substances were removed from the 2015-2016 Edition of the Technical Instructions (see paragraph 2.7.1.1 of the DGP/24 Report), the meeting agreed that a consequential amendment to the Annex 18 Standard which referred to the deleted provisions be removed. On the basis that the amendment was a minor one and not safety related, the Secretary recommended waiting until more substantive amendments to Annex 18 were proposed before bringing the proposal to the Air Navigation Commission (ANC) for preliminary review and before sending it out to States for comments. This was agreed.

**1.2 REQUEST FOR LEGAL ADVICE ON APPLICABILITY
OF ANNEX 18 AND THE TECHNICAL INSTRUCTIONS
(DGP/25-WP/44)**

1.2.1 Whether or not entities, other than operators, not knowingly involved with handling dangerous goods (e.g. freight forwarders handling general cargo) fell within the scope of Annex 18 had been raised during discussions on new provisions for dangerous goods competency-based training (see paragraph 6.2.1 under Agenda Item 6 of this report). It was noted that the current provisions in the Technical Instructions specifically required initial and recurrent dangerous goods training programmes be established and maintained by or on behalf of freight forwarders, including freight forwarders processing cargo or mail other than dangerous goods by virtue of Part 1;4.1.1 f) and Part 1;4.2.2. If Annex 18 did not in fact allow for regulatory authority over such entities, there was a discrepancy in the training provisions of the Technical Instructions that needed to be addressed. 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. However, for some panel members, the current structure of Annex 18 did not provide a legal basis for addressing staff not handling dangerous goods, and therefore requiring dangerous goods training for these entities within their States was not legally enforceable.

1.2.2 A legal officer explained to the panel that whether or not the mandatory requirement in the Technical Instructions for freight forwarders who did not handle dangerous goods to be trained was legally enforceable was dependent on the scope of Annex 18. He outlined the position of the ICAO Legal Bureau on the subject, which was that since Annex 18 was applicable to all international civil aircraft operations, entities involved with knowingly introducing dangerous goods into the aviation system and those entities defined in the Annex would fall within its scope. Freight forwarders were not defined in Annex 18, but could be considered within its scope by virtue of the surface transport provisions in paragraph 2.6. Since this provision was a recommendation, training requirements for freight forwarders not handling dangerous goods should similarly be in the form of a recommended practice. He emphasized that despite the recommendatory nature of the provision, there was nothing to stop a State from mandating training requirements to entities which fell outside the scope of Annex 18.

1.2.3 While the advice of the Legal Bureau was appreciated, some members questioned whether a recommended practice related to ground transport was the appropriate provision for the Legal

Bureau to base its interpretation of the scope of dangerous goods training. It was suggested that a freight forwarder may unknowingly introduce dangerous goods offered by a shipper into the aviation system and would at that point fall within the scope of the Annex. The legal officer referred to *mens rea* and the need for an element of intent. Others questioned whether the same would apply to ground handling agents, which were not defined in Annex 18, or designated postal operators, who were not part of the dangerous goods transport system. The Secretariat explained that both entities were within the scope of Annex 18 by virtue of ground handlers being defined and addressed in Annex 6, making them part of the aviation system, and designated postal operators being defined and addressed in Annex 18.

1.2.4 Recognizing that there were differing opinions on the subject amongst panel members, it was suggested this would also be the case among States without members or observers on the panel. The Secretary suggested seeking comments from all Contracting States on the subject through a State letter.

1.2.5 It was agreed that measures needed to be taken to determine the feasibility of amending Annex 18 to clarify its scope while ensuring it applied to entities such as freight forwarders not knowingly involved with handling dangerous goods and whether the scope could be consistently applied to all Contracting States. The panel believed that this task was beyond its purview and asked that guidance be sought from the ANC and the Council.

1.3 RECOMMENDATION

1.3.1 In light of the foregoing discussion, the meeting developed the following recommendation:

RSPP | **Recommendation 1/1 — Amendment to segregation requirements for toxic and infectious substances in Annexes 18**

That comments from States be sought on a proposed amendment to Annexes 18 related to segregation requirements for toxic and infectious substances as presented in the appendix to the report on this agenda item, but only once more substantive amendments to Annex 18 are developed.

APPENDIX

PROPOSED AMENDMENT TO ANNEX 18

...

CHAPTER 8. OPERATOR'S RESPONSIBILITIES

...

8.7 Separation and segregation

8.7.1 Packages containing dangerous goods which might react dangerously one with another shall not be stowed on an aircraft next to each other or in a position that would allow interaction between them in the event of leakage.

~~8.7.2 Packages of toxic and infectious substances shall be stowed on an aircraft in accordance with the provisions of the Technical Instructions.~~

8.7.3² Packages of radioactive materials shall be stowed on an aircraft so that they are separated from persons, live animals and undeveloped film, in accordance with the provisions in the Technical Instructions.

...

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

2.1 AMENDMENTS TO PART 1 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.1.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 1 (DGP/25-WP/11)

2.1.1.1 The meeting reviewed amendments to Part 1 of the Technical Instructions to reflect the decisions taken by the UN Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals (subsequently referred to in the report, for the sake of brevity, as “UNCOE”) at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by the 2015 DGP Working Group Meeting (DGP-WG/15, Montréal, 27 April to 1 May 2015). The amendments were agreed.

2.1.2 General Exception for Search and Rescue Operations (DGP/25-WP/9)

2.1.2.1 Suggested limitations with respect to the exception in Part 1;1.1.5.1 d) for dangerous goods used as aid in connection with search and rescue operations were raised. The provisions specified that the exception applied “during flight”, but there were some dangerous goods needed for search and rescue operations which were used on the ground and not during the flight such as diving cylinders, hand-held flares and other survival equipment. There was also uncertainty in relation to whether or not the provision could be applied to training flights on which the same dangerous goods might be carried as those carried during live operations. The proposer noted that in his State the operator either removed dangerous goods from the aircraft during training or sought approval from the State to carry the goods through an exemption. The proposer believed both approaches were excessive. The panel was invited to consider an amendment which would expand the applicability of the provision to account for these limitations.

2.1.2.2 While there was support for the proposal in principle, the meeting could not agree to the original wording proposed in that there was concern it would broaden the scope to which the provision applied. A revised proposal was developed based on comments provided. The revised amendment was agreed, but it was suggested that work continue during the next biennium to further refine the provision by moving away from attempts to incorporate an exhaustive list of special aircraft operations for which exceptions applied to allow for a more systemic approach to determining if a special aircraft operation was subject to exceptions.

2.1.3 Special Provision A62 — State of Origin (DGP/25-WP/35)

2.1.3.1 Clarification was sought on the interpretation of the definition of State of Origin and how it related to Special Provision A62 which was assigned to general, not otherwise specified, entries for explosives. Special Provision A62 specified that the entries could only be used when no other appropriate designation existed in the dangerous goods list and only with the approval of the appropriate authority of

the State of Origin. Recognizing that the definition for State of Origin was the State in the territory of which the *consignment* was first to be loaded on an aircraft, and the definition for consignment referred to packages of dangerous goods accepted by an operator from one shipper at one time at one addresses moving to one consignee at one destination address, it was questioned whether this would mean that an approval was required for every individual shipment from each State for explosives to which Special Provision A62 applied. It was noted that the definition for State of Origin had been modified in the 2013-2014 Edition of the Technical Instructions and that the previous edition referred to cargo instead of consignment. The meeting was invited to discuss whether a consequential change to Special Provision A62 when the definition was changed had been overlooked or if an approval was in fact required from each State for every individual shipment of explosives to which Special Provision A62 applied.

2.1.3.2 Although many believed the intent of the special provision was to require a one-time approval of classification by the State where the products were originally manufactured, the definition of State of Origin and the wording of the special provision did not make this clear. It was suggested that referring to State of Origin in relation to approvals for classification purposes may not be appropriate. During discussions it was noted that other provisions in the Technical Instructions involving approval of classification also referred to State of Origin.

2.1.3.3 Although Special Provision A62 was based on SP 178 of the Model Regulations and SP 178 referred to country of origin, the lack of clarity introduced when the definition for State of Origin was modified in the Technical Instructions was not an issue in the Model Regulations. It was suggested that replacing “State of Origin” with “State of Manufacturer” would clarify the intent of the proposal, but it was noted that State of Manufacturer was defined in Annex 8 in relation to the assembly of aircraft and would therefore make this inappropriate. Terminology which did not refer to a defined term was therefore proposed. The panel agreed to replace “State of Origin” with “State in which the dangerous goods were manufactured” in Special Provision A62. It was noted that State of Origin with respect to classification was referred to in other provisions throughout the Technical Instructions and agreed that the text in these provisions would be aligned with revised Special Provision A62.

2.2 AMENDMENTS TO PART 2 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.2.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 2 (DGP/25-WP/12)

2.2.1.1 The meeting reviewed amendments to Part 2 of the Technical Instructions to reflect the decisions taken by the UNCOE at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by DGP-WG/15. The following issues were raised during discussion:

- a) The description of Division 4.1 substances in paragraph 2 of the Introductory Chapter of Part 2 was modified to include “Solid” before “desensitized explosives” for the sake of alignment with the UN Model Regulations.
- b) A requirement for a copy of the document of approval to accompany a consignment that included substances identified by the shipper (with the approval of the appropriate national authority) as being listed by name in Table 3-1 but for which the classification criteria for another hazard class or division applied was added to 2;1.2

at DGP-WG/15. It was questioned whether this was necessary, recognizing that not all States required the shipper to obtain a document of approval for this purpose. Some members opposed removing the requirement on the basis that operators would need it for verification purposes during acceptance checks. A compromise was suggested requiring a statement on the transport document indicating that classification was based on the provisions of Part 1;1.2 instead of a requirement for a copy of the document of approval. While some members could not support this as they considered it important for operators to have evidence of approval, others suggested that using the provision in Part 1;1.2 meant that the shipper was communicating additional hazards and therefore evidence of approval would be an excessive requirement. The requirement was maintained as written.

- c) Text included in new Special Provision A209 referred to in the new provisions for forbidden gases of Class 2 and forbidden substances of Class 3, Division 6.1 and Class 8 related to temperature control was moved to the Supplement as part of Special Provision A330.

2.2.2 Replacement of “Exemption” with “Exception” In Part 2, Chapter 2 (DGP/25-WP/7)

2.2.2.1 An amendment to replace the word “exemption” with “exception” in the note in Part 2;2.2 which made Division 2.2 gases not subject to the Instructions when contained in a list of articles was proposed. It was suggested that although the use of the word “exemption” aligned with the text in the UN Model Regulations, the word had a specific meaning in the Technical Instructions as defined in Part 1;3. It was agreed that “exception” was more appropriate as it was used throughout the Technical Instructions to indicate cases where all or certain provisions of the Technical Instructions did not apply. The amendment was agreed.

2.3 AMENDMENTS TO PART 3 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.3.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 3 (DGP/25-WP/13)

2.3.1.1 The meeting reviewed amendments to Part 3 of the Technical Instructions to reflect the decisions taken by the UNCOE at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by the 2014 DGP Working Group Meeting (DGP-WG/14, Rio de Janeiro, 20 to 24 October 2014) and by DGP-WG/15. The following issues were raised during discussion:

- a) It was noted that some provisions contained in revised SP 240 of the Model Regulations were not included in corresponding Special Provision A21 of the Technical Instructions as they were already contained in applicable packing instructions or other special provisions. Further amendments to Special Provision A21 were agreed during discussions on a proposal to clarify provisions for batteries contained in equipment in Packing Instruction 952 (see paragraph 2.4.2 of this report).

- b) DGP-WG15 agreed to the removal of “other type of pallets” throughout the Instructions but wanted to give more consideration to removing the term in Special Provision A70. DGP/25 agreed to its removal.
- c) The text of the requirement for a copy of the document of approval to accompany a consignment of prototype or low production batteries transported in accordance with Special Provision A88 was modified to remove any suggestion that providing quantity limitations was the only information necessary to grant an approval. Minor editorial amendments were also made to the special provision. Most of the provisions in Special Provision A88 specific to lithium batteries were moved to new Packing Instruction 910 (see the appendix to the Report on Agenda Item 3).
- d) An editorial amendment to replace “listing” with “entry” in Special Provision A102, which matched SP 244 of the UN Model Regulations, was agreed. The UN Sub-Committee would be informed.
- e) Text in new Special Provision A209 related to temperature control was moved to the Supplement as part of Special Provision A330.
- f) Further amendments to the revised overpack provisions for dangerous goods packed in limited and excepted quantities contained in the UN Model Regulations were incorporated to reflect additional labelling requirements for the air mode. Editorial amendments were also incorporated to clarify the intent of the provisions.

2.3.1.2 The amendments were agreed.

2.3.2 **Cargo Aircraft only Package Limits for UN0501 — Propellant, Solid 1.4C (DGP/25-WP/10)**

2.3.2.1 It was noted that UN 0501 — **Propellant, solid** a Division 1.4C explosive, was listed as forbidden on both passenger and cargo aircraft in Table 3-1. While all other Division 1.4C explosives listed in Table 3-1 were forbidden on passenger aircraft, only UN 0501 was also forbidden on cargo aircraft. A maximum net quantity of 75 kg per package was permitted on cargo aircraft only for all other Division 1.4.C explosives, which was consistent with the permissible quantities provided in the *Guidance Material for the Dangerous Goods Panel to Aid in the Preparation of the Technical Instructions and Supporting Documents*. It was also reported that a June 2015 meeting of the United Nations Working Group on Explosives had determined that there were no differences between the transport risks posed by UN 0501 and other Division 1.4C explosives. Accordingly, an amendment to Table 3-1 was proposed to permit a maximum net quantity of 75 kg of UN 0501 — **Propellant, solid** per package on cargo aircraft only when packed in accordance with Packing Instruction 114.

2.3.2.2 There were some objections to removing the prohibition from transport on cargo aircraft on the basis that these explosives could burn without supplemental oxygen. A fire involving these articles could therefore exceed the capabilities of aircraft fire suppressions systems. There were also concerns with the impact pressurization could have on these explosives. The majority of panel members supported the amendment based on input from the UN working group which indicated that the hazards posed by these particular explosives were no different to the hazards posed by other Division 1.4C explosives which were permitted. It was noted that Division 1.4 was limited to substances and articles which

presented no significant hazard and which presented only a small hazard in the event of ignition or initiation during transport. The amendment was agreed.

2.3.3 Revision of “Consumer Commodity” to Include Aviation Regulated Substances (DGP/25-WP/32)

2.3.3.1 Special Provision A112, assigned to ID 8000 — **Consumer commodity**, described the types of substances which could be assigned to ID 8000 and included a list of specific UN numbers permitted, provided such substances did not have a subsidiary risk. An amendment which expanded the list to include UN 3334 — **Aviation regulated liquid, n.o.s.*** and UN 3335 — **Aviation regulated solid, n.o.s.*** was proposed, noting that solutions of less than 25 per cent formaldehyde were often classified as UN 3334 and usually shipped in a form suitable for retail sale.

2.3.3.2 The amendment was agreed.

2.3.4 Requirements for Sterilization Devices Containing Nitrogen Dioxide or Nitric Oxide (DGP/25-WP/34, Revised)

2.3.4.1 The meeting 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 small quantities of 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. Two special provisions were proposed, one for gases and the other for liquids. 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.

2.3.4.2 There was support for the proposal in principle, recognizing the need to provide a safe mechanism to facilitate humanitarian relief. There were, however, a number of concerns raised with the initial proposal including:

- a) ensuring that the special provision only applied when the substances were contained in sterilization devices needed to be emphasized;
- a) the amendment was based on Special Provision A131 — although the quantity limitations were less restrictive, a consistent approach was needed;
- b) an indication of what hazard labels needed to be applied was needed as was an indication of documentation requirements;
- c) there was support for a suggestion for a more generic provision that could be applied to sterilization devices containing other dangerous goods, but the proposer explained efforts to do this were unsuccessful because of various properties with different types of devices.

2.3.4.3 A revised proposal addressing concerns raised by the panel was agreed.

2.3.5 Special Provision A104 (DGP/25-WP/36)

2.3.5.1 An amendment deleting Special Provision A104, assigned to UN 1230 — **Methanol** was proposed. The entry for UN 1230 — **Methanol** was classified as a flammable liquid with a toxic subsidiary risk in the Technical Instructions. It was noted that the UNCOE had originally based the assignment of a toxic subsidiary risk on human experience rather than toxicity data and that incidents involving railroad workers purposely drinking methanol after mistaking it for ethanol had contributed to this decision. An exception from the requirement for a toxic subsidiary risk label had been added to the Technical Instructions so as to provide relief from the requirement to segregate toxic and infectious substances from animals and foodstuffs, recognizing that the segregation requirement was not relevant to the UNCOE's justification for assigning the subsidiary risk. A subsidiary risk label was a requirement for UN 1230 — **Methanol** for all other modes of transport. As such, Special Provision A104 specified that although the label was not required by the Technical Instructions, it could still be applied. Noting that the segregation requirements for toxic and infectious substances had been removed from the 2015-2016 Edition of the Technical Instructions, it was felt that relief from the labelling requirements were no longer justified. In the interest of multi-modal harmonization, it was agreed to include the toxic label in Column 5 of the dangerous goods list and to delete Special Provision A104.

2.3.5.2 Although there were some objections to the proposal by some who supported the status quo and were concerned the change would cause problems with inter-modal transport in their States, the majority supported it. The amendment was agreed.

2.3.6 Incident with Catecholborane (DGP/25-WP/47)

2.3.6.1 The meeting was informed of an incident involving catecholborane which was classified as a general entry under UN 2924 — **Flammable liquid, corrosive, n.o.s.** The product properties indicated that the substance decomposes to borane gas at a rate of two per cent per week at room temperature, that borane gas could ignite when in contact with moist air, and that catecholborane could react violently with water. Transport of the substance from Asia to Europe was delayed for nine days as the result of a typhoon and the temperature had been consistently above 33°C. Four broken bottles were discovered after they arrived at their destination. The substance was stored after arrival for approximately two weeks at 8°C, but several bottles exploded and caught fire once they were picked up and prepared for another shipment. It was concluded that moist air entered the bottles during the long transit time under high temperatures causing a chemical reaction and pressure build up. The industry recommended that Catecholborane be forbidden for transport by air unless transported in pressure receptacles and under cooled conditions. No proposal for amending the Technical Instructions was provided, but the panel was invited to discuss the incident and recommend action if deemed necessary.

2.3.6.2 The presenter noted that she was aware of shippers who had only shipped the substance during winter months to ensure appropriate temperature control; this was of great concern recognizing that there was no method to guarantee temperature control in an aircraft cargo compartment. She also noted that several manufacturers had classified the substance the same way. There was general consensus that the substance should be forbidden for transport by air, although some cautioned against a hasty decision involving a single incident that did not occur in transport without more comprehensive information. Panel members suspected a classification problem, but whether this was due to shipper error or a limitation in the classification criteria in the regulations would need to be determined. While adding a new entry for catecholborane to Table 3-1 appeared to be a sensible solution, there were concerns that the substance could be one of a family of substances with the same properties. The need for temperature control only heightened these concerns. Although it was recognized that a comprehensive solution would

require more information and further investigation by the UN Sub-Committee, the panel agreed that the status quo was not an option that could be taken based on the risks to safety what were already known. In the absence of a UN number assigned by the UNCOE and recognizing that the UN process would not be immediate, the panel recommended adding a light type entry in the Technical Instructions with a special provision assigned to it forbidding the substance for transport by air on both passenger and cargo aircraft. Transport on cargo aircraft would be possible with the approval of the State of Origin and State of the Operator. Recognizing the potential threat to safety, the panel recommended that the amendment be incorporated in the 2015-2016 Edition of the Technical Instructions by way of an addendum. The panel stressed the importance of disseminating the information quickly and as widely as possible. As such, the Secretariat would issue an electronic bulletin to States encouraging them to disseminate the information to industry, and industry participants on the panel would disseminate the information within their network of shippers.

2.4 AMENDMENTS TO PART 4 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.4.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 4 (DGP/25-WP/14)

2.4.1.1 The meeting reviewed amendments to Part 3 of the Technical Instructions to reflect the decisions taken by the UNCOE at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by DGP-WG/14 and DGP-WG/15. The following issues were raised during discussion:

- a) Net quantity per package limitations for aerosols, gas cartridges and receptacles, small containing gas were added to Packing Instructions 203 and Y203 to align the packing instructions more closely with packing instructions of other classes which also provided quantity limitations;
- b) For the sake of harmonization, outer packagings listed in Packing Instruction 450 would be aligned with what was permitted in the UN Model Regulations for UN 3527 — **Polyester resin kit** despite the fact that not all packagings permitted would be practical to use.

2.4.1.2 The amendments to Part 4 were agreed as amended.

2.4.2 Revision to Packing Instruction 952 for Small Battery-Powered Vehicles (DGP/25-WP/5)

2.4.2.1 It was noted that Packing Instruction 952, UN 3171 — **Battery-powered equipment** and UN 3171 — **Battery-powered vehicle**, did not require outer packaging as it was assumed that the vehicles and equipment would be large and robust enough to prevent damage during transport. Although Special Provision A21 required *equipment* powered by lithium batteries to be consigned under UN 3091 — Lithium metal batteries packed with or contained in equipment or UN 3480 — Lithium ion batteries packed with or contained in equipment, there was no such requirement for *vehicles* powered by lithium batteries. Examples of smaller lithium battery-powered items which met the description of a vehicle defined in Special Provision A21 were provided, and it was suggested these could be subject to damage during transport without packaging. To ensure that lithium battery-powered vehicles in particular

were protected from damage during transport, an amendment to Packing Instruction 952 was proposed requiring vehicles which could be handled in other than an upright orientation to be placed in strong, rigid out packaging.

2.4.2.2 Noting that a revision to Special Provision A21 had been proposed for the sake of alignment with the revision adopted by the UNCOE in the equivalent special provision in the UN Model Regulations (SP 240) allowing for parts of a vehicle, including the battery, to be detached if the vehicle had to be shipped in packaging, the panel was also invited to consider:

- a) not adopting the change to Special Provision A21; or
- b) whether lithium ion batteries detached from a vehicle should be required to be packed in UN specification packaging.

2.4.2.3 There was agreement that batteries which were removed from a vehicle would need to be classified separately as lithium batteries packed on their own. The proposed new wording for vehicles powered by batteries in a disassembled state was therefore removed as was the separate list of outer packaging that was proposed for lithium ion or sodium batteries packed with the vehicle. Not everyone agreed that the proposed text referring to vehicles which could possibly be handled in other than an upright position would be an effective way of delineating small vehicles from large ones. The importance of ensuring the battery was in a vehicle large and robust enough to protect it was the intended goal, but these members questioned whether the proposed wording would achieve this. The majority, however, supported the wording used and the revised amendment to Packing Instruction 952 was agreed.

2.4.2.4 The panel decided not to adopt new text in Special Provision A21 that had been added to the corresponding special provision in the UN Model Regulations which referred to vehicles being detached from their frames to fit into the packaging as it was felt to be unnecessary.

2.4.3 Provision for the Use of Large Packagings (DGP/25-WP/43)

2.4.3.1 It was noted that packagings where the net mass exceeded 400 kg would be considered large packagings which were currently not permitted for air transport. It was suggested, however, that some articles larger than 400 kg were permitted by the Technical Instructions by virtue of “no limit” appearing in the maximum net quantity per package field of Table 3-1 and that such articles would need to be placed in larger packagings. It was therefore proposed to add provisions in the Technical Instructions for the use of large packagings for these articles to be transported on cargo aircraft, subject to approval by the appropriate national authority of the State of Origin and the State of the Operator. A new Chapter 13 in Part S-4 of the Supplement which included conditions which applied to the use of such packagings was also proposed.

2.4.3.2 The amendment was revised to clarify that the provision applied to one article and to account for requirements for certain marks and labels to be affixed to two opposing sides of the package. A question was raised as to why the amendment was limited to cargo aircraft. It was explained that it was based on existing provisions for portable tanks, which were permitted on cargo aircraft only, and it was felt that this was appropriate as passenger aircraft would not always be feasible for these large articles.

2.4.3.3 The revised amendment was agreed.

2.5 AMENDMENTS TO PART 5 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.5.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 5 (DGP/25-WP/15)

2.5.1.1 The meeting reviewed amendments to Part 3 of the Technical Instructions to reflect the decisions taken by the UNCOE at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by DGP-WG/15.

2.5.1.2 Amendments related to lithium batteries were considered under Agenda Item 5. The remaining amendments were agreed.

2.5.2 Use of Environmentally Hazardous Substance Mark (DGP/25-WP/46)

2.5.2.1 A revision to the special marking provisions for environmentally hazardous substances (EHS) was proposed to re-introduce an exception from the EHS marking on packages containing a net quantity of 5 L or less for liquids or a net mass of 5 kg or less for solids. The exception was removed from the 2015-2016 Edition of the Technical Instructions as it was considered redundant with the introduction of Special Provision A197, assigned to the entries in the dangerous goods list for EHS. The special provision made EHS not subject to any other provisions of the Technical Instructions when in quantities of 5 L or less for liquids or 5 kg or less for solids provided certain general packing provisions were met. These revisions were made for the sake of harmonization with the UN Model Regulations. It was reported, however, that some shippers wished to transport EHS assigned to UN 3077 or UN 3082 as fully regulated substances even if they were within the quantity limitations set by the new special provision. However, because of the deletion of the exception for the use of the EHS mark for packagings of less than 5L or 5 kg, the use of the mark would now be mandatory without the application of Special Provision A197. It was suggested that it was never the intention to require the mark to be used for such consignments and that the proposed amendment was therefore justified. It was noted that the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) had reinstated the exception which caused problems for multi-modal transport because the air mode still required it. While recognizing the issue was of a multi-modal nature and would normally be brought for consideration to the UN Sub-Committee as a first step, this would mean the revision would only be introduced into the 2019-2020 Edition of Technical Instructions. The panel was therefore asked to consider adopting the amendment in the 2017-2018 Edition and advising the UN Sub-Committee accordingly.

2.5.2.2 There was sympathy for the logistical problems the lack of harmonization had caused to intermodal transport between road and air, and several members supported the amendment. The majority, however, did not support it as they could not justify introducing a misalignment with the UN Model Regulations, especially since the issue had been discussed at length at the UN Sub-Committee. The amendment was not agreed.

2.6 AMENDMENTS TO PART 6 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.6.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 6 (DGP/25-WP/16)

2.6.1.1 The meeting reviewed amendments to Part 6 of the Technical Instructions to reflect the decisions taken by the UNCOE at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by DGP-WG/15. The amendments were agreed, subject to the following revisions based on issues raised during discussion:

- a) “porous mass” would be replaced with “porous material” in 6;5.1.1.9 b) and 6;5.1.5.1 j) for the sake of alignment with the UN Model Regulations;
- b) “must” would be removed from the note under 6;8.1.3 (moved from 6;2.4) for the sake of consistency with other notes in the Technical Instructions which did not use “must”.

2.7 AMENDMENTS TO PART 7 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.7.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 7 (DGP/25-WP/17)

2.7.1.1 The meeting reviewed amendments to Part 7 of the Technical Instructions to reflect the decisions taken by the UNCOE at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by DGP-WG/14 and DGP-WG/15.

2.7.1.2 The amendments were agreed.

2.7.2 Provision of Information to Passengers (DGP/25-WP/27)

2.7.2.1 Amendments to the provisions concerning the requirements for operators to provide information to passengers about dangerous goods that they are forbidden to carry aboard an aircraft were proposed. The rationale behind the amendments proposed was to make Part 7;5.1 less prescriptive and more goal-oriented so as to provide more stability in the provisions, recognizing that these have been subject to numerous amendments over the years in response to technological improvements that changed procedures for checking in and issuing boarding passes to passengers. The amendment included a new requirement for operators to describe their procedures for informing passengers about dangerous goods in their operations manual and/or other appropriate manuals.

2.7.2.2 Guidance material was also developed and proposed for inclusion in the Supplement to the Technical Instructions. The material included examples of methods the operator could consider for informing passengers. The material was seen as a tool States could use as part of their oversight responsibilities when reviewing an operator’s dangerous-goods related procedures.

2.7.2.3 The panel supported the proposal in principle, recognizing the need for goal-oriented rather than prescriptive standards. A number of suggestions for improvement were raised. A high-level

method for acquiring a conscious acknowledgement from passengers that they had seen the information was considered important, both as a tool to ensure passengers received the information and also as evidence in the event of an incident. Also, the need for pictograms to convey information was seen to be important, recognizing the limitations written text had on those who did not understand the language they were written in. The guidance material developed for incorporation in the Supplement was also supported. It was suggested that guidance on the linkage between Annex 6 and Annex 18 should be strengthened; the addition of the new chapter on dangerous goods in Annex 6 had helped to improve awareness of States' oversight responsibilities over operators, but there were still many States where this knowledge was lacking.

2.7.2.4 A revised amendment developed by an ad hoc working group which addressed comments from the panel was agreed, subject to a number of editorial amendments and the addition of new guidance material developed for the Supplement on how States may notify operators of specific information or guidance necessary to implement a passenger notification system.

2.7.3 Acceptance Checklist (DGP/25-WP/28)

2.7.3.1 It was suggested that the current operator acceptance procedures did not explicitly require the operator to fill out a checklist, only to use it. There was therefore no established method for identifying the person who performed the acceptance check. It was suggested that this was an important piece of information to have in the event of an incident that needed to be investigated. An amendment requiring a completed acceptance checklist to be signed by the person accepting the consignment was therefore proposed. Although the initial proposal was not supported by the panel, a revised amendment which clearly indicated the intended outcome was agreed, i.e. that the operator must be able to identify the person who performed the acceptance check. Additionally, it was agreed that a requirement to retain this information would be added to the existing provisions for retention of documents or information in Part 7;4.11.

2.7.4 Reporting of Dangerous Goods in Passenger and Crew Baggage (DGP/25-WP/42)

2.7.4.1 It was noted that most States assign responsibility for screening checked and carry-on baggage and of passengers and crew either directly with a government aviation security agency or with agencies that were contracted by the airport operator as part of the airport operator's responsibility under national aviation security regulations. Referring to the operator reporting requirements for dangerous goods prohibited in passenger or crew baggage or on the person, it was suggested that these agencies did not have legislative responsibility to advise the operators. In these cases it was impossible for operators to fulfil their reporting responsibilities. A revision to Part 7;4.5 was therefore proposed to limit the obligation on the operator to report when the operator actually detected the dangerous goods or when the operator was specifically made aware of the details of the dangerous goods detected by a third party.

2.7.4.2 An amendment to the Part 1;7 expanding the recommendation for entities other than operators to report dangerous goods accidents, incidents, and the discovery of undeclared and misdeclared dangerous goods to include dangerous goods discovered in baggage or on the person which are not permitted in accordance with Part 8. It was believed this would encourage direct communication between the appropriate national authorities responsible for aviation security and those responsible for civil aviation allowing for more comprehensive reporting.

2.7.4.3 While there was agreement that security screeners *should* let operators know of dangerous goods discovered during screening, the panel was not optimistic that any amendments to the Technical Instructions aimed at getting screeners to report would be effective as they did not clearly fall within the scope of Annex 18 and the Technical Instructions. Provisions would only be effective if they were mandatory, which would mean an amendment to Annex 17 — *Security — Safeguarding International Civil Aviation against Acts of Unlawful Interference*. The panel was reminded, however, of the lack of motivation from AVSECP to collaborate with DGP, despite direction from the Secretary General to establish a joint DGP/AVSECP task force. The amendment to Part 1;7 was therefore not agreed. The panel nevertheless agreed that efforts to engage with AVSECP should continue.

2.7.4.4 There was no opposition to the amendment to Part 7 of the Technical Instructions to clarify that the operator was only required to report incidents involving undeclared or misdeclared dangerous goods for which they were aware. The amendment to Part 7;4.5 was agreed.

2.8 AMENDMENTS TO PART 8 OF THE TECHNICAL INSTRUCTIONS: GENERAL

2.8.1 Draft Amendments to the Technical Instructions agreed at DGP-WG/15 (DGP/25-WP/18)

2.8.1.1 The meeting reviewed amendments to Part 8 of the Technical Instructions to reflect proposals agreed by DGP-WG/15. The amendments were agreed.

2.8.2 Restriction for Thermometers which Contain Mercury, Carried by Passengers or Crew (DGP/25-WP/4)

2.8.2.1 A proposal to remove provisions for small medical or clinical thermometers containing mercury permitting passengers to carry them in carry-on baggage or on the person was considered. The proposer highlighted two incidents involving leakage of mercury from thermometers carried in the cabin that had occurred in his State and the ensuing need to decontaminate the aircraft. Recognizing that digital thermometers had become widely available, he suggested there was no longer a need to allow mercury thermometers in the cabin or cockpit. There was support for the proposal, recognizing the cost and difficult process to clean a spill and the potential for serious damage if undetected. There was some discussion as to whether the thermometers should also be banned from checked baggage, but it was agreed to retain the provision for checked baggage on the basis that there were parts of the world where their use was more prevalent. The amendment was agreed.

2.8.3 Battery-powered Mobility Aids (DGP/25-WP/41)

2.8.3.1 Revisions to the passenger provisions for battery-powered mobility aids were proposed whereby the three entries currently included in Table 8-1 for mobility aids powered by non-spillable wet batteries, mobility aids powered by spillable batteries, and mobility aids powered by lithium ion batteries were merged into one. Noting that the current provisions included requirements that could only be applied by the operator and which were out of the passenger's control, the new single entry limited the provisions to those which were within the passenger's control. Those which were the responsibility of the operator were moved to a new section in the storage and loading chapter of Part 7 (Part 7;2.13). The new section included clarification that collapsible mobility aids could retain their batteries when not collapsed and that not all mobility aids required the removal of batteries in order to collapse or fold them. Requirements for

mobility aids separated from their batteries were not included in the new section, recognizing that a mobility aid on its own was not considered as an item of dangerous goods.

2.8.3.2 There was strong support for the principles applied in developing the amendment. A number of suggestions for improvement were proposed during the discussion. Work on the provisions would continue over the next biennium.

2.8.4 **Reformatting of Table 8-1 (DGP/25-WP/50)**

2.8.4.1 The panel was invited to comment on revisions aimed at simplifying the passenger provisions for incorporation in the 2019-2020 Edition of the Technical Instructions. The panel had agreed during its working group meeting that the structure of Table 8-1 had become increasingly complex with the introduction of more and more entries into the list. The revised list was simplified by generically grouping entries according to their hazard and function. This allowed for the removal of redundant text that had been repeated in the current provisions. The revised provisions also separated items which were not intended to be carried by the average passenger, such as instruments carried by the Organization for the Prohibition of Chemical Weapons, into a separate Table 8-2.

2.8.4.2 Panel members were also invited to consider specifying that dangerous goods carried by passengers and crew must be intended for personal use only in an effort to stop retailers from carrying large quantities of dangerous goods. Finally, members were invited to consider removing the column for dangerous goods carried “on the person”, noting that this only applied to lighters and matches. It was proposed to include this constraint next to the applicable items in the “restriction” column.

2.8.4.3 There was strong support for the approach taken in developing the proposed amendments and appreciation for the work done.

2.8.4.4 One participant noted confusion in his State with whether larger articles containing batteries such as large battery-powered toys or electronic scooters could be considered “portable” electronic devices. It was suggested that there would be no confusion with the restructured provisions as the restrictions applied specifically to the lithium batteries or non-spillable batteries and not to the article. The size of the article the batteries were contained in would be therefore be irrelevant. The restructured provisions prohibited carriage of the batteries in checked baggage. The batteries for articles too large for the cabin would therefore need to be removed and placed in checked baggage.

2.8.4.5 There was strong support for the philosophy used in restructuring the provisions. The need for a table that was easy to navigate and simple terminology that would be understandable to passengers was recognized. It was suggested that whether or not a separate table for items intended to be carried by the “average” person was necessary needed further consideration, recognizing potential difficulties in differentiating between an average and a normal passenger.

2.8.4.6 Work on the restructured table would continue. The proposer noted this to be a long-term project which would result in a stable structure that would reduce the need to constantly modify the table in the future. The goal was to have a finalized structure that could be incorporated in the 2019-2020 Edition of the Technical Instructions.

2.9 **RECOMMENDATION**

2.9.1 In light of the foregoing discussions, the meeting developed the following recommendations:

Recommendation 2/1 — Amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2017-2018 Edition

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

Recommendation 2/2 — Amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2015-2016 Edition to address immediate safety concerns

That the 2015-2016 Edition of the Technical Instructions be amended as indicated in Appendix B to the report on this agenda item.

APPENDIX A

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

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/25-WP/3
(see paragraph 3.2.1.1) and ST/SG/AC.10/42/Add.1/Corr.1

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 and polymerizing 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.

Part IV. Test methods concerning transport equipment

UN Model Regulations, Chapter 1.1, ST/SG/AC.10/42/Add.1/Corr.1

Part V. Classification procedures, test methods and criteria relating to sectors other than transport.

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:

...

DGP/25-WP/9 (paragraph 2.1.2 of this report)

d) to provide, during flight, or related to the flight, aid in connection with search and rescue operations;

...

UN Model Regulations, Chapter 1.1.1.2, Note 3, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.1.1)

- 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.

...

DGP/25-WP/9 (paragraph 2.1.2 of this report)

1.1.5.5 Dangerous goods transported under 1.1.5.1 a), b), c) and d) may be carried on flights made by the same aircraft for other purposes (e.g. training flights and positioning flights prior to or after maintenance), subject to the conditions in 1.1.5.4 a) to i).

...

UN Model Regulations, Chapter 1.1.1.7, Note 3, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.1.1)

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/25-WP/3 (see paragraph 3.2.1.1)

Aerosols or aerosol dispensers. An article consisting of a non-refillable receptacles meeting the requirements of 6;3.2.7, made of metal, glass or plastics 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.

...

DGP/25-WP/43 (see paragraph 2.4.3 of this report)

Large packaging. (~~Not permitted for air transport.~~) A packaging consisting of an outer packaging which contains articles or inner packagings and 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 m³;

Note.— Large packagings are only permitted as provided for in Part 4, Introductory Note 13 and S-4;13 of the Supplement.

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 m³;

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.5~~Rev.6, Amend.1 and Amend.2).

...

DGP/25-WP/3 (see paragraph 3.2.1.1.1):

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/25-WP/3
(see paragraph 3.2.1.1)

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 UN 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/25-WP/3 (see paragraph 3.2.1.1.1):

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/25-WP/3 (see paragraph 3.2.1.3):

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/25-WP/3 (see paragraph 3.2.2.1.1 a) and b))

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.

Additional requirement for the air mode (copy of the document of approval). Not included in UN Model Regulations:

1.2.1 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 Sub-Committee 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.

2. CLASSES, DIVISIONS, PACKING GROUPS — DEFINITIONS

2.1 Substances (including mixtures and solutions) and articles subject to these Instructions are assigned to one of nine classes according to the hazard or the most predominant of the hazards they present. Some of these classes are subdivided into divisions. These classes and divisions are:

...

Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases

UN Model Regulations, Chapter 2.0.1.1, ST/SG/AC.10/42/Add.1/Corr.1 and DGP/25-WP/12 (see paragraph 2.2.1.1 a) of this report)

Division 4.1: Flammable solids, self-reactive and related substances and solid desensitized explosives and polymerizing substances

Division 4.2: Substances liable to spontaneous combustion

Division 4.3: Substances which, in contact with water, emit flammable gases

...

UN Model Regulations, Chapter 2.0.2.2 ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.2.1) (editorial amendment in 3.1 was incorporated in 2015-2016 Edition by way of corrigendum)

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/25-WP/3
(see paragraph 3.2.2.1)

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

...

1.4.2.1 Certain Division 1.4S explosives, identified by Special Provision A165 in Table 3-1, are subject to Test Series 6 (d) of Part I of the *UN Manual of Tests and Criteria* (see ~~ST/SG/AC.10/36/Add.2~~ ST/SG/AC.10/11/ Rev.6) to demonstrate that any hazardous effects arising from functioning are confined within the package. Evidence of a hazardous effect outside the package includes:

...

UN Model Regulations, Chapter 2.1.2.1.1 ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.2.1)

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 only extremely insensitive substances	N	1.6N
---	---	------

...

UN Model Regulations, Chapter 2.1.3.7, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.2.1)

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

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DGP/25-WP/7 (see paragraph 2.2.2 of this report)

2.2 DIVISIONS

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2.2.3 Gases of Division 2.2 are not subject to these Instructions when contained in the following:

- a) foodstuffs, including carbonated beverages (except UN 1950);
- b) balls intended for use in sports; or
- c) tyres which meet the provisions of Special Provision A59.

Note.— This ~~exemption~~ exception does not apply to lamps. For lamps see 1;2.6.

...

UN Model Regulations, Chapter 2.2.4 ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraphs 3.2.2.1.1 d) and e)) and DGP/25-WP/12 (see paragraph 2.2.1.1 c) 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/25-WP/3 (see paragraph 3.2.2.1.1 f))

- a) the viscosity¹ 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.

...

UN Model Regulations, Chapter 2.3.2.2, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.2.1)

Table 2-5. Viscosity and flashpoints

<i>Kinematic viscosity (extrapolated) v (at near-zero shear rate) mm²/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 < v ≤ 80</u>	20 < t ≤ 60	4	above 17
<u>80 < v ≤ 135</u>	60 < t ≤ 100	4	above 10
<u>135 < v ≤ 220</u>	20 < t ≤ 32	6	above 5
<u>220 < v ≤ 300</u>	32 < t ≤ 44	6	above -1
<u>300 < v ≤ 700</u>	44 < t ≤ 100	6	above -5
<u>700 < v</u>	100 < t	6	-5 and below

...

UN Model Regulations, Chapter 2.3.5, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraphs 3.2.2.1.1 d) and e)) and DGP/25-WP/12 (see paragraph 2.2.1.1 c) 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.

...

¹ 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.

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/25-WP/3
(see paragraph 3.2.2.1)

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).

...

4.2.3 Division 4.1 — Self-reactive substances

...

DGP/25-WP/35 (see paragraph 2.1.3 of this report)

4.2.3.2.5 Classification of self-reactive substances not listed in Table 2-6 and assignment to a generic entry must be made by the appropriate authority of the ~~State of Origin~~ State in which the dangerous goods were manufactured on the basis of a test report. Principles applying to the classification of such substances are provided in 2.4.2.3.3 of the UN Recommendations. The applicable classification procedures, test methods and criteria, and an example of a suitable test report, are given in the current edition of the UN *Manual of Tests and Criteria*, Part II. The statement of approval must contain the classification and the relevant transport conditions.

UN Model Regulations, Chapter 2.4, new 2.4.2.5.3, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.1.1) and ST/SG/AC.10/42/Add.1/Corr.1

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.

...

4.4 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.

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Chapter 5

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

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DGP/25-WP/35 (see paragraph 2.1.3 of this report)

5.2 OXIDIZING SUBSTANCES (DIVISION 5.1)

5.2.1 Classification in Division 5.1

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

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

...

5.3.2 Classification of organic peroxides

5.3.2.5 Classification of organic peroxides not listed in 5.3.2.4 and assignment to a generic entry must be made by the appropriate authority of the ~~State of Origin~~ State in which the dangerous goods were manufactured on the basis of a test report. Principles applying to the classification of such substances are provided in 2.5.3.3 of the UN Recommendations. The applicable classification procedures, test methods and criteria, and an example of a suitable test report, are given in the current edition of the UN *Manual of Tests and Criteria*, Part II. The statement of approval must contain the classification and the relevant transport conditions.

...

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

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

UN Model Regulations, Chapter 2.5, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.2.1)

<i>Organic peroxide</i>	<i>Concentration (per cent)</i>	<i>Diluent type A (per cent)</i>	<i>Diluent type B (per cent) (Note 1)</i>	<i>Inert solid (per cent)</i>	<i>Water (per cent)</i>	<i>Control tempera- ture (°C)</i>	<i>Emergency tempera- ture (°C)</i>	<i>UN generic entry</i>	<i>Notes</i>
...									
tert-Butyl cumyl peroxide	>42-100							3107 3109	
...									
tert-Butyl peroxy-3,5,5- trimethylhexanoate	> 32 <u>37</u> -100							3105	
tert-Butyl peroxy-3,5,5- trimethylhexanoate	≤42			≥58				3106	
tert-Butyl peroxy-3,5,5- trimethylhexanoate	≤ 32 <u>37</u>		≥ 68 <u>63</u>					3109	
...									
Dibenzoyl peroxide	> 54 <u>52</u> -100			≤48				FORBIDDEN	3
...									
Dicetyl peroxydicarbonate	≤100					+30	+35	3116 <u>3120</u>	
...									
...									

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, DGP/25-WP/3
(see paragraphs 3.2.2.1.1 d) and e)) and DGP/25-WP/12 (see paragraph 2.2.1.1 c) 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.

...

DGP/25-WP/45 (see paragraph 3.3 of this report)

6.3.6 Infected live animals

6.3.6.1 *Infected live animals*

~~A live animal that has been intentionally infected and is known or suspected to contain an infectious substance must not be transported by air unless the infectious substance contained cannot be consigned by any other means. Live animals must not be used to consign infectious substances unless such a substance cannot be consigned by any other means. Infected live animals.~~ A live animal that has been intentionally infected and is known or suspected to contain an infectious substance may only be transported by air under the terms and conditions of an approval granted by the appropriate national authority authorities of the States of Origin, Transit, Destination and Operator in accordance with the Supplement to these Instructions (Part S-1:2).

6.3.6.2 *Infected animal material*

~~Unless an infectious substance cannot be consigned by any other means, live animals must not be used to consign such a substance.~~

~~6.3.6.3—Animal material from animals intentionally infected for the purpose of propagating pathogens—affected by pathogens of Category A or which would be assigned to Category A in cultures only, must be assigned to UN 2814 or UN 2900 as appropriate. Animal material infected by pathogens of Category B other than those which would be assigned to Category A if they were in cultures must be assigned to UN 3373.~~

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Chapter 7

CLASS 7 — RADIOACTIVE MATERIAL

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7.2.4 Classification of packages

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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, DGP/25-WP/3 (see paragraphs 3.2.2.1.1 d) and e)) and DGP/25-WP/12 (see paragraph 2.2.1.1 c) 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/25-WP/3 (see paragraph 3.2.3.2.1 c))

3.1 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.

3.2 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.

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Table 3-2. Special provisions

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DGP/25-WP/35 (see paragraph 2.1.3 of this report)

- A17 These substances must not be classified and transported unless authorized by the appropriate authority of the ~~State of Origin~~ State in which the dangerous goods were manufactured on the basis of results from Series 2 tests and a Series 6(c) test on packages as prepared for transport.

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UN Model Regulations, SP 225, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.3.2)

- 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.

The following text was included as a note in the UN Model Regulations. DGP determined it should be shown as regular text as it is regulatory. The UN Sub-Committee Secretary informed the 47th Session that legal requirements were included as notes in the Model Regulations and also in the ADR.

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.

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UN Model Regulations, SP 240, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2.1 d)), DGP/25-WP/13 (see paragraph 2.3.1.1 a) of this report) and DGP/25-WP/5 (see paragraph 2.4.2.4 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.

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.~~

Text added to UN SP 240 related to vehicles which contain dangerous goods other than batteries is not included in Special Provision A21 because it is included in Packing Instructions 220, 378, 950 and 951.

...

UN Model Regulations, SP 207, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.3.2)

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

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DGP/25-WP/35 (see paragraph 2.1.3 of this report)

A49 Other inert material or inert material mixture may be used at the discretion of the appropriate authority of the State of Origin State in which the dangerous goods were manufactured, provided this inert material has identical phlegmatizing properties.

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A62 (178) This designation may only be used when no other appropriate designation exists in the list and then only with the approval of the appropriate authority of the State of Origin State in which the dangerous goods were manufactured.

...

UN Model Regulations, SP 236, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.3.2.1 e))

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.

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DGP/25-WP/2 (see paragraph 3.2.7.2):

“Machinery” was added to Special Provision A70 to account for new entries in Table 3-1 for internal combustion machinery.

A70 Internal combustion or fuel cell engines or machinery 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, DGP/25-WP/3 (see paragraph 3.2.3.2.1 f) and DGP/25-WP/13 (see paragraph 2.3.1.1 c) of this report)

A88 Pre-production 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 and cells) of 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;

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Appendix A to the Report on Agenda Item 2

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~~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~~

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 ~~⊖~~.

...

UN Model Regulations, SP 244, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2.1 g)) and DGP/25-WP/13 (see paragraph 2.3.1.1 d) of this report)

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

DGP/25-WP/36 (see paragraph 2.3.5 of this report)

A104 ~~A toxic subsidiary risk label, although not required by these Instructions, may be applied.~~

...

DGP/25-WP/32 (see paragraph 2.3.3 of this report)

A112 Consumer commodities may only include substances of Class 2 (non-toxic aerosols only), Class 3, Packing Group II or III, Division 6.1 (Packing Group III only), UN 3077, UN 3082 ~~and~~, UN 3175, UN 3334 and UN 3335, provided such substances do not have a subsidiary risk. Dangerous goods that are forbidden for transport aboard passenger aircraft must not be transported as consumer commodities.

...

UN Model Regulations, SP 204, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.3.2.1 h))

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.

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UN Model Regulations, SP 312, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.3.2.1 i))

- 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/25-WP/2 (see paragraph 3.2.7.2):

- 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.

...

UN Model Regulations, SP 373, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.3.2)

- 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

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- v) each detector must be tested to a 1×10^{-10} cm³/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.

...

UN Model Regulations, SP 369, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.3.2)

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/25-WP/3 (see paragraph 3.2.3.2.1 j))

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

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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/25-WP/3 (see paragraph 3.2.3.2)

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.**

...

UN Model Regulations, SP 382, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.3.2)

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/25-WP/3 (see paragraph 3.2.3.2)

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/25-WP/3
(see paragraph 3.2.3.2.1 k))

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/25-WP/3
(see paragraph 3.2.3.2.1 d))

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,

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three- and four-wheeled vehicles or motorcycles, lawn tractors, self-propelled farming and construction equipment, boats and aircraft.

Text added to UN SP 385 related to securely installing dangerous goods that are integral components of the vehicle and lithium batteries meeting the requirements of 2;9.3 were not included in Special Provision A207 because the provisions were adequately addressed in Packing Instructions 950 and 951.

...

UN Model Regulations, SP 363, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.3.2.1 d))

A208 (≈363) SP 363 of the Model Regulations includes the phrase “except those which are assigned under UN 3166 or UN 3363” at the end of sub-paragraph a) but was not included here as it was not considered necessary. A208 is assigned to 3528, 3529 and 3530 in Table 3-1.

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).

SP 363 of the Model Regulations includes an exception (sub-paragraph b of that provision) for Engines or machinery which are empty of liquid or gaseous fuels and which do not contain other dangerous goods which is not included in special Provision A208 as it is proposed that the provisions in Special Provision A70 contradict this and that A70 should be retained.

b) 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.

c) 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.

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d) 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.

DGP/25-WP/40 (see paragraph 6.4.1 of this report)

Note.— Until 31 March 2017, shippers may identify engines as Class 9, UN 3166 using the proper shipping names and Packing Instruction 950 or 951 as shown in the 2015-2016 Edition of these Instructions. In that instance the dangerous goods transport document must indicate the packing instruction number and the UN number and proper shipping name in effect in the 2015-2016 Edition of these Instructions. The marks and labels applied, when required, must be consistent with the information shown on the dangerous goods transport document.

Text included in UN SP 363 (sub-paragraph f) related to dangerous goods required for the functioning or safe operation of the engines or machinery and lithium batteries meeting the requirements of 2;9.3 is not included in Special Provision A208 because the provisions are adequately addressed in the applicable packing instructions (220, 378, 972)

Most of the provisions included in sub-paragraph g) of UN SP 363 were not included in Special Provision A208 as they were considered inappropriate for the air mode. It was considered more appropriate to include the remaining provisions (i.e. sub-sub paragraphs i) ii) and iii)) in the applicable packing instructions.

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UN Model Regulations, SP 386, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2), DGP/25-WP/12 (see paragraph 2.2.1.1 c) of this report) and DGP/25-WP/19 (see paragraph 3.1.3 of this report)

Provisions included in UN SP 386 related to temperature control were not included in Special Provision A209 since they applied to substances which were forbidden for transport by air unless exempted. They were included in the Supplement as new Special Provision A330 (see the appendix to the Report on Agenda Item 3).

A209 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 in which case the substances are forbidden for transport by air.

DGP/25-WP/47 (see paragraph 2.3.6 of this report)

A210 This substance is forbidden for transport by air. It may be transported on cargo aircraft only with the prior approval of the appropriate authority of the State of Origin and the State of the Operator under the written conditions established by those authorities.

DGP/25-WP/34, Revised (see paragraph 2.3.4 of this report)

A211 Receptacles, small containing gas (toxic, oxidizing and corrosive) or Gas cartridges (toxic, oxidizing and corrosive) which are intended for use in sterilization devices only, when containing:

- a) UN1067 — Nitrogen dioxide; or
- b) UN1660 — Nitric oxide, compressed

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may be transported on passenger and cargo aircraft irrespective of the indication of "forbidden" in columns 10 to 13 of Table 3-1, provided:

- a) the water capacity of receptacles or gas cartridges does not exceed 30 mL;
- b) receptacles or gas cartridges are designed such that the burst pressure is not less than four times the pressure in the cartridge at 55°C;
- c) receptacles or gas cartridges are packed in a compatible, sealed intermediate packaging with sufficient adsorbent material capable of containing the contents of the gas cartridge;
- d) intermediate packagings are securely packed in an outer packaging of a type permitted by Packing Instruction 203 meeting the Packing Group I performance requirements of Part 6; Chapter 1;
- e) the aggregate water capacity of all receptacles or gas cartridges in a package does not exceed 300 mL;
- f) packages bearing hazard labels denoting the hazards of "toxic gas", "oxidizer" and "corrosive"; and
- g) reference to Special Provision A211 is made on the dangerous goods transport document as required by Part 5:4.1.5.8.

If the above conditions are met, the requirements of Special Provision A2 do not apply.

A212

UN 2031 — Nitric acid, other than red fuming, with more than 20% and less than 65% nitric acid intended for use in sterilization devices only, may be transported on passenger aircraft irrespective of the indication of "forbidden" in columns 10 and 11 of Table 3-1 provided:

- a) each inner packaging contains not more than 30 mL;
- b) each inner packaging is contained in a sealed leak-proof intermediate packaging with sufficient absorbent material capable of containing contents of the inner packaging;
- c) intermediate packagings are securely packed in an outer packaging of a type permitted by Packing Instruction 855 meeting the Packing Group I performance requirements of Part 6; Chapter 1;
- d) the maximum quantity of nitric acid in the package does not exceed 300 mL; and
- e) reference to Special Provision 212 is made on the dangerous goods transport document as required by Part 5:4.1.5.8.

...

Chapter 4

DANGEROUS GOODS IN LIMITED QUANTITIES

...

UN Model Regulations, Chapter 3.4, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2) and DGP/25-WP/13 (see paragraph 3.2.1.1 e) 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~~An overpack containing dangerous goods packed in limited quantities ~~are placed in an overpack, the overpack must be marked with the word "OVERPACK" and the marking required by this chapter, unless the markings representative of all dangerous goods in the overpack are visible~~ must be:

- a) marked with the word "OVERPACK" in lettering of at least 12 mm high;
- b) marked with the other marks required by this chapter; and
- c) labelled as required by this chapter

unless the marks and labels representative of all dangerous goods in the overpack are visible.

...

UN Model Regulations, Chapter 3.5, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.3.2)

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.

UN Model Regulations, Chapter 3.5, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.3.2) and DGP/25-WP/13 (see paragraph 3.2.1.1 e) of this report

5.4.3 Use of overpacks

5.4.3.1 An overpack containing dangerous goods packed in excepted quantities ~~must display the markings required by 5.4.1, must be:~~

a) marked with the word "OVERPACK" in lettering of at least 12 mm high; and

b) marked with the other marks required by this chapter

unless the marks representative of all dangerous goods on packages in the overpack are clearly visible. 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

INTRODUCTORY NOTES

...

DGP/25-WP/3 (see paragraph 3.2.3.1.2)

Note 7.— Carriage of oxygen and air with aquatic animals

With the approval of the appropriate authority of the State of Origin, ~~of Destination~~ and of the Operator, for the purpose of providing life support to aquatic animals during transport, cylinders containing Oxygen compressed (UN 1072) or Air, compressed (UN 1002) may be carried to oxygenate the water in accordance with the provisions of Table S-3-1 and Special Provision A302 (which appear in the Supplement).

...

Note 10.— Carriage of flames

With the approval of the appropriate authority of the State of Origin, ~~or transit (where applicable), of Destination~~ and of the Operator, lamps fuelled by UN 1223 — **Kerosene** or UN 3295 — **Hydrocarbons, liquid, n.o.s.**, carried by a passenger to transport a symbolic flame (e.g. Olympic flame, Peace flame) may be carried in accordance with the provisions of Special Provision A324 (which appears in the Supplement to this document).

...

DGP/25-WP/43 (see paragraph 2.4.3 of this report)

Note 13.— Large packagings

With the approval of the appropriate authority of the State of Origin and the State of the Operator, an article with a total net mass exceeding 400 kg may be packed in large packagings and carried on cargo aircraft in accordance with the provisions of Part S-4:13 of the Supplement.

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/25-WP/3 (see paragraph 3.2.4.1)

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/25-WP/3 (see paragraph 3.2.4.1)

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/25-WP/3 (see paragraph 3.2.4.1)

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

...

UN Model Regulations, P112(c), PP48, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.4.1)

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)

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.

...

UN Model Regulations, Chapter 4.1, 4.1.4.1, ST/SG/AC.10/42/Add.1/Corr.1

Packing Instruction 130

...

PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:

- The following applies to UN 0006, 0009, 0010, 0015, 0016, 0018, 0019, 0034, 0035, 0038, 0039, 0048, 0056, 0137, 0138, 0168, 0169, 0171, 0181, 0182, 0183, 0186, 0221, 0238, 0243, 0244, 0245, 0246, 0254, 0280, 0281, 0286, 0287, 0297, 0299, 0300, 0301, 0303, 0321, 0328, 0329, 0344, 0345, 0346, 0347, 0362, 0363, 0370, 0412, 0424, 0425, 0434, 0435, 0436, 0437, 0438, 0451, 0459 and 0488. 0502 and 0510. Large and robust explosive articles, normally intended for military use, without their means of initiation or with their means of initiation containing at least two effective protective features, may be carried unpackaged. When such articles have propelling charges or are self-propelled, their ignition systems must be protected against stimuli encountered during normal conditions of transport. A negative result in Test Series 4 on an unpackaged article indicates that the article can be considered for transport unpackaged. Such unpackaged articles may be fixed to cradles or contained in crates or other suitable handling, storage or launching devices in such a way that they will not become loose during normal conditions of transport. Where such large explosive articles are as part of their operational safety and suitability tests subjected to test regimes that meet the intentions of these Instructions and such tests have been successfully undertaken, the appropriate national authority may approve such articles to be transported under these Instructions.
- For UN 0457, 0458, 0459 and 0460, whenever loose explosive substances or the explosive substance of an uncased or partly cased article may come into contact with the inner surface of metal packagings (1A2, 1B2, 4A, 4B and metal receptacles), the metal packaging must be provided with an inner liner or coating.

...

UN Model Regulations, packing instruction 137, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.4.1)

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)

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/25-WP/3 (see paragraph 3.2.4.1)

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 11114-2:2000¹³ must be met.

...

UN Model Regulations, paragraph 4.1.6.8, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.4.1)

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/25-WP/3 (see paragraph 3.2.4.1)

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

UN Model Regulations, packing instruction P200, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.4.1.1 a)) and alignment with UN efforts to introduce consistent use of terms “mark” and “marking”)

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.
- 2) The following two tables cover compressed gases (Table 1) and liquefied and dissolved gases (Table 2). They provide:
 - a) the UN number, name and description, and classification of the substance;
 - b) the LC₅₀ for toxic substances;
 - c) the types of cylinders authorized for the substance, shown by the letter "X";
 - d) 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.

- e) the minimum test pressure of the cylinders;
 - f) 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;
 - g) 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:
 - a) For compressed gases, the working pressure must be not more than two-thirds of the test pressure of the cylinders. Restrictions to this upper limit on working pressure are imposed by special packing provision "o". In no case must the internal pressure at 65°C exceed the test pressure.
 - b) 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.

- c) 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 liquefied 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.

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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/25-WP/2 (see paragraph 3.2.4.1):

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 these ~~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>
<u>UN 2037 Gas cartridges</u>	<u>1 kg</u>	<u>15 kg</u>
<u>UN 2037 Receptacles, small, containing gas</u>	<u>1 kg</u>	<u>15 kg</u>

DGP/25-WP/2 (see paragraph 3.2.4.1) and DGP/25-WP/3 (see paragraph 3.2.4.1.1 b))

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/25-WP/2 (see paragraph 3.2.4.1)

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.

<u>UN number and name</u>	<u>Total gross mass per package</u>
<u>UN 1950 Aerosols, flammable</u>	<u>30 kg G</u>
<u>UN 1950 Aerosols, flammable (engine starting fluid)</u>	<u>30 kg G</u>
<u>UN 1950 Aerosols, non-flammable</u>	<u>30 kg G</u>
<u>UN 1950 Aerosols, non-flammable (tear gas devices)</u>	<u>30 kg G</u>
<u>UN 2037 Gas cartridges</u>	<u>1 kg</u>
<u>UN 2037 Receptacles, small, containing gas</u>	<u>1 kg</u>

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 was 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~~
- ~~— Plastic~~
- ~~— 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.~~

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UN Model Regulations, packing instruction P205, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.4.1)

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.

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UN Model Regulations, packing instruction P206, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.4.1)

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

- a) 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.
- b) Spray application equipment (such as a hose and wand assembly) must not be connected during transport.
- c) The minimum test pressure must be in accordance with Packing Instruction 200 for the propellant but must not be less than 20 bar.
- d) 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.

e) 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:

- 1) Calculation of the vapour pressure of the liquid component and of the partial pressure of the compressed gas at 15°C (filling temperature);
 - 2) 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;
 - 3) 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.
- 4) Calculation of the vapour pressure of the liquid component at 65°C;
 - 5) 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;
 - 6) Consideration of the solubility of the compressed gas at 65°C in the liquid phase.

The test pressure of the cylinders 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/25-WP/3 (see paragraph 3.2.4.1)

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/25-WP/3 (see paragraph 3.2.3.2.1 d)) and DGP/25-WP/3 (see paragraph 3.2.4.1)

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 3166 <u>3529</u> Engines, internal combustion, flammable gas powered, Machinery, internal combustion, flammable gas powered or Vehicle, flammable gas powered or Vehicle, fuel cell, flammable gas powered, or Engine, fuel cell, flammable gas powered <u>or Machinery, fuel cell, flammable gas powered</u>	Forbidden	No limit

ADDITIONAL PACKING REQUIREMENTS

The following general requirements are included in UN SP 363 sub-paragraph g) and not in corresponding Special Provision A208 of the Technical Instructions. It was considered more appropriate to include these requirements in this packing instructions (see note before Special Provision A208 in DGP/25-WP/13).

General

- 1) 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;
- 2) 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

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.

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Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

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

(See Packing Instruction ~~954~~ **220** 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 3466 3528 <u>Engines, internal combustion, flammable liquid powered or Machinery, internal combustion, flammable liquid powered</u> Vehicle, flammable liquid powered or Vehicle, fuel cell, flammable liquid powered or Engine, fuel cell, flammable powered or Machinery, fuel cell, flammable liquid powered	No limit	No limit

ADDITIONAL PACKING REQUIREMENTS

The following general requirements were included in UN SP 363 sub-paragraph g) and not in corresponding Special Provision A208 of the Technical Instructions. It was considered more appropriate to include these requirements in this packing instruction (see note before Special Provision A208 in DGP/25-WP/13).

General

- 1) 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;
- 2) Any valves or openings (e.g. venting devices) must be closed during transport;
- 3) 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.

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**

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UN Model Regulations, packing instruction P412, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.4.1) and DGP/25-WP/14 (see paragraph 2.4.1.1 b) 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.

<u>COMBINATION PACKAGINGS</u>						<u>SINGLE PACKAGINGS</u>
<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 Division 4.1 Packing Group II</u>	<u>Glass</u>	<u>1.0 kg</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Plastics</u>	<u>5.0 kg</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Metal</u>	<u>5.0 kg</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 Division 4.1 Packing Group III</u>	<u>Glass</u>	<u>2.5 kg</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Plastics</u>	<u>10.0 kg</u>	<u>n/a</u>	<u>n/a</u>		
	<u>Metal</u>	<u>10.0 kg</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 (4A, 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)
Plywood (1D)
Steel (1A1, 1A2)

Jerricans

Aluminium (3B1, 3B2)
Plastics (3H1, 3H2)
Steel (3A1, 3A2)

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).

<u>COMBINATION PACKAGINGS</u>							<u>SINGLE PACKAGINGS</u>
<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>	
Activator (Organic peroxide)	Plastics*	n/a	30 mL	100 g	1 kg	30 kg	No
	Metal*	n/a	30 mL	100 g			
Base material Division 4.1 Packing Group II	Glass	1.0 kg	n/a	n/a			
	Plastics	1.0 kg	n/a	n/a			
	Metal	1.0 kg	n/a	n/a			
Activator (Organic peroxide)	Plastics*	n/a	30 mL	100 g			
	Metal*	n/a	30 mL	100 g			
Base material Division 4.1 Packing Group III	Glass	2.5 kg	n/a	n/a			
	Plastics	5.0 kg	n/a	n/a			
	Metal	5.0 kg	n/a	n/a			

*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
Plywood
Steel

Jerricans

Aluminium
Plastics
Steel

UN Model Regulations, P406, PP48, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.4.1.1 c))

Packing Instruction 451

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

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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.

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)

...

Packing Instruction 459

Passenger and cargo aircraft — self-reactive substances and polymerizing substances

General requirements

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

1) Compatibility requirements

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

2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS							SINGLE PACKAGINGS
UN number and proper shipping name	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle) — passenger	Total quantity per package — passenger	Inner packaging quantity (per receptacle) — cargo	Total quantity per package — cargo		
Liquids							
UN 3223	Self-reactive liquid type C	Plastics	0.5 L	5 L	1.0 L	10 L	No
UN 3225	Self-reactive liquid type D	Plastics	0.5 L	5 L	1.0 L	10 L	
UN 3227	Self-reactive liquid type E	Plastics	1.0 L	10 L	2.5 L	25 L	
UN 3229	Self-reactive liquid type F	Plastics	1.0 L	10 L	2.5 L	25 L	
<u>UN 3532</u>	<u>Polymerizing substance, liquid, stabilized, n.o.s.*</u>	<u>Plastics</u>	<u>1.0 L</u>	<u>10 L</u>	<u>2.5 L</u>	<u>25 L</u>	
Solids							
UN 3224	Self-reactive solid type C	Plastics	0.5 kg	5 kg	1.0 kg	10 kg	No
		Plastic bag	0.5 kg	5 kg	1.0 kg	10 kg	
UN 3226	Self-reactive solid type D	Plastics	0.5 kg	5 kg	1.0 kg	10 kg	
		Plastic bag	0.5 kg	5 kg	1.0 kg	10 kg	
UN 3228	Self-reactive solid type E	Plastics	1.0 kg	10 kg	2.5 kg	25 kg	
		Plastic bag	1.0 kg	10 kg	2.5 kg	25 kg	
UN 3230	Self-reactive solid type F	Plastics	1.0 kg	10 kg	2.5 kg	25 kg	
		Plastic bag	1.0 kg	10 kg	2.5 kg	25 kg	
<u>UN 3531</u>	<u>Polymerizing substance, solid, stabilized, n.o.s.*</u>	<u>Plastics</u>	<u>1.0 kg</u>	<u>10 kg</u>	<u>2.5 kg</u>	<u>25 kg</u>	
		<u>Plastic bag</u>	<u>1.0 kg</u>	<u>10 kg</u>	<u>2.5 kg</u>	<u>25 kg</u>	

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Cushioning materials must not be readily combustible.
- Packagings must meet the Packing Group II performance requirements.

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

Fibreboard (4G)
 Natural wood (4C1, 4C2)
 Plastics (4H1, 4H2)
 Plywood (4D)
 Reconstituted wood (4F)

Drums

Fibre (1G)
 Plastics (1H1, 1H2)
 Plywood (1D)

Jerricans

Plastics (3H1, 3H2)

Chapter 7**CLASS 5 — OXIDIZING SUBSTANCES;
ORGANIC PEROXIDES**

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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
<i>Packing instruction</i>	<i>Packing Group</i>	<i>Inner packaging (see 6;3.2)</i>	<i>Inner packaging quantity (per receptacle)</i>	<i>Total quantity per package</i>	
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/25-WP/3
(see paragraph 3.2.4.1)

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)

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

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)

<i>Composites</i>	<i>Drums</i>	<i>Jerricans</i>
All (see 6;3.1.18)	Aluminium (1B1) Other metal (1N1) Plastics (1H1) Steel (1A1)	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/25-WP/3 (see paragraphs 3.2.2.1.2 and 3.2.4.1)

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 Uranium hexafluoride, radioactive material, excepted package, non-fissile or fissile-excepted	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)

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Packing Instruction 620

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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/25-WP/3 (see paragraph 3.2.4.1)

Packing Instruction 650

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- 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.

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

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UN Model Regulations, packing instruction P005, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraphs 3.2.3.2.1 d) and 3.2.4.1)

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 Engines, internal combustion, flammable liquid powered or Vehicle, flammable liquid powered or Vehicle, fuel cell, flammable liquid powered or Engine, fuel cell, flammable powered	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~~ **vehicles** 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/25-WP/3
(see paragraphs 3.2.3.2.1 d) and 3.2.4.1)

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 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	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.~~

...

UN Model Regulations, packing instruction P005, ST/SG/AC.10/42/Add.1, DGP/25-WP/3
(see paragraphs 3.2.3.2.1 d) and 3.2.4.1)

Packing Instruction 952

Passenger and cargo aircraft for UN 3171 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 951 for flammable gas-powered vehicles ~~and engines~~ [or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels](#))

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DGP/25-WP/5 (see paragraph 2.4.2 of this report)

ADDITIONAL PACKING REQUIREMENTS

This entry applies to vehicles and equipment which are powered by wet batteries, sodium batteries or lithium batteries and which are transported with these batteries installed. Examples of such vehicles and equipment are electrically-powered cars, lawn mowers, wheelchairs and other mobility aids. Vehicles that also contain an internal combustion engine must be consigned under the entry UN 3166 Vehicle (flammable gas powered) (See Packing Instruction 951) or Vehicle (flammable liquid powered) (See Packing Instruction 950), as appropriate.

[Where vehicles could possibly be handled in other than an upright position, the vehicle must be secured in a strong, rigid outer packaging of the type below. The vehicle must be secured by means capable of restraining the vehicle in the outer packaging to prevent any movement during transport which would change the orientation or cause the vehicle to be damaged](#)

Battery-powered vehicles, machines or equipment must meet the following requirements:

...

Strong outer packagings – vehicles

Boxes

[Aluminium](#)
[Fibreboard](#)
[Natural wood](#)
[Other metal](#)
[Plastics](#)
[Plywood](#)
[Reconstituted wood](#)
[Steel](#)

Drums

[Aluminium](#)
[Fibre](#)
[Other metal](#)
[Plastics](#)
[Plywood](#)
[Steel](#)

Jerricans

[Aluminium](#)
[Plastics](#)
[Steel](#)

...

DGP/25-WP/2 (see paragraph 3.2.7.2) and DGP/25-WP/3 (see paragraph 3.2.7.4.1)

Packing Instruction 954

Passenger and cargo aircraft for UN 1845 only

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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~~.

...

UN Model Regulations, P906, ST/SG/AC.10/42/Add. and DGP/25-WP/3 (see paragraph 3.2.4.1)

Packing Instruction 956

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

...

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>Quantity — passenger</i>	<i>Quantity — cargo</i>
UN 1841 Acetaldehyde ammonia	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 Zinc dithionite or Zinc hydrosulphite	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 Castor beans or Castor flake or Castor meal or Castor pomace	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 Environmentally hazardous substance, solid, n.o.s.	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 Polyhalogenated biphenyls, solid or Polyhalogenated terphenyls, solid or <u>Halogenated monomethyl-diphenylmethanes, solid</u>	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 Aviation regulated solid, n.o.s.	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 Polychlorinated biphenyls, solid	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				

...

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”.

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.

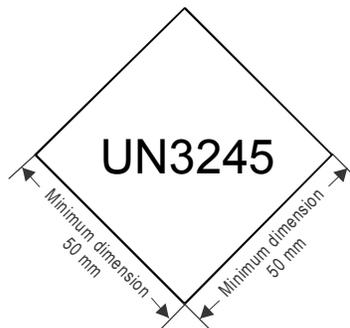
2) Closure requirements

— 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.

...

DGP/25-WP/2 (see paragraph 3.2.7.2)

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~~.

...

...

UN Model Regulations, P906, ST/SG/AC.10/42/Add. and DGP/25-WP/3 (see paragraph 3.2.4.1)

Packing Instruction 964

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

...

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	Passenger	Cargo
UN 1941 Dibromodifluoromethane	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 1990 Benzaldehyde	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 2315 Polychlorinated biphenyls, liquid	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 3082 Environmentally hazardous substance, liquid, n.o.s.	Glass	10.0 L	450 L	450 L	450 L	450 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 3151 Polyhalogenated biphenyls, liquid or Polyhalogenated terphenyls, liquid <u>or</u> <u>Halogenated monomethyldiphenylmethanes, liquid</u>	Glass	10.0 L	100 L	220 L	100 L	220 L
	Plastics	30.0 L				
	Metal	40.0 L				
UN 3334 Aviation regulated liquid, n.o.s.	Glass	10.0 L	450 L	450 L	450 L	450 L
	Plastics	30.0 L				
	Metal	40.0 L				

...

UN Model Regulations, packing instruction P005, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2.1 d) and DGP/25-WP/3 (see paragraph 3.2.4.1n)

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 or Packing Instruction 952 for battery-powered equipment and vehicles

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>
UN 3530 Engine, internal combustion or Machinery, internal combustion	No limit	No limit

General

- 1) 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;
- 2) Any valves or openings (e.g. venting devices) must be closed during transport;
- 3) 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.

ADDITIONAL PACKING REQUIREMENTS

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.

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 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.

Batteries

All batteries must be installed and securely fastened in the battery holder of the 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 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 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 machine or equipment, such as fire extinguishers, tire inflation canisters or safety devices, must be securely mounted in the machine or equipment

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/25-WP/3 (see paragraph 3.2.7.4)

- 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;

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/25-WP/3 (see paragraph 3.2.5.1)

- 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

...

1.2 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/25-WP/3 (see paragraph 3.2.5.2)

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). There were no objections from either group.

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)).

...

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/cm² for beta and gamma emitters and low toxicity alpha emitters and 0.04 Bq/cm² 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/25-WP/3 (see paragraph 3.2.5.1)

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/25-WP/3 (see paragraph 3.2.5.1)

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".

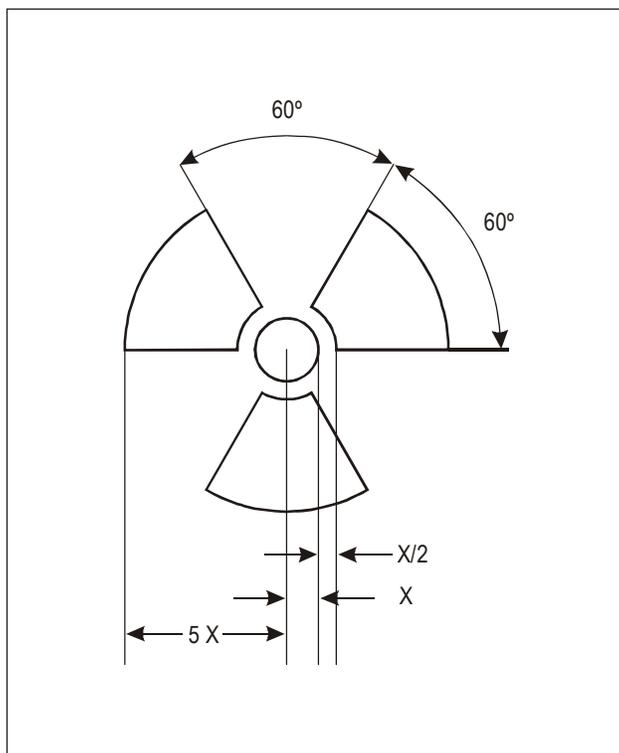


Figure 5-1. Basic trefoil symbol with proportions based on a central circle of radius X. The minimum allowable size of X must be 4 mm.

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/25-WP/3 (see paragraph 3.2.5.1)

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° (diamond-shaped). The symbol (fish and tree) must be black on white or suitable contrasting background. The minimum dimensions must be 100 mm × 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/25-WP/3 (see paragraph 3.2.5.1)

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.

...

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/25-WP/3 (see paragraph 3.2.5.1)

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/25-WP/3 (see paragraph 3.2.5.1)

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~~21~~ and 5-24~~22~~ 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~~23~~; such labels, where applicable, must be affixed adjacent to the labels conforming to Figure 5-19~~20~~, 5-20~~21~~, or 5-24~~22~~, 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/25-WP/3 (see paragraph 3.2.5.1). Amendment replacing reference to 3.5.1.1 d) with 3.5.1.1 b) was incorporated in 2015-2016 Edition by way of a corrigendum.

3.2.8 Except as provided in 3.5.1.1-~~d~~b), 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-~~31~~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 liquid dangerous goods in single packages packagings with end closures ~~containing liquid dangerous goods~~ must be labelled with either the "Package Orientation" label (Figure ~~5-27~~ 5-29), or pre-printed package orientation labels meeting the same specification as either Figure ~~5-27~~ 5-29 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 ~~5-3~~ 5-4 to ~~5-24~~ 5-26.

Note.— Where appropriate, labels in Figures ~~5-3~~ 5-4 to ~~5-24~~ 5-26 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 ~~5-3~~ 5-4).
 - 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/25-WP/3
(see paragraph 3.2.5.1.1 a))

- 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 pictorial symbol on the Class 9 label for lithium cells and batteries (Figure 5-26). 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/25-WP/3 (see paragraph 3.2.5.1)

In addition to new text related to the Class 9 label for lithium batteries, further amendments to sub-paragraph e) are made for the sake of harmonization with the UN Model Regulations as shown below.

- 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)~~ On labels other than those for material of Class 7, the insertion of any text (other than the class or division number or compatibility group) in the space below the symbol must be confined to particulars indicating the nature of the risk and precautions to be taken in handling. In the case of the Class 9 label for lithium cells and batteries (Figure 5-26), no text other than the class number must be included in the bottom part of the label.
- 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 5-19²⁰, 5-20²¹ or 5-24²² 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 5-2223 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 5-2223 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 5-2527 to 5-2729 and Figures 5-2931 to 5-3233. 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 5-2729 or ISO Standard 780:1997.

...

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 5-2830. 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 5-1920, 5-2021 and 5-2422, and where appropriate Figure 5-2223, with dimensions as required for the placard in Figure 5-2830.

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 5-2830. 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.

...

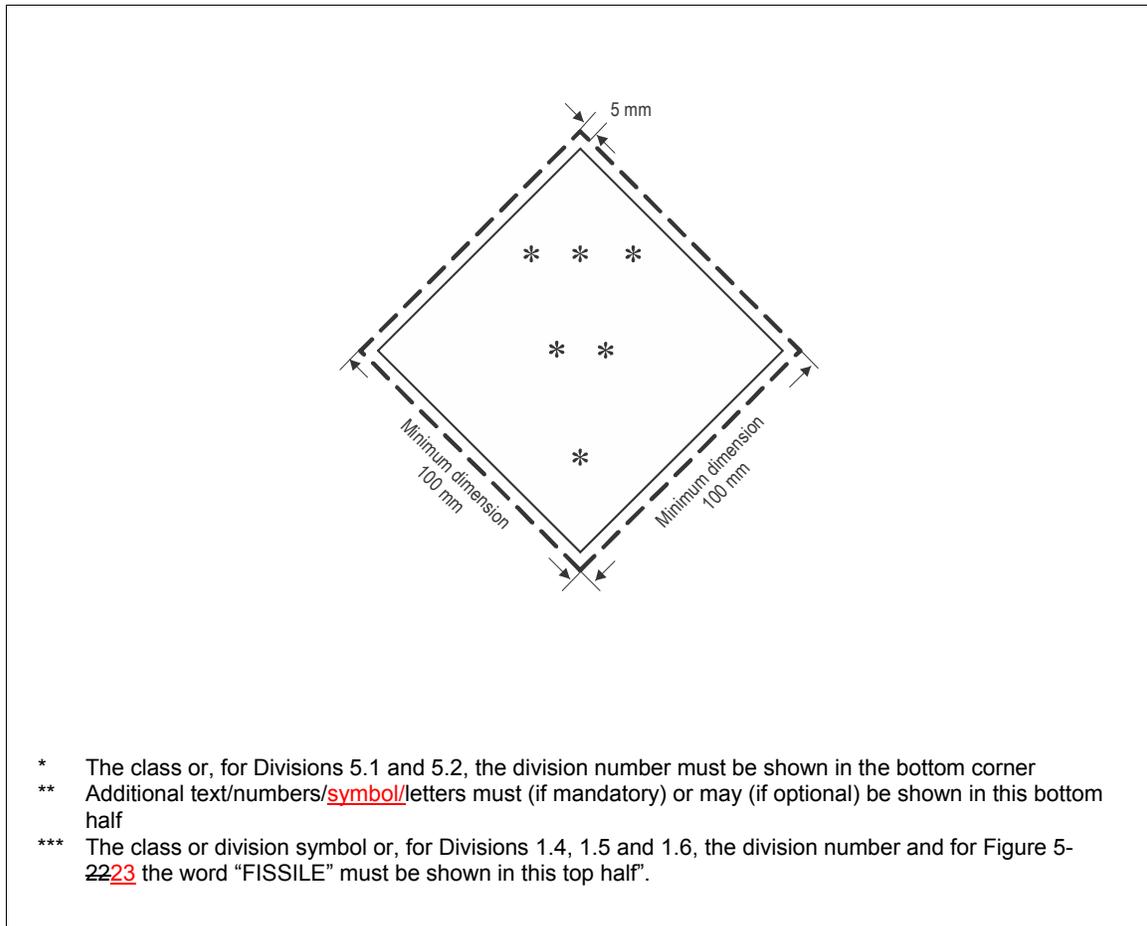


Figure 5-3 5-4. Class/division label

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Chapter 4

DOCUMENTATION

...

DGP/25-WP/40 (see paragraph 6.4.1 of this report)

4.1.4 Information required on the dangerous goods transport document

4.1.4.1 Dangerous goods description

The dangerous goods transport document must contain the following information for each dangerous substance, material or article offered for transport:

- a) the UN or ID number preceded by the letters "UN" or "ID" as appropriate;
- b) the proper shipping name, as determined according to 3;1.2, including the technical name enclosed in parenthesis, as applicable (see 3;1.2.7);
- c) the primary hazard class or, when assigned, the division of the goods, including for Class 1 the compatibility group letter. The words "Class" or "Division" may be included preceding the primary hazard class or division numbers;
- d) subsidiary hazard class or division number(s) corresponding to the subsidiary risk label(s) required to be applied, when assigned, must be entered following the primary hazard class or division and must be enclosed in parenthesis. The words "Class" or "Division" may be included preceding the subsidiary hazard class or division numbers;
- e) where assigned, the packing group for the substance or article which may be preceded by "PG" (e.g. "PG II").

Note.— Until 31 March 2017, shippers may identify engines as Class 9, UN 3166 using the proper shipping names and Packing Instruction 950 or 951 as shown in the 2015-2016 Edition of these Instructions. In that instance the dangerous goods transport document must indicate the packing instruction number and the UN number and proper shipping name in effect, in the 2015-2016 Edition of these Instructions. The marks and labels applied, when required, must be consistent with the information shown on the dangerous goods transport document.

...

4.1.5 Information required in addition to the dangerous goods description

...

DGP/25-WP/3 (see paragraph 3.2.5.1.1 d)), UN Model Regulations, paragraph 5.4.1.5.12, ST/SG/AC.10/42/Add.1/Corr.1 and DGP/25-WP/34, Revised (see paragraph 2.3.4 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, A51, A78, A190, A191, A201, A202, A208, A211 or A212;
- 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/25-WP/3 (see paragraph 3.2.5.4):

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/25-WP/3 (see paragraph 3.2.5.1.1 d))

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/25-WP/3 (see paragraph 3.2.6.1)

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~~ 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

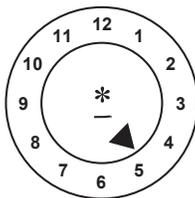
UN Model Regulations, paragraph 6.1.3.1, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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~~ 2.1.11; 2.1.12; and 2.1.13. 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
NL/VL823

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 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

 4HW/Y136/S/98 as in 2.1.1 a), b), c)1), c)2)B), d)2) and e)
NL/VL826 as in 2.1.1 f) and g)

for a remanufactured steel drum to contain liquids

 1A2/Y/100/01 as in 2.1.1 a), b), c)1), c)2)A), d)1) and e)
USA/MM5 as in 2.1.1 f) and g)

2.1.11 Examples of ~~for~~ markings for RECONDITIONED packagings:

 1A1/Y1.4/150/97 as in 2.1.1 a), b), c)1), c)2)A), d)1) and e)
NL/RB/01 RL as in 2.1.8 h), i) and j)

 1A2/Y150/S/99 as in 2.1.1 a), b), c)1), c)2)B), d)2) and e)
USA/RB/00 R as in 2.1.8 h), i) and j)

...

DGP/25 agreed to delete paragraphs 2.2.1 and 2.2.2 for the sake of harmonization with the UN Model Regulations, recognizing that they were repeated in Part 6;6.4.2, and to renumbering and modifying paragraph 2.2.3 and 2.3 as shown below.

2.2 — PACKAGING MARKINGS FOR INFECTIOUS SUBSTANCES

~~— 2.2.1 — Packagings for infectious substances, which meet the requirements of Packing Instruction 620 and Chapter 6 of this Part, must be marked with a packaging marking.~~

~~— 2.2.2 — The packaging marking consists of:~~

- ~~— a) — the United Nations packaging symbol;~~
- ~~— b) — the code designating the type of packaging according to the provisions of 1.3;~~
- ~~— 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 appropriate national authority.~~

~~2.2.3~~**2.1.12** Example of a ~~for~~ marking is **packagings for infectious substances**:

 4G/CLASS 6.2/01 as in ~~2.2.2~~ **6.4.2** a), b), c) and d)
S/SP-9989-ERIKSSON as in ~~2.2.2~~ **6.4.2** e) and f)

~~Each element of the marking applied in accordance with a) to f) must be clearly separated, e.g. by a slash or space, so as to be easily identifiable.~~

UN Model Regulations, paragraph 6.1.3.12, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.6.1 a))

~~2.3~~ PACKAGING MARKINGS FOR SALVAGE PACKAGINGS

~~2.1.13~~ Example of ~~for~~ marking for SALVAGE packagings:

	1A2T/Y300/S/01	as in 2.1.1 a), b), c)2)B), d)2) and e)
	USA/abc	as in 2.1.1 f) and g)

DGP/25 agreed to move the provisions for intermediate bulk containers from this chapter to a new Part 6;8 for the sake of harmonization with the UN Model Regulations while keeping the example for marking intermediate bulk containers in this chapter as shown below.

The following example for marking of intermediate bulk containers is moved from 2.4.4 with minor revisions to the introductory text and the references.

~~2.1.14~~ Example for marking intermediate bulk containers:

	13H3/Z/03 01	as in as in 8.1.2 a), b),c), and d)
	F/Meunier1713/0/1000	as in 8.1.2 e), f), g) and h)

DGP/25 agreed to delete the last sentence of the note below for the sake of harmonization with the UN Model Regulations and on the basis that it was considered redundant based on the provisions in 6;2.1.7.

Note.— ~~In the~~ The marking, for which examples are given in 2.1.10, 2.1.11, 2.1.12 and 2.1.13 ~~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.

See note above new paragraph 2.1.14 above.

~~2.4~~ PACKAGING MARKINGS FOR INTERMEDIATE BULK CONTAINERS

~~2.4.1~~ Intermediate bulk containers, which meet the requirements of Chapter 6.5 of the UN Recommendations, must be marked with a packaging marking.

~~2.4.2~~ The packaging marking consists of:

~~a)~~ the United Nations packaging symbol 

~~For metal IBCs on which the marking is stamped or embossed, the capital letters “UN” may be applied instead of the symbol;~~

~~b)~~ The code designating the type of IBC as shown in Packing Instruction 956 and as described in detail in Chapter 6.5 of the UN Model Recommendations;

~~c)~~ A capital letter designating the packing group(s) for which the design type has been approved:

~~1)~~ X for Packing Groups I, II and III;

~~2)~~ Y for Packing Groups II and III;

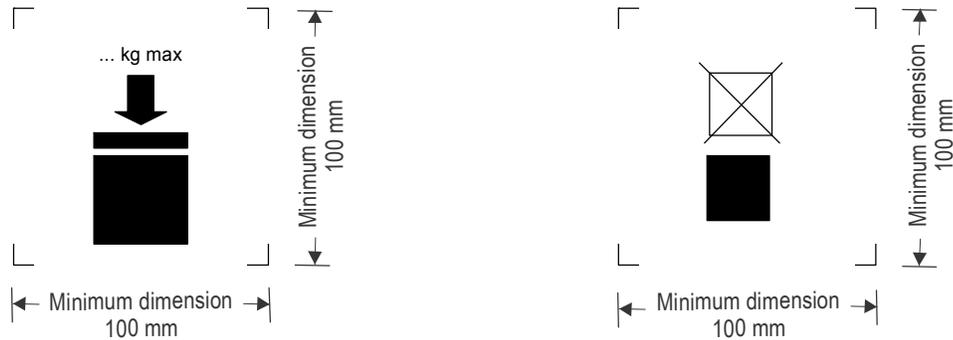
~~3)~~ Z for Packing Group III only;

~~d)~~ The month and year (last two digits) of manufacture;

~~e)~~ The State authorizing the allocation of the mark; indicated by the distinguishing sign for motor vehicles in international traffic;

- ~~f) The name or symbol of the manufacturer and other identification of the IBC, as specified by the appropriate national authority;~~
- ~~g) The stacking test load in kg. For IBCs not designed for stacking, the figure "0" must be shown;~~
- ~~h) The maximum permissible gross mass in kg.~~

~~2.4.3 The maximum permitted stacking load applicable when the IBC is in use must be displayed on a symbol as shown in Figure 6-1 or Figure 6-2. The symbol must be durable and clearly visible.~~



~~Figure 6-1. IBCs capable of being stacked~~

~~Figure 6-2. IBCs not capable of being stacked~~

~~The minimum dimensions must be 100 mm x 100 mm. The letters and numbers indicating the mass must be at least 12 mm high. The area within the printer's marks indicated by the dimensional arrows must be square. Where dimensions are not specified, all features must be in approximate proportion to those shown. The mass marked above the symbol must not exceed the load imposed during the design type test (see 6.5.6.6.4 of the UN Model Regulations) divided by 1.8.~~

~~Note. The provisions of 2.4.3 must apply to all IBCs manufactured, repaired or remanufactured as from 1 January 2011. The provisions of 2.4.3 of the 2013-2014 Edition of these Instructions may continue to be applied to all IBCs manufactured, repaired or remanufactured between 1 January 2011 and 31 December 2016.~~

~~2.4.4 Example of a marking is:~~

- ~~13H3/Z/03 01 as in as in 2.4.2 a), b), c), and d)~~
- ~~EMounier1713/0/1000 as in 2.4.2 e), f), g) and h)~~

~~...~~

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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, DGP/25-WP/3 (see paragraph 3.2.6.1) and DGP/25-WP/16 (see paragraph 2.6.1.1 a) 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~~ material.

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/25-WP/3 (see paragraph 3.2.6.1)

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;

DGP/25-WP/16 (see paragraph 2.6.1.1 a) of this report)

- 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~~ **material** 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/25-WP/3 (see paragraph 3.2.6.1)

5.1.6 Periodic inspection and testing

5.1.6.1 Refillable cylinders **other than cryogenic receptacles** 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/25-WP/3 (see paragraphs 3.2.6.1 and 3.2.6.1 b))

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
ISO 9809-4:2014	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	Until further notice
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 Until 31 December 2020
ISO ISO 7866: 2012+ Cor 1:2014	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing <i>Note.— Aluminium alloy 6351A or equivalent must not be used.</i>	Until further notice
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 <u>Until 31 December 2020</u>
<u>ISO 11119-1:2012</u>	<u>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</u>	<u>Until further notice</u>
ISO 11119-2:2002	Gas cylinders of composite construction — Specification and test methods — Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners.	Until further notice <u>Until 31 December 2020</u>
<u>ISO 11119-2:2012 + Amd 1:2014</u>	<u>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</u>	<u>Until further notice</u>
ISO 11119-3:2002	Gas cylinders of composite construction — Specification and test methods — Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners.	Until further notice <u>Until 31 December 2020</u>
<u>ISO 11119-3:2013</u>	<u>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</u>	<u>Until further notice</u>

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 appropriate national 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/25-WP/3 (see paragraph 3.2.6.1)

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>	<u>Until further notice</u>

...

UN Model Regulations, paragraph 6.2.2.2, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.6.1)

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	Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials.	Until further notice
+	ISO 11114-2:2013	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/25-WP/3 (see paragraph 3.2.6.1)

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
+	ISO 10297:2014	Gas cylinders — Cylinder valves — Specification and type testing	Until 31 December 2020
+	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/25-WP/3 (see paragraph 3.2.6.1)

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 Until 31 December 2018
	<u>ISO 10462:2013</u>	<u>Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance.</u>	<u>Until further notice</u>
+	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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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
 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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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/25-WP/3 (see paragraph 3.2.6.1)

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;~~4.2~~ 1.3;

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/25-WP/3
(see paragraph 3.2.6.1)

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).

...

6.5.4 Puncture test

6.5.4.1 Packagings with a gross mass of 7 kg or less

Samples must be placed on a level, hard surface. A cylindrical steel rod with a mass of at least 7 kg, a diameter of 38 mm and the impact end edges of a radius not exceeding 6 mm (see Figure ~~6-3~~ 6-1) must be dropped in a vertical free fall from a height of one metre measured from the impact end to the impact surface of the sample. One sample must be placed on its base. A second sample must be placed in an orientation perpendicular to that used for the first sample. In each instance, the steel rod must be aimed to impact the primary receptacle. Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s).

6.5.4.2 Packagings with a gross mass exceeding 7 kg

Samples are dropped onto the end of a cylindrical steel rod. The rod must be set vertically on a level, hard surface. It must have a diameter of 38 mm with the upper end edges of a radius not exceeding 6 mm (see Figure ~~6-3~~ 6-1). The rod must protrude from the surface a distance at least equal to the distance between the centre of the primary receptacle(s) and the outer surface of the outer packaging, with a minimum protrusion of 200 mm. One sample is dropped with its top face lowermost in a vertical free fall from a height of 1 m, measured from the top of the steel rod. A second sample is dropped from the same height in an orientation perpendicular to that used for the first sample. In each instance, the packaging must be so orientated that the steel rod would be capable of penetrating the primary receptacle(s). Following each impact, penetration of the secondary packaging is acceptable provided that there is no leakage from the primary receptacle(s).

...

Chapter 8

REQUIREMENTS FOR INTERMEDIATE BULK CONTAINERS

8.1 PACKAGING MARKINGS FOR INTERMEDIATE BULK CONTAINERS

8.1.1 Intermediate bulk containers, which meet the requirements of Chapter 6.5 of the UN Recommendations, must be marked with a packaging marking.

8.1.2 The packaging marking consists of:

a) the United Nations packaging symbol 

For metal IBCs on which the marking is stamped or embossed, the capital letters "UN" may be applied instead of the symbol;

b) The code designating the type of IBC as shown in Packing Instruction 956 and as described in detail in Chapter 6.5 of the UN Model Recommendations;

c) A capital letter designating the packing group(s) for which the design type has been approved:

1) X for Packing Groups I, II and III;

2) Y for Packing Groups II and III;

3) Z for Packing Group III only;

d) The month and year (last two digits) of manufacture;

e) The State authorizing the allocation of the mark; indicated by the distinguishing sign for motor vehicles in international traffic;

f) The name or symbol of the manufacturer and other identification of the IBC, as specified by the appropriate national authority;

g) The stacking test load in kg. For IBCs not designed for stacking, the figure "0" must be shown;

h) The maximum permissible gross mass in kg.

8.1.3 The maximum permitted stacking load applicable when the IBC is in use must be displayed on a symbol as shown in Figure 6-2 or Figure 6-3. The symbol must be durable and clearly visible.

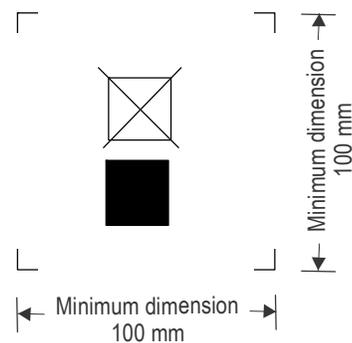
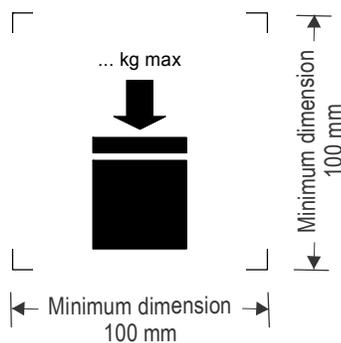


Figure 6-2. IBCs capable of being stacked

Figure 6-3. IBCs not capable of being stacked

The minimum dimensions must be 100 mm x 100 mm. The letters and numbers indicating the mass must be at least 12 mm high. The area within the printer's marks indicated by the dimensional arrows must be square. Where dimensions are not specified, all features must be in approximate proportion to those shown. The mass marked above the symbol must not exceed the load imposed during the design type test (see 6.5.6.6.4 of the UN Model Regulations) divided by 1.8.

~~Note.— The provisions of 8.1.3 apply to all IBCs manufactured, repaired or remanufactured as from 1 January 2011. The provisions of 8.1.3 of the 2013-2014 Edition of these Instructions may continue to be applied to all IBCs manufactured, repaired or remanufactured between 1 January 2011 and 31 December 2016.~~

8.1.4 Example of a marking is:

	13H3/Z/03 01	as in as in 8.1.2 a), b),c), and d)
	F/Meunier1713/0/1000	as in 8.1.2 e), f), g) and h)

...

Part 7

OPERATOR'S RESPONSIBILITIES

...

DGP/25-WP/2 (see paragraph 3.2.7.2)

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:

...

DGP/25-WP/28 (see paragraph 2.7.3 of this report)

1.3.2 The operator must be able to identify the person who performed the acceptance check.

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/25-WP/2 (see paragraph 3.2.7.2) and DGP/25-WP/3 (see paragraph 3.2.7.4)

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/25-WP/2 (see paragraph 3.2.7.2)

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/25-WP/3 (see paragraph 3.2.7.3)

- 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;

...

DGP/25-WP/42 (see paragraph 2.7.4 of this report)

4.5 REPORTING OF UNDECLARED OR MISDECLARED DANGEROUS GOODS

An operator must report any occasion when undeclared or misdeclared dangerous goods are discovered in cargo or mail. Such a report must be made to the appropriate authorities of the State of the Operator and the State in which this occurred. An operator must also report any occasion when dangerous goods not permitted under 8;1.1.1 are discovered by the operator, or the operator is advised by the entity that discovers the dangerous goods, either in the baggage or on the person, of passengers or crew members. Such a report must be made to the appropriate authority of the State in which this occurred.

...

4.11 RETENTION OF DOCUMENTS OR INFORMATION

DGP/25-WP/28 (see paragraph 2.7.3 of this report)

4.11.1 The operator must ensure that at least one copy of the documents or information appropriate to the transport by air of a consignment of dangerous goods is retained for a minimum period of three months after the flight on which the dangerous goods were transported. As a minimum, the documents or information which must be retained are the dangerous goods transport documents, the acceptance checklist (when this is in a form which requires ~~physical~~ completion), the identification of the person who performed the acceptance check and the written information to the pilot-in-command. These documents or the information must be made available to the appropriate national authority upon request.

DGP/25-WP/2 (see paragraph 3.2.7.2) and DGP/25-WP/28 (see paragraph 2.7.3 of this report)

4.11.2 For each package or overpack containing dangerous 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) and the identification of the person who performed the acceptance check should be retained for a minimum period of three months after the completion of the acceptance checklist.

Note.— Where the documents or information are kept electronically or in a computer system, they should be capable of being reproduced in a printed manner.

...

DGP/25-WP/27 (see paragraph 2.7.2)

Chapter 5

PROVISIONS CONCERNING PASSENGERS AND CREW

5.1 INFORMATION TO PASSENGERS

5.1.1 ~~An operator must ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is presented at the point of ticket purchase or, if this is not practical, made available in another manner to passengers prior to the check-in process. Information provided via the Internet may be in text or pictorial form but must be such that ticket purchase cannot be completed until the passenger, or a person acting on their behalf, has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage. Operators must inform passengers about dangerous goods that passengers are forbidden to transport aboard an aircraft. The notification system must be described in their operations manual and/or other appropriate manuals. The notification system must ensure that where the ticket purchase and/or boarding pass issuance can be completed by a passenger without the involvement of another person, the system must include an acknowledgement by the passenger that they have been presented with the information. The information must be provided to passengers:~~

- ~~a) at the point of ticket purchase or, if this is not practical, made available in another manner to passengers prior to boarding pass issuance; and~~
- ~~b) at boarding pass issuance, or when no boarding pass is issued, prior to boarding the aircraft.~~

~~Note.— The information may be provided in text or pictorial form, electronically, or verbally, as described in the operator's manuals.~~

5.1.2 ~~An operator or the operator's handling agent and the airport operator must ensure that notices warning passengers of information on the types of dangerous goods which they are forbidden to transport aboard an aircraft is communicated effectively to passengers. This information must be prominently displayed, in sufficient number, presented at each of the places at an airport where tickets are issued, passengers are checked in, boarding passes are issued, passenger baggage is dropped off and aircraft boarding areas are maintained, and at any other location where passengers are checked in issued boarding passes and/or checked baggage is accepted. These notices. This information must include visual examples of dangerous goods forbidden from transport aboard an aircraft.~~

5.1.3 ~~An operator, of passenger aircraft, should have information on those dangerous goods which may be carried by passengers in accordance with 8;1.1.2 made available prior to the check-in boarding pass issuance process on their websites or other sources of information.~~

~~5.1.4 When provision is made for the check-in process to be completed remotely (e.g. via the Internet), the operator must ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is presented to passengers. Information may be in text or pictorial form but must be such that the check-in process cannot be completed until the passenger, or a person acting on their behalf, has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage.~~

~~5.1.5 When provision is made for the check-in process to be completed at an airport by a passenger without the involvement of any other person (e.g. automated check-in facility), the operator or the airport operator must ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is presented to passengers. Information should be in pictorial form and must be such that the check-in process cannot be completed until the passenger has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage.~~

DGP/25-WP/3 (see paragraphs 3.2.8.2 and 3.2.8.5)

New Item 19) was incorporated in 2015-2016 Edition through Addendum No. 1 to the 2015-2016 Edition of the Technical Instructions. Revisions to Item 8) were incorporated in the 2015-2016 Edition through Addendum/Corrigendum No. 2 to the 2015-2016 Edition of the Technical Instructions.

Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

...

Table 8-1. Provisions for dangerous goods carried by passengers or crew

<i>Items or articles</i>	<i>Location</i>			<i>Approval of the operator(s) is required</i>	<i>The pilot-in-command must be informed</i>	<i>Restrictions</i>
	<i>Checked baggage</i>	<i>Carry-on baggage</i>	<i>On the person</i>			
...						
Medical necessities						
...						

DGP/25-WP/3 (see paragraphs 3.2.8.2 and 3.2.8.5)

Revisions to Item 8) were incorporated in the 2015-2016 Edition through Addendum/Corrigendum No. 2 to the 2015-2016 Edition of the Technical Instructions.

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					
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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			
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	<p>a) carried by passengers for medical use; <u>and</u></p> <p>b) each installed or spare battery <u>batteries or cells</u> 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> <p>e) 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</p> <p>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 by a passenger.</p>
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>a) <u>carried by passengers for medical use;</u></p> <p>b) <u>batteries or 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; and</u></p> <p>c) <u>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>a) <u>carried by passengers for medical use; and</u></p> <p>b) <u>batteries or 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.</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>a) <u>carried by passengers for medical use;</u></p> <p>b) <u>batteries or 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;</u></p> <p>c) <u>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>d) <u>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			
DGP/25-WP/4 (see paragraphs 2.8.2 of this report)						
9) Small medical or clinical thermometer which contains mercury	Yes	Yes No	Yes No	No	No	a) no more than one per person; b) must be for personal use; and c) must be in its protective case.
Consumer articles						
...						

DGP/25-WP/3 (see paragraphs 3.2.8.2 and 3.2.8.5)

New Item 19) was incorporated in 2015-2016 Edition through Addendum No. 1 to the 2015-2016 Edition of the Technical Instructions

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	<u>a) carried by passengers or crew for personal use;</u> <u>b) 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> <u>c) each battery must not exceed the following:</u> <u>— for lithium metal batteries, a lithium content of not more than 2 grams; or</u> <u>— for lithium ion batteries, a Watt-hour rating of not more than 100 Wh;</u> <u>d) 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> <u>e) recharging of the devices and/or batteries on board the aircraft is not permitted.</u>
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Items or articles	Location			Approval of the operator(s) is required	The pilot-in-command must be informed	Restrictions
	Checked baggage	Carry-on baggage	On the person			
<p>4920) Portable electronic devices (such as watches, calculating machines, cameras, cellular phones, laptop computers, camcorders, <u>electronic baggage tags</u>)</p> <hr/> <p>Portable electronic devices (including medical devices) 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)</p>	Yes	Yes	Yes	No	No	<p>a) carried by passengers or crew for personal use;</p> <p>b) should be carried as carry-on baggage;</p> <p>c) each battery must not exceed the following:</p> <ul style="list-style-type: none"> — for lithium metal batteries, a lithium content of not more than 2 grams; or — for lithium ion batteries, a Watt-hour rating of not more than 100 Wh; <p>d) if devices are carried in checked baggage, measures must be taken to prevent unintentional activation; and</p> <p><u>e) if devices are carried outside the baggage, e.g. electronic baggage tags, the device must provide adequate protection for the battery fitted inside the device;</u></p> <p><u>f) devices such as electronic baggage tags and data loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. Active devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems. The device must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport. Active devices in or on checked baggage must be designed with a minimum of two independent means to turn off completely, turn off cellular or mobile functions, or a combination of both when airborne. Each battery must not exceed the following:</u></p> <ul style="list-style-type: none"> <u>— for lithium metal batteries, a lithium metal content of 1.0 gram; or</u> <u>— for lithium ion batteries, a Watt-hour rating of 2.7 Wh;</u> <p>eg) 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>

<i>Items or articles</i>	<i>Location</i>			<i>Approval of the operator(s) is required</i>	<i>The pilot-in-command must be informed</i>	<i>Restrictions</i>
	<i>Checked baggage</i>	<i>Carry-on baggage</i>	<i>On the person</i>			
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"> — for lithium metal batteries, a lithium content of not more than 2 grams; or — for lithium ion batteries, a Watt-hour rating of not more than 100 Wh; and <p>d) batteries and cells must be of a type which meets the requirements of each test in the <i>UN Manual of Tests and Criteria</i>, Part III, subsection 38.3.</p>
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 <i>UN 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 <i>UN 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	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
+ Catecholborane						A210						
+ 1, 3, 2-Benzodioxaborole						A210						
+ Nitrogen dioxide contained in gas cartridges for use in sterilization devices, see Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037) or Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037)												
+ Nitric oxide, compressed contained in gas cartridges for use in sterilization devices, see Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037) or Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037)												
* Propellant, solid	0501	1.4C							FORBIDDEN		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
≠ Propellant, solid	0501	1.4C		Explosive 1.4					FORBIDDEN		114	75 kg
+ Rocket motors †	0510	1.4C		Explosive 1.4				E0	FORBIDDEN		130	75 kg
* 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
* Butadienes, stabilized	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/>	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

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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	
* 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	
* 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	

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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
* 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
* 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	
* Refrigerant gas R 1113	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	✓ 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	

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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 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
* 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

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		
* 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		
* 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		<input checked="" type="checkbox"/>	A209	I	E3	351	1 L	361	30 L
* Ethyleneimine, stabilized	1185	6.1	3			<input checked="" type="checkbox"/>				FORBIDDEN	FORBIDDEN		
≠ Ethyleneimine, stabilized	1185	6.1	3			<input checked="" type="checkbox"/>	A209			FORBIDDEN	FORBIDDEN		
* Isoprene, stabilized	1218	3		Liquid flammable		<input checked="" type="checkbox"/>	I	E3	351	1 L	361	30 L	
≠ Isoprene, stabilized	1218	3		Liquid flammable		<input checked="" type="checkbox"/>	A209	I	E3	351	1 L	361	30 L
* Methanol	1230	3	6.1	<input checked="" type="checkbox"/> Liquid flammable		<input checked="" type="checkbox"/>	A104 A113	II	E2	352 Y341	1 L 1 L	364	60 L
≠ Methanol	1230	3	6.1	Liquid flammable & Toxic		<input checked="" type="checkbox"/>	A113	II	E2	352 Y341	1 L 1 L	364	60 L

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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
* 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
* 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

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Part 3

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
* 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
* Hydrogen cyanide, stabilized containing less than 3% water and absorbed in a porous inert material	1614	6.1				<input checked="" type="checkbox"/>				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	<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
* 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

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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 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		A209		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		A209		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	A209		I	E0	FORBIDDEN	361	30 L
* Aerosols, non-flammable	1950	2.2		Gas non-flammable		A98 A145 A167			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		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	<input checked="" type="checkbox"/> 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

3-2-11

Part 3

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	
* 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
* 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
* Celluloid, in blocks, rods, rolls, sheets, tubes, etc. (except scrap)	2000	4.1		Solid flammable		☑	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
* Nitric acid, other than red fuming, with more than 20% and less than 65% nitric acid	2031	8		Corrosive		☑	II		E0	FORBIDDEN		855	30 L
≠ Nitric acid, other than red fuming, with more than 20% and less than 65% nitric acid	2031	8		Corrosive		A212	II		E0	FORBIDDEN		855	30 L
* Xenon	2036	2.2		Gas non-flammable		☑			E1	200	75 kg	200	150 kg
≠ Xenon	2036	2.2		Gas non-flammable		A69 A202			E1	200	75 kg	200	150 kg
* Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3	☑	A2			FORBIDDEN		FORBIDDEN	
≠ Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3		A2 A211			FORBIDDEN		FORBIDDEN	

Chapter 2

3-2-12

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
* Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A2				FORBIDDEN		FORBIDDEN
≠ Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3	A2 A211				FORBIDDEN		FORBIDDEN
* 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
* 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

3-2-13

Part 3

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
* 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
* 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
* Bicyclo [2.2.1] hepta-2-5-diene, stabilized	2251	3		Liquid flammable		☑	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		☑	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
* 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

Chapter 2

3-2-14

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
* 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
* 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

3-2-15

Part 3

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
* 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			
* Radioactive material, uranium hexafluoride, non-fissile or fissile excepted	2978	7	☑	☑ 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			
* 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
* Vinylpyridines, stabilized	3073	6.1	☑	☑ 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

Chapter 2

3-2-16

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
* Methacrylonitrile, stabilized	3079	6.1	3			☑				FORBIDDEN	FORBIDDEN	
≠ Methacrylonitrile, stabilized	3079	6.1	3			A209				FORBIDDEN	FORBIDDEN	
* Lithium metal batteries (including lithium alloy batteries) †	3090	9		☑ Miscellaneous	US 2 US 3	☑ A88 A99 A154 A164 A183 A201		E0		FORBIDDEN	See 968	
≠ Lithium metal batteries (including lithium alloy batteries) †	3090	9		Miscellaneous — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A183 A201 A206		E0		FORBIDDEN	See 968	
* Lithium metal batteries contained in equipment (including lithium alloy batteries) †	3091	9		☑ Miscellaneous	US 2 US 3	☑ 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 — Lithium batteries	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	☑ 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 — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A181 A185 A206		E0	969	5 kg	969	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
+ Halogenated monomethyldiphenylmethanes, liquid	3151	9		Miscellaneous		A11 A95	II	E2	964	100 L	964	220 L
+ Halogenated monomethyldiphenylmethanes, solid	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

Chapter 2

3-2-18

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
									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

3-2-19

Part 3

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
* Nitroglycerin mixture, desensitized, liquid, n.o.s.* with not more than 30% nitroglycerin, by mass	3357	3			BE 3	☑				FORBIDDEN	FORBIDDEN	
≠ Nitroglycerin mixture, desensitized, liquid, n.o.s.* with not more than 30% nitroglycerin, by mass	3357	3			BE 3	A17				FORBIDDEN	FORBIDDEN	
				☑		☑						
* Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous	US 3	A88 A99 A154 A164 A183		E0	See 965		See 965	
≠ Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	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	☑ 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 — Lithium batteries	US 3	A48 A88 A99 A154 A164 A181 A185 A206		E0	967	5 kg	967	35 kg

Chapter 2

3-2-20

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	Max. net quantity per package	Packing instruction	Max. net quantity per package
									10	11	12	13
* Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous <input checked="" type="checkbox"/>	US 3	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 — Lithium batteries	US 3	A88 A99 A154 A164 A181 A185 A206		E0	966	5 kg	966	35 kg
* Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted	3507	8	<input checked="" type="checkbox"/>	Corrosive <input checked="" type="checkbox"/>		A139 A194	I	E0	<input checked="" type="checkbox"/> See 877		<input checked="" type="checkbox"/> 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	<input checked="" type="checkbox"/> 3166	<input checked="" type="checkbox"/> 9		Miscellaneous <input checked="" type="checkbox"/>		A67 A70 A87 A134		E0	<input checked="" type="checkbox"/> 950	No limit	<input checked="" type="checkbox"/> 950	No limit
≠ Engine, internal combustion, flammable liquid powered	3528	3		Liquid flammable		67 A70 A87 A208		E0	378	No limit	378	No limit

3-2-21

Part 3

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		A67 A70 A87 A176 A208		E0	378	No limit	378	No limit
+ Machinery, internal combustion, flammable liquid powered	3528	3		Liquid flammable		A67 A70 A87 A208		E0	378	No limit	378	No limit
+ Machinery, fuel cell, flammable liquid powered	3528	3		Liquid flammable		A67 A70 A87 A176 A208		E0	378	No limit	378	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		A67 A70 A87 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		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
+ Machinery, internal combustion, flammable gas powered	3529	2.1		Gas flammable		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit

Chapter 2

3-2-22

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 gas powered	3529	2.1		Gas flammable		A67 A70 A87 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	459	10 kg	459	25 kg
+ Polymerizing substance, liquid, stabilized, n.o.s.*	3532	4.1		Solid flammable		A209	III	E0	459	10 L	459	25 L
+ Polymerizing substance, solid, temperature controlled, n.o.s.*	3533	4.1				A209		E0	FORBIDDEN		FORBIDDEN	FORBIDDEN
+ Polymerizing substance, liquid, temperature controlled, n.o.s.*	3534	4.1				A209		E0	FORBIDDEN		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		<input checked="" type="checkbox"/>	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			<input checked="" type="checkbox"/>			FORBIDDEN		FORBIDDEN	
≠ Acrolein, stabilized	1092	6.1	3			A209			FORBIDDEN		FORBIDDEN	
* 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
* 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
* Aerosols, non-flammable	1950	2.2		Gas non-flammable		A98 A145 A167		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		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		<input checked="" type="checkbox"/> 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

Chapter 2

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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
+ 1, 3, 2-Benzodioxaborole						A210						
* 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

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Part 3

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
* 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	<input checked="" type="checkbox"/> 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	<input checked="" type="checkbox"/> 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		<input checked="" type="checkbox"/>	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		<input checked="" type="checkbox"/>	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		<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
* Butyl vinyl ether, stabilized	2352	3		Liquid flammable		<input checked="" type="checkbox"/>	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

3-2-6

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
+ Catecholborane						A210						
* 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	

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Part 3

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

Chapter 2

3-2-8

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
* 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		A67 A70 A87 A208		E0	FORBIDDEN		220	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		A67 A70 A87 A176 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		A67 A70 A87 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		67 A70 A87 A208		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		
									10	11	12	13		
* 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
* 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
* Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3	A2					FORBIDDEN		FORBIDDEN	
≠ Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3	A2 A211					FORBIDDEN		FORBIDDEN	
+ Halogenated monomethyldiphenylmethanes, liquid	3151	9		Miscellaneous		A11 A95			II	E2	964	100 L	964	220 L
+ Halogenated monomethyldiphenylmethanes, solid	3152	9		Miscellaneous		A11 A95			II	E2	956	100 kg	956	200 kg

Chapter 2

3-2-10

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
* 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	
* 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
* 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

3-2-11

Part 3

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
* Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous <input checked="" type="checkbox"/>	US 3	A88 A99 A154 A164 A183		E0	See 965		See 965	
≠ Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	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 <input checked="" type="checkbox"/>	US 3	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 — Lithium batteries	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 <input checked="" type="checkbox"/>	US 3	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 — Lithium batteries	US 3	A88 A99 A154 A164 A181 A185 A206		E0	966	5 kg	966	35 kg

Chapter 2

3-2-12

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 metal batteries (including lithium alloy batteries) †	3090	9		☑ Miscellaneous	US 2 US 3	☑ A88 A99 A154 A164 A183 A201		E0	FORBIDDEN		See 968	
≠ Lithium metal batteries (including lithium alloy batteries) †	3090	9		Miscellaneous — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A183 A201 A206		E0	FORBIDDEN		See 968	
* Lithium metal batteries contained in equipment (including lithium alloy batteries) †	3091	9		☑ Miscellaneous	US 2 US 3	☑ 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 — Lithium batteries	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	☑ 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 — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A181 A185 A206		E0	969	5 kg	969	35 kg
+ Machinery, fuel cell, flammable gas powered	3529	2.1		Gas flammable		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit

3-2-13

Part 3

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		A67 A70 A87 A176 A208		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		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
+ Machinery, internal combustion, flammable liquid powered	3528	3		Liquid flammable		A67 A70 A87 A208		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	
* Methanol	1230	3	6.1	Liquid flammable		<input checked="" type="checkbox"/>	II	E2	352 Y341	1 L 1 L	364	60 L
≠ Methanol	1230	3	6.1	Liquid flammable & Toxic		A113	II	E2	352 Y341	1 L 1 L	364	60 L

Chapter 2

3-2-14

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
* 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
* Methyl acrylate, stabilized	1919	3		Liquid flammable			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
* 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		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
* Nitric acid, other than red fuming, with more than 20% and less than 65% nitric acid	2031	8		Corrosive			II	E0	FORBIDDEN		855	30 L
≠ Nitric acid, other than red fuming, with more than 20% and less than 65% nitric acid	2031	8		Corrosive		A212	II	E0	FORBIDDEN		855	30 L

3-2-15

Part 3

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
+ Nitric oxide, compressed contained in gas cartridges for use in sterilization devices, see Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037) or Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037)												
* 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
+ Nitrogen dioxide contained in gas cartridges for use in sterilization devices, see Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037) or Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable (UN No. 2037)												
* Nitroglycerin mixture, desensitized, liquid, n.o.s.* with not more than 30% nitroglycerin, by mass	3357	3			BE 3	☑			FORBIDDEN		FORBIDDEN	
≠ Nitroglycerin mixture, desensitized, liquid, n.o.s.* with not more than 30% nitroglycerin, by mass	3357	3			BE 3	A17			FORBIDDEN		FORBIDDEN	
* 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

Chapter 2

3-2-16

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"/>												
* 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
* 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
+ Polymerizing substance, liquid, stabilized, n.o.s.*	3532	4.1		Solid flammable		A209	III	E0	459	10 L	459	25 L
+ Polymerizing substance, liquid, temperature controlled, n.o.s.*	3534	4.1				A209		E0	FORBIDDEN		FORBIDDEN	
+ Polymerizing substance, solid, stabilized, n.o.s.*	3531	4.1		Solid flammable		A209	III	E0	459	10 kg	459	25 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
* Propellant, solid	0501	1.4C							FORBIDDEN		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
≠ Propellant, solid	0501	1.4C		Explosive 1.4					FORBIDDEN		114	75 kg

3-2-17

Part 3

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
* 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		
* Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3	<input checked="" type="checkbox"/> A2				FORBIDDEN		FORBIDDEN
≠ Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8		AU 1 CA 7 IR 3 NL 1 US 3	A2 A211				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

Chapter 2

3-2-18

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
+ 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	FORBIDDEN
≠ Sulphur trioxide, stabilized	1829	8			AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN	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	FORBIDDEN
≠ Trifluorochloroethylene, stabilized	1082	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	A2 A209				FORBIDDEN	FORBIDDEN	FORBIDDEN

3-2-19

Part 3

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
* 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

Chapter 2

3-2-20

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
* 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

3-2-21

Part 3

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 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

Chapter 2

3-2-22

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

**PROPOSED AMENDMENT TO THE TECHNICAL INSTRUCTIONS
RECOMMENDED FOR INCORPORATION IN THE 2015-2016 EDITION
OF THE TECHNICAL INSTRUCTIONS BY WAY OF AN ADDENDUM**

DGP/25-WP/47 (see paragraph 2.3.6 of this report)

Part 3

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

...

Chapter 2

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

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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
<u>Catecholborane</u>						A210						
<u>1.3.2-Benzodioxaborole</u>						A210						

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Chapter 3

SPECIAL PROVISIONS

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Table 3-2. Special provisions

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A210

This substance is forbidden for transport by air. It may be transported on cargo aircraft only with the prior approval of the appropriate authority of the State of Origin and the State of the Operator under the written conditions established by those authorities.

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

3.1 DRAFT AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS TO ALIGN WITH THE UN RECOMMENDATIONS (DGP/25-WP/19)

3.1.1 The meeting reviewed amendments to the Supplement to the Technical Instructions to reflect the decisions taken by the UN Committee at its seventh session (Geneva, 12 December 2014). The amendments also reflected proposals agreed by DGP-WG/15.

3.1.2 A new special provision assigned to UN 1005 — **Ammonia, anhydrous** and UN 3516 — **Adsorbed gas, toxic, corrosive, n.o.s.** was added to the UN Model Regulations which provided an exception from full regulation provided certain conditions were met. Recognizing that both substances were only permitted for transport by air on cargo aircraft through the application of Special Provision A2, it was agreed to add the conditions provided in the Model Regulations as guidance in the Supplement in a new Special Provision A329 on which States could base an approval.

3.1.3 Text in new provisions for forbidden gases of Class 2 and forbidden substances of Class 3, Division 6.1 and Class 8 related to temperature control were included in a new Special Provision A330. The text was based on UN SP 386 which included provisions for chemical stabilization and temperature control. Recognizing that substances requiring temperature control were forbidden for transport by air, the provisions for temperature control were included in the Supplement and not in the Technical Instructions.

3.1.4 A new packing instruction assigned to UN Nos. 3090, 3091, 3480 and 3481 which included packing provisions for production runs consisting of 100 cells and batteries or less and for pre-production prototypes of cells and batteries when transported for testing. Many of the provisions in the new packing instructions were moved from Special Provision A88 in the Technical Instructions. The meeting agreed to maintain some of the more restrictive requirements in Special Provision A88.

3.1.5 The amendments were agreed.

3.2 PACKING INSTRUCTION 212 (DGP/25-WP/6)

3.2.1 An amendment to the Technical Instructions to reduce the number of packing instructions for aerosols was agreed at DGP-WG/14 (see paragraph 7.1 of this report). The amendment reduced the number of packing instructions applied to UN 1950 from five to two so that the applicable packing provisions in Packing Instructions 204, Y204 and 212 were absorbed into Packing Instructions 203 and Y203. DGP-WG/14 had inadvertently overlooked the fact that Packing Instructions 203 and 212 were also included in the Supplement. An amendment to delete Packing Instruction 212 and to align Packing Instruction 203 with the revised Packing Instruction 203 in the Technical Instructions was therefore proposed.

During the review of the provisions for aerosols, it was noted that the maximum net quantity per package recommended on a passenger aircraft for Aerosols, non-flammable (tear gas devices) of Divisions 2.2 with a subsidiary risk of 6.1 was 75 kg which was greater than the 50 kg permitted on a cargo aircraft. An amendment to the Dangerous Goods List for Class 2 contained in the Supplement (Table S-3-1) reducing the recommended quantity permitted on a passenger aircraft to 25 kg was therefore proposed.

3.2.2 The amendments were agreed.

3.3 **INFECTED LIVE ANIMALS (DGP/25-WP/45)**

3.3.1 Inconsistencies with respect to the provisions for the transport of infected live animals between the Technical Instructions and the Supplement were raised at DGP-WG/15 whereby the former permitted their transport under the terms and conditions of an approval granted by the appropriate national authority while the Supplement referred to an exemption being granted by all States concerned.

3.3.2 Guidance from the World Health Organization (WHO), the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization (FAO) was sought in order to determine how to ensure consistency between the two documents. This resulted in proposed amendments to Part 2;6.3.6 of the Technical Instructions and Part S-1;2 of the Supplement (Limitation of Dangerous Goods on Aircraft — infected live animals).

3.3.3 The Technical Instructions were revised to require approvals from the States of Origin, Transit, Destination and Operator in accordance with revised provisions in the Supplement. In coordination with FAO, OIE and WHO, the panel agreed to add a provision in the Supplement for the appropriate authorities to include, at a minimum, public health, veterinary and/or other appropriate authorities when applicable and for authorities to apply a risk-based approach dependent on which category the infectious substance was classified and which UN number was assigned when considering requests for approval. Amendments to the supplement also included clarification on documentation, marking and labelling requirements and a reference to guidance material on the international standards for export and import of live animals.

3.3.4 An amendment to the Technical Instructions to clearly distinguish between infected live animals and infected animal material was also agreed.

3.3.5 During the review of the provisions, a misalignment with the UN Model Regulations was discovered in relation to the classification of animal material whereby provisions for animal material affected by pathogens of Category B were omitted from the Technical Instructions. The provisions were added to the Technical Instructions. It was also suggested that use of *affected* should be replaced with *infected* and that provisions in both documents related to animal material *affected* by pathogens of Category A needed to be amended to indicate that *affected* animal material means animal material from animals intentionally *infected* for the purpose of propagating pathogens. Amendments to these provisions were developed in collaboration with the WHO representative and email consultation with representatives from FAO and OIE. The Secretary would inform the UN Sub-Committee of the changes and the justification for introducing them.

3.4 **RECOMMENDATION**

3.4.1 In light of the foregoing discussions, the meeting developed the following recommendation:

Recommendation 3/1 — Amendment to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2017-2018 Edition

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

APPENDIX

PROPOSED AMENDMENTS TO THE SUPPLEMENT TO THE
TECHNICAL INSTRUCTIONS

Part S-1

GENERAL

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Chapter 2

LIMITATION OF DANGEROUS GOODS ON
AIRCRAFT — INFECTED LIVE ANIMALS

DGP/25-WP/45 (see paragraph 3.3 of this report)

2.1 The use of live animals must only be considered for the transport of an infectious substance when the substance cannot be shipped by any other means. Infected animals may only be transported ~~when an exemption is granted by the States concerned under the terms and conditions of an approval granted by the appropriate authorities of the States of Origin, Transit, Destination and Operator. Such authorities must include at a minimum public health, veterinary, and/or other appropriate authorities when applicable.~~

2.2 A risk based approach, dependent on whether the infectious substance is classified as Category A or Category B and on whether it is assigned to UN 2814, UN 2900 or UN 3373 , must be used when considering a request for such an approval.

2.3 Such intentionally infected animals must be shipped in germ-tight packaging at least as secure as that used in the air transport of germ-free animals. These consignments must be declared and ~~labelled~~ marked as "Infected live animals" "Live Animal" and marked and labelled in accordance with Part 4:8, Part 5:2 and Part 5:3 as applicable as "Infectious Substance".

2.4 When an empty receptacle is to be returned to the shipper it must be properly disinfected/sterilized before shipment. Moreover, all marks and labels required in accordance with 2.3 ("Live Animal" and "Infectious Substance" labels) must be removed, obliterated or otherwise made no longer visible. (See also Part S-6;6)

Note.— Guidance on the international standards for export / import of live animals is given in the OIE Terrestrial Animal Health Code (<http://www.oie.int/en/international-standard-setting/terrestrial-code/access-online/>) and the OIE Aquatic Animal Health Code (<http://www.oie.int/en/international-standard-setting/aquatic-code/access-online/>).

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Part S-3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND QUANTITY LIMITATIONS

(ADDITIONAL INFORMATION FOR PART 3 OF THE TECHNICAL INSTRUCTIONS)

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See the attachment for proposed changes to Table S-3-1

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Chapter 6

SPECIAL PROVISIONS

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Table S-3-4. Special Provisions

Supplementary special provisions

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DGP/25-WP/3 (see paragraph 3.2.3.1)

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:

- a) 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;
- b) 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;
- c) the oxygen or air cylinder and regulator must be restrained and protected within the equipment;
- d) the oxygen or air regulator used must have a maximum flow rate of not more than five litres per minute;
- e) the oxygen or air flow rate to the container must be limited to that sufficient to provide life support to the aquatic animals;
- f) 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

- g) 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.

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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:

- a) no more than four lamps may be carried on board the aircraft;
- b) lamps may contain no more fuel than the quantity adequate for the duration of the flight and the fuel must be contained in a leakproof reservoir;
- c) lamps must be adequately secured;
- d) 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;
- e) lamps may be lit by the accompanying person, but must not be refilled on board the aircraft;
- f) at least one fire extinguisher must be kept within reach of the accompanying person at all times. The accompanying person must be trained in the use of the extinguisher;
- g) the crew members of the aircraft must be given a verbal briefing about the carriage of the lamps and the pilot-in-command must be provided with a copy of the approval; and
- h) Part 7;4.1.1.1 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/25-WP/3 (see paragraph 3.3.1.2)

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 1~~ 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 Special Provision A329 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 through an approval (Special Provision A2). Special Provision A329 is based on SP 379 of the UN Model Regulations. The UN Model Regulations provide an exception from the regulations provided the conditions in SP 379 are observed. Because the substances are only permitted on cargo aircraft with the prior approval, DGP/25 agreed to modify the UN special provision by removing the exception and requiring that the conditions in the special provision be met in addition to the conditions established by the authorities.

A329 (379) Anhydrous ammonia adsorbed or absorbed on a solid contained in ammonia dispensing systems or cylinders intended to form part of such systems may be transported on cargo aircraft only with the prior approval of the appropriate authority of the State of Origin and the State of the Operator under the written conditions established by those authorities in addition to the following:

- 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.

UN Model Regulations, Chapter 3.3, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.1.1) and ST/SG/AC.10/42/Add.1/Corr.1

UN text: “when transported” changed to “when offered for transport” in line with what was done for A202 of the Technical Instructions (DGP/25-WP/13) (see DGP/25-WP/3, paragraph 3.2.3.2.1 j))

When offered for transport 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.

UN Model Regulations, Chapter 3.3, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.1.1), ST/SG/AC.10/42/Add.1/Corr.1 and DGP/25-WP/19 (see paragraph 3.1.3 of this report)

A330 (≈386) 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 of the Technical Instructions). 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.

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Part S-4

PACKING INSTRUCTIONS

(ADDITIONAL INFORMATION FOR PART 4 OF THE TECHNICAL INSTRUCTIONS)

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Chapter 3

CLASS 1 — EXPLOSIVES

UN Model Regulations, P112(c), PP48, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.3.1.2)

The text of UN PP48 did not appear in Packing Instruction 112 c) of the Technical Instructions. ST/SG/AC.10/42/Add.1 added a second sentence to PP48. The provision, including the new second sentence, was added to the Technical Instructions for the sake of alignment with the UN Model Regulations.

112	PACKING INSTRUCTION 112		112								
...											
c) for solid dry powder 1.1D											
<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top;"><i>Inner packagings</i></td> <td style="width: 33%; vertical-align: top;"><i>Intermediate packagings</i></td> <td style="width: 33%; vertical-align: top;"><i>Outer packagings</i></td> <td></td> </tr> <tr> <td style="vertical-align: top;"> Bags paper, multiwall, water-resistant plastics woven plastics Receptacles fibreboard metal plastics wood </td> <td style="vertical-align: top;"> Bags (for 1050 only) paper, multiwall, water-resistant with inner lining plastics Receptacles metal plastics wood </td> <td style="vertical-align: top;"> Boxes 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) Drums aluminium (1B1, 1B2) fibre (1G) other metal (1N1, 1N2) steel (1A1, 1A2) </td> <td></td> </tr> </table>				<i>Inner packagings</i>	<i>Intermediate packagings</i>	<i>Outer packagings</i>		Bags paper, multiwall, water-resistant plastics woven plastics Receptacles fibreboard metal plastics wood	Bags (for 1050 only) paper, multiwall, water-resistant with inner lining plastics Receptacles metal plastics wood	Boxes 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) Drums aluminium (1B1, 1B2) fibre (1G) other metal (1N1, 1N2) steel (1A1, 1A2)	
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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.
- 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.

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DGP/25-WP/6 (see paragraph 3.2 of this report)

Chapter 4**CLASS 2 — GASES**

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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.

Plastic aerosols (IP.7C)

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

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 of the Technical Instructions.

DGP/25-WP/6 (see paragraph 3.2 of this report)

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>(75 kg)</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>(25 kg)</u>	<u>50 kg</u>
<u>UN 2037 Gas cartridges</u>	<u>1 kg</u>	<u>15 kg</u>
<u>UN 2037 Receptacles, small, containing gas</u>	<u>1 kg</u>	<u>15 kg</u>

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 movement.

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 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.~~

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

UN Model Regulations, packing instruction P910, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2.1 f) and DGP/25-WP/19 (see paragraph 3.1.4 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

DGP/25 agreed to require the packaging to meet the Packing Group I criteria as this was what had been required in the Technical Instructions in Special Provision A88

- Packagings must meet the Packing Group I 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 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) 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 packed 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.

Equipment or batteries not subject to Part 6 of these Instructions

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 be packed in strong outer packagings or protective enclosures not subject to the requirements of Part 6 of these Instructions under conditions specified by the appropriate national authority. Additional conditions that may be considered in the approval process include, but are not limited to:

- 1) 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
- 2) 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.

DGP/25 agreed to maintain packagings that were required under Special Provision A88 (i.e. metal, plastic or plywood drum or a metal, plastic or wooden box)

OUTER PACKAGINGSBoxes

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

Drums

Aluminium (1B2)
Fibre (1G)
Other metal (1N2)
Plastics (1H2)
Plywood (1D)
Steel (1A2)

Jerricans

Aluminium (3B2)
Plastics (3H2)
Steel (3A2)

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DGP/25-WP/43 (see paragraph 2.4.3 of this report)

Chapter 13

LARGE PACKAGINGS

Note.— This Chapter has no corresponding Chapter in the Technical Instructions.

13.1 GENERAL

13.1.1 Large packagings may be used for the transport of articles in accordance with the provisions of this chapter only when the following conditions are met:

- a) transport is on cargo aircraft only;
- b) approval of the appropriate authority of the State of Origin and the State of the Operator is obtained;
- c) the value indicated in column 13 of Table 3.1 of the Technical Instructions shows “no limit”.

13.2 DESIGN, CONSTRUCTION, APPROVAL AND MARKING

13.2.1 General

13.2.1.1 Each large packaging must be designed, constructed, approved, tested and marked in accordance with the requirements of the UN Model Regulations, Chapter 6.6 and as provided in the Technical Instructions and this Supplement.

13.2.1.2 Only rigid large packagings of UN code “50” are permitted.

13.3 OTHER REQUIREMENTS

13.3.1 The applicable requirements of Part 4.1 of the Technical Instructions must be met when articles are transported in large packagings.

13.3.2 Large packagings must be marked and labelled as required by Part 5.2 and 5.3 of the Technical Instructions except that large packagings must bear the marks required by Part 5.2.4.1, the hazard label and the “Cargo aircraft only” label (Figure 5-28) applied to two opposite sides.

13.4 ADDITIONAL DOCUMENTATION

The requirements concerning the dangerous goods transport document in Part 5.4.1 of the Technical Instructions must be met. When articles are shipped in large packagings under the approval of the appropriate authority of the State of Origin and the State of the Operator, the consignment must be accompanied by a copy of the documents of approval showing all relevant transport conditions.

13.5 SPECIAL RESPONSIBILITIES OF THE OPERATOR IN ACCEPTING ARTICLES IN LARGE PACKAGINGS

Articles may not be accepted for transport in large packagings before advance arrangements have been made between the shipper and the operator. Before accepting the consignment, the operator must ensure that all applicable requirements of Part 7 of the Technical Instructions can be satisfied, particularly those in 7.2.4.2 relating to the securing of packages containing dangerous goods, and that the required approval for the transport has been issued.

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DGP/25-WP/27 (see paragraph 2.7.2 of this report)

Part S-7

STATE'S RESPONSIBILITIES WITH RESPECT TO OPERATORS

...

Chapter 5

PROVISIONS CONCERNING PASSENGERS AND CREW

5.1 BACKGROUND

5.1.1 The purpose of this guidance is to provide States with a model for use in approving an operator's operations manual content on the provision of information to passengers as required by Part 7;5.1 of the Technical Instructions. The provisions of Part 7;5.1 of the Technical Instructions are intended to ensure that operators provide information to passengers on dangerous goods that passengers are forbidden to have in checked, carry-on baggage or on their person.

5.1.2 This guidance is intended to serve as a template for the design of operator systems for passenger notification of dangerous goods restrictions. Use of this applicable guidance constitutes one means of compliance with Part 7;5.1 of the Technical Instructions. Other equivalent approaches may also be used to achieve compliance.

5.2 APPLICABILITY AND SCOPE

5.2.1 This guidance is applicable to all States that approve an operator's air operator certificate in accordance with Annex 6 and Annex 18 to the Convention on International Civil Aviation. Use of this guidance may also be beneficial to passenger aircraft operators to assist them in the development of a passenger notification system that meets the requirements set out in Part 7;5.1 of the Technical Instructions.

5.2.2 This guidance primarily contains methods for passenger notification and acknowledgement, when required, of dangerous goods that passengers are forbidden to transport aboard an aircraft and which must be communicated to passengers during passenger ticket purchase, boarding pass issuance, acceptance of checked baggage and aircraft boarding. Additional guidance is given on airport signage notification with a view that such notification will play a role in an operator's overall passenger notification strategy.

5.3 MANUAL AND TRAINING REQUIREMENTS

5.3.1 Each State must ensure that information is presented to passengers in such a manner that passengers are made aware of the types of dangerous goods that passengers are forbidden from transporting aboard an aircraft as provided for in the Technical Instructions.

5.3.2 Each operator must ensure that all policies, procedures, and systems for notifying passengers about dangerous goods that are forbidden from transport aboard aircraft are documented in an appropriate operations manual and approved by a national authority of the State of the Operator. At a minimum, the operations manual must include information on how passengers will be notified and acknowledge, when required, of the restriction on the carriage of dangerous goods before, at during, and after ticketing/booking, boarding pass issuance and check-in processes.

5.3.3 Dangerous goods information provided to a passenger or a person acting on their behalf, via the Internet, during the ticketing/booking process must be presented in a manner that promotes understanding. Before completion of the ticketing/booking process an acknowledgement of understanding of the dangerous goods must be obtained from the passenger or a person acting on their behalf.

5.3.4 Each employee who interfaces with a passenger in the process of ticket purchase, boarding pass issuance, acceptance of checked baggage and aircraft boarding must be trained in the operator's policies and procedures. Employees

with a function identified in Tables 1-4 and 1-5 must also be trained on the passenger provisions contained in Part 8;1.1 of the Technical Instructions.

5.4 HOW TO USE THIS GUIDANCE

5.4.1 This guidance is intended to serve as a template for the type of passenger notification information that should be included, documented, and approved in an operator's operations manual(s). Each section gives guidance on common methods for ticketing/booking and check-in, information delivery, and acknowledgement. This guidance is based on how passengers commonly purchase their tickets or check in. It is recognized that some operators may not provide all options for ticketing/ booking, check-in, or may provide other options than those mentioned in this guidance. This guidance may be used in whole or in part with the approval of the State of the Operator.

5.4.2 The State should utilize its normal method to notify operators (e.g. information bulletins, advisory circulars) on specific information or guidance necessary to implement a passenger notification system in their operations manual in alignment with the provisions in the Technical Instructions and this Supplement.

5.5 INFORMATION TO PASSENGERS

5.5.1 Part 7;5.1 of the Technical Instructions sets out the requirements for provision of dangerous goods information to passengers. These provisions are written to be outcome-based, i.e. the method for the operator to provide the required information to passengers is not prescribed; instead the actual method is left for the operator to determine to allow for operator innovation and to provide flexibility recognizing that not all operators have the same capabilities.

5.5.2 The information provided to passengers should use pictorial images that represent common items of dangerous goods that are forbidden in passenger baggage.

5.6 METHODS BY WHICH INFORMATION MAY BE PROVIDED TO PASSENGERS

5.6.1 Ticket issuance

The operator is required to provide information as to the types of dangerous goods that the passengers are forbidden from carrying on board an aircraft to the passenger at the point of ticket purchase or, if this is not practical, made available in another manner to passengers prior to boarding pass issuance. Methods of providing this information to the passenger include:

- a) notices prominently displayed, in sufficient number, at each of the places at an airport or off-airport where tickets are issued;
- b) as part of the physical ticket receipt / itinerary;
- c) by email with the ticket receipt / itinerary;
- d) on the airline website in text or pictorial form. When provided in this manner the process must be such that ticket purchase cannot be completed until the passenger, or a person acting on their behalf, has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage;
- e) notices prominently displayed, in sufficient number, at self-service ticket purchase kiosks;
- f) on a screen within a ticket purchase kiosk. When provided in this manner the process must be such that ticket purchase cannot be completed until the passenger, or a person acting on their behalf, has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage.

5.6.2 Boarding pass issuance

The operator must provide passengers with information as to the types of dangerous goods that they are forbidden from carrying on board an aircraft in association with the issuance of the boarding pass. Methods of providing this information to the passenger include:

- a) notices prominently displayed, in sufficient number, at each of the places at an airport or off-airport where boarding passes are issued;
- b) electronic displays;

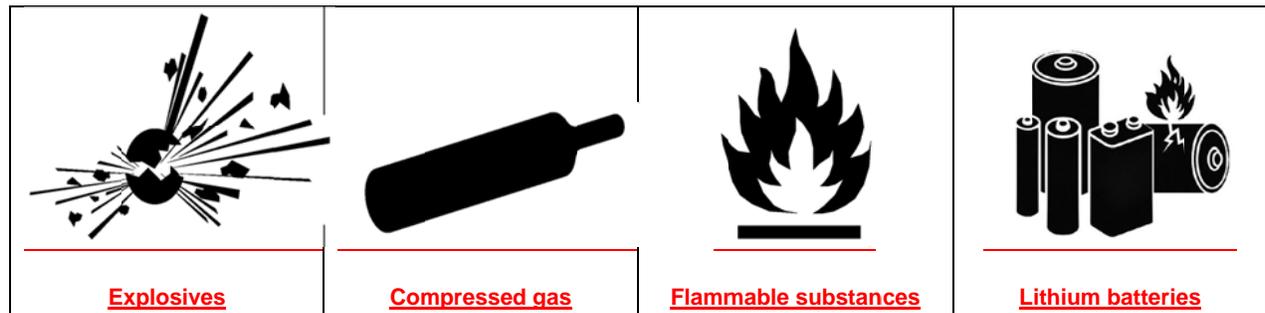
- c) notices prominently displayed, in sufficient number, at self-service boarding pass issue kiosks;
- d) on a screen within a boarding pass issue kiosk. When provided in this manner the process must be such that the boarding pass issue process cannot be completed until the passenger, or a person acting on their behalf, has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage;
- e) included with the boarding pass that may be issued with the ticket receipt;
- f) by email with the boarding pass;
- g) on the airline website in text or pictorial form. When provided in this manner the process must be such that the boarding pass issue process cannot be completed until the passenger, or a person acting on their behalf, has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage;
- h) displayed on mobile applications that allow the passenger to generate their boarding pass. When provided in this manner the process must be such that the boarding pass issue process cannot be completed until the passenger has been presented with this information and indicated that they have understood the restrictions on dangerous goods in baggage; and
- i) where the operator does not issue a physical or electronic boarding pass in advance of the passenger boarding the aircraft, the operator must implement a process such that the passengers are presented with a notice or other information prior to boarding the aircraft.

5.7 PASSENGER INFORMATION NOTIFICATION ELEMENTS

5.7.1 The method used by the operator to convey to passengers information about dangerous goods that passengers are not permitted to carry aboard an aircraft, in checked or carry-on baggage or on their person should use pictorial images or graphics that don't rely on the use of language to communicate the type of common but higher risk items of dangerous goods. Examples of these include:

- a) explosives/fireworks;
- b) compressed gases/flammable gas (butane, camping gas);
- c) flammable liquids, such as gasoline, paint and lighter fluid;
- d) oxidizers, such as pool chemicals;
- e) corrosives, such as wet cell batteries, bleach and household cleaners;
- f) radioactive materials; and
- g) lithium batteries.

5.7.2 The pictorial images or graphics used should also make use of the standard pictograms to indicate dangerous goods. Inclusion of these pictograms into the pictorial information is recommended to enhance the overall effectiveness of the passenger notification. Examples of these include:



			
<p><u>Corrosive substances</u></p>	<p><u>Toxic substances</u></p>	<p><u>Oxidizers</u></p>	<p><u>Radioactive materials</u></p>

...

DGP/25-WP/3 (see paragraph 3.2.1.3)

Chapter ~~5~~ 6

INSPECTIONS

...

Renumber all paragraph numbers to reflect new Chapter number 6.

~~5~~6.6 TRAINING PROGRAMMES

~~5~~6.6.1 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.

...

ATTACHMENT

PROPOSED AMENDMENTS TO TABLE S-3-1

Table S-3-1. Supplementary Dangerous Goods List - DRAFT

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
A												
≠ Acrolein dimer, stabilized	2607	3		Liquid flammable		A209 A330						
≠ Acrolein, stabilized	1092	6.1	3	Toxic & Liquid flammable		A209 A323 A330	I		FORBIDDEN		FORBIDDEN	
≠ Acrylic acid, stabilized	2218	8	3	Corrosive & Liquid flammable		A209 A330						
≠ Acrylonitrile, stabilized	1093	3	6.1	Liquid flammable & Toxic		A209 A330	I	E0	FORBIDDEN		361	30 L
≠ Adsorbed gas, toxic, corrosive, n.o.s.*	3516	2.3	8	Gas toxic & Corrosive	AU 1 CA 7 IR 3 NL 1 US 3	A2 A329		E0	see 210		see 210	
≠ 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	203	(25 kg)	203	50 kg
≠ Allyl isothiocyanate, stabilized	1545	6.1	3	Toxic & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330	II	E0	654	(5 L)	661	60 L
≠ Allyltrichlorosilane, stabilized	1724	8	3	Corrosive & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330	II	E0	876	(1 L)	876	30 L
≠ Ammonia, anhydrous	1005	2.3	8	Gas toxic & Corrosive	AU 1 CA 7 IR 3 NL 1 US 3	A2 A329			See 210		See 210	
B												
≠ Bicyclo [2.2.1] hepta-2-5-diene, stabilized	2251	3		Liquid flammable		A209 A330						

Chapter 2

S-3-2-2

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
≠ 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 A330		E0	FORBIDDEN		200	150 kg
≠ Butadienes, stabilized	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Butyl acrylates, stabilized	2348	3		Liquid flammable		A209 A330						
≠ 1,2-Butylene oxide, stabilized	3022	3		Liquid flammable		A209 A330						
≠ n-Butyl methacrylate, stabilized	2227	3		Liquid flammable		A209 A330						
≠ Butyl vinyl ether, stabilized	2352	3		Liquid flammable		A209 A330						
C												
≠ Chloroprene, stabilized	1991	3	6.1	Liquid flammable & Toxic		A209 A330	I	E0	FORBIDDEN		361	30 L
≠ Crotonaldehyde	1143	6.1	3	Toxic & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3 US 4	A2 A209 A319 A330	I		FORBIDDEN		FORBIDDEN	
≠ Crotonaldehyde, stabilized	1143	6.1	3	Toxic & Liquid flammable	AU 1 CA 7 IR 3 NL 1 US 3 US 4	A2 A209 A323 A330	I		FORBIDDEN		FORBIDDEN	
≠ Cyanogen chloride, stabilized	1589	2.3	8	Gas toxic & Corrosive	AU 1 CA 7 IR 3 NL 1 US 3	A2 A209 A330			See 210		See 210	
D												
≠ Diketene, stabilized	2521	6.1	3	Toxic & Liquid flammable		A209 A323 A330	I		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
≠ Dipropylamine	2383	3	8	Liquid flammable & Corrosive		A209 A330						
≠ Divinyl ether, stabilized	1167	3		Liquid flammable		A209 A330						
E												
≠ Engine, fuel cell, flammable gas powered †	3529	2.1		Gas flammable		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
≠ Engine, internal combustion, flammable gas powered	3529	2.1		Gas flammable		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
≠ Ethylacetylene, stabilized	2452	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Ethyl acrylate, stabilized	1917	3		Liquid flammable		A209 A330						
≠ Ethyleneimine, stabilized	1185	6.1	3	Toxic & Liquid flammable		A209 A323 A330	I		FORBIDDEN		FORBIDDEN	
≠ Ethyl methacrylate, stabilized	2277	3		Liquid flammable		A209 A330						
G												
≠ Gas cartridges (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8	Gas toxic & Oxidizer & Corrosive	AU 1 CA 7 IR 3 NL 1 US 3	A2 A211			See 210		See 210	
H												
≠ Hydrogen cyanide, stabilized containing less than 3% water	1051	6.1	3	Toxic & Liquid flammable		A209 A323 A330	I		FORBIDDEN		FORBIDDEN	
≠ Hydrogen cyanide, stabilized containing less than 3% water and absorbed in a porous inert material	1614	6.1		Toxic		A209 A330	I		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
I												
≠ Isobutyl acrylate, stabilized	2527	3		Liquid flammable		A209 A330						
≠ Isobutyl methacrylate, stabilized	2283	3		Liquid flammable		A209 A330						
≠ Isoprene, stabilized	1218	3		Liquid flammable		A209 A330						
L												
≠ Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	US 3	A88 A99 A154 A164 A183 A206 A331						
≠ Lithium metal batteries (including lithium alloy batteries) †	3090	9		Miscellaneous — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A183 A201 A206		E0	FORBIDDEN		See 968	
M												
+ Machinery, fuel cell, flammable gas powered	3529	2.1		Gas flammable		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
+ Machinery, internal combustion, flammable gas powered	3529	2.1		Gas flammable		A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
≠ Methacrylaldehyde, stabilized	2396	3	6.1	Liquid flammable & Toxic		A209 A330						
≠ Methacrylic acid, stabilized	2531	8		Corrosive		A209 A330						
≠ Methacrylonitrile, stabilized	3079	6.1	3	Toxic & Liquid flammable		A209 A323 A330	I		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
≠ Methylacetylene and propadiene mixture, stabilized †	1060	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Methyl acrylate, stabilized	1919	3		Liquid flammable		A209 A330						
≠ Methyl isopropenyl ketone, stabilized	1246	3		Liquid flammable		A209 A330						
≠ Methyl methacrylate monomer, stabilized	1247	3		Liquid flammable		A209 A330						
≠ Methyl vinyl ketone, stabilized	1251	6.1	3 8	Toxic & Liquid flammable & Corrosive		A209 A323 A330	I		FORBIDDEN		FORBIDDEN	
N												
≠ Nitric acid, other than red fuming, with more than 20% and less than 65% nitric acid	2031	8		Corrosive		A212	II	E0	851	(1 L)	855	30 L
≠ Nitroglycerin mixture, desensitized, liquid, n.o.s.* with not more than 30% nitroglycerin, by mass	3357	3		Liquid flammable	BE 3	A17 A304	II		FORBIDDEN		FORBIDDEN	
≠ 2,5-Norbornadiene, stabilized	2251	3		Liquid flammable		A209 A330						
P												
+ Polymerizing substance, liquid, stabilized, n.o.s.*	3532	4.1		Solid flammable		A209 A330						
+ Polymerizing substance, liquid, temperature controlled, n.o.s.*	3534	4.1		Solid flammable		A209 A330	III	E0	FORBIDDEN		FORBIDDEN	
+ Polymerizing substance, solid, stabilized, n.o.s.*	3531	4.1		Solid flammable		A209 A330						
+ Polymerizing substance, solid, temperature controlled, n.o.s.*	3533	4.1		Solid flammable		A209 A330	III	E0	FORBIDDEN		FORBIDDEN	
≠ Propadiene, stabilized	2200	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Propellant, solid	0501	1.4C		Explosive 1.4					FORBIDDEN (114 b))		114	75 kg
≠ Propyleneimine, stabilized	1921	3	6.1	Liquid flammable & Toxic	US 4	A209 A330	I	E0	FORBIDDEN		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
R												
≠ Receptacles, small, containing gas (toxic, oxidizing & corrosive) without a release device, non-refillable	2037	2.3	5.1 8	Gas toxic & Oxidizer & Corrosive	AU 1 CA 7 IR 3 NL 1 US 3	A2 A211			See 210		See 210	
≠ Refrigerant gas R 1113	1082	2.3	2.1	Gas toxic & Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A2 A209 A330			FORBIDDEN		FORBIDDEN	
+ Rocket motors †	0510	1.4C		Explosive 1.4				E0	FORBIDDEN		130	75 kg
S												
≠ Styrene monomer, stabilized	2055	3		Liquid flammable		A209 A330						
≠ Sulphur trioxide, stabilized	1829	8		Corrosive	AU 1 CA 7 IR 3 NL 1 US 3	A2 A209 A323 A330	I		858	(1 kg)	862	(25 kg)
T												
≠ Tetrafluoroethylene, stabilized	1081	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Trifluorochloroethylene, stabilized	1082	2.3	2.1	Gas toxic & Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A2 A209 A330			See 210		See 210	
V												
≠ Vehicle, flammable gas powered	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A203 A207		E0	FORBIDDEN		951	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
≠ Vehicle, fuel cell, flammable gas powered †	3166	9		Miscellaneous		A67 A70 A87 A118 A120 A134 A176 A203 A207			E0	FORBIDDEN	951	No limit
≠ Vinyl acetate, stabilized	1301	3		Liquid flammable		A209 A330						
≠ Vinyl bromide, stabilized	1085	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Vinyl butyrate, stabilized	2838	3		Liquid flammable		A209 A330						
≠ Vinyl chloride, stabilized	1086	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3 US 4	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Vinyl ethyl ether, stabilized	1302	3		Liquid flammable		A209 A330						
≠ Vinyl fluoride, stabilized	1860	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Vinylidene chloride, stabilized	1303	3		Liquid flammable		A209 A330						
≠ Vinyl isobutyl ether, stabilized	1304	3		Liquid flammable		A209 A330						
≠ Vinyl methyl ether, stabilized	1087	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 A330		E0	200	(5 kg)	200	150 kg
≠ Vinylpyridines, stabilized	3073	6.1	3 8	Toxic & Liquid flammable & Corrosive		A209 A330						
≠ Vinyltoluenes, stabilized	2618	3		Liquid flammable		A209 A330						

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

4.1 DRAFT AMENDMENTS TO THE EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS (DGP/25-WP/20)

4.1.1 The meeting reviewed amendments to the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) to reflect the decisions taken by the UN Committee at its seventh session (Geneva, 12 December 2014) and amendments agreed by DGP-WG/15. The amendments were agreed.

4.2 RECOMMENDATION

4.2.1 In light of the foregoing discussion, the meeting developed the following recommendation:

Recommendation 4/1 — Amendment to the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) for incorporation in the 2017-2018 Edition

That the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) be amended as indicated in the appendix to the report on this agenda item.

APPENDIX

**PROPOSED AMENDMENTS TO THE EMERGENCY RESPONSE
GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS
GOODS**

Section 4

**CHART OF DRILLS AND
LIST OF DANGEROUS GOODS WITH
DRILL REFERENCE NUMBERS**

DGP/25-WP/3 (see paragraph 3.4.1.1) and DGP/25-WP/20 (see paragraph 4.1 of this report)

Amend Tables 4-2 and 4-3 as indicated:

<i>UN No.</i>	<i>Drill Code</i>	<i>Proper shipping name</i>
<u>0510</u>	<u>1L</u>	<u>Rocket motors</u>
2815	8L <u>8P</u>	N-Aminoethylpiperazine
2977	7C <u>7CP</u>	Radioactive material, uranium hexafluoride, fissile
2978	7C <u>7CP</u>	Radioactive material, uranium hexafluoride
3507	8L <u>6C</u>	Uranium hexafluoride, radioactive material, excepted package
3166 <u>3528</u>	9L <u>3L</u>	Engine, internal combustion, flammable liquid powered
3166 <u>3528</u>	9L <u>3L</u>	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>
3166 <u>3529</u>	9L <u>10L</u>	Engine, internal combustion, flammable gas powered
3166 <u>3529</u>	9L <u>10L</u>	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>

Agenda Item 5: Development of a comprehensive strategy to mitigate risks associated with the transport of lithium batteries including development of performance-based packaging standards and efforts to facilitate compliance

**5.1 REPORT OF THE THIRD INTERNATIONAL
MULTIDISCIPLINARY LITHIUM BATTERY
TRANSPORT COORDINATION MEETING
(DGP/25-WP/8)**

5.1.1 The panel was presented with the report of the Third International Multidisciplinary Lithium Battery Transport Coordination Meeting which was held in Montréal from 28 to 30 July 2015. It was attended by experts in the fields of dangerous goods, operations, airworthiness, safety management systems, aircraft cargo fire safety research and development and representatives of the airframe manufacturing and lithium battery industries. It was reported that prior to the meeting, two major airframe manufacturers had provided notices to operators warning of the potential for a fire involving high-density lithium batteries to exceed the capability of aircraft cargo compartment fire protection systems. The notices indicated that representatives of both manufacturers supported recommendations made by the International Coordinating Council of Aerospace Industries Associations (ICCAIA) and the International Federation of Air Line Pilots' Associations (IFALPA) to DGP-WG/15 which included a prohibition on the carriage of high-density packages of lithium ion batteries and cells on passenger aircraft until such time as safer methods of transport were implemented. Both manufacturers recommended in their notices that operators who chose to carry lithium batteries as cargo conduct a safety risk assessment. Several large operators responded to the notices by instituting bans on the transport of lithium ion batteries. Recognizing that the ultimate goal was to permit their transport by air, the multidisciplinary meeting agreed that performance-based standards, including packaging standards, needed to be developed as part of a comprehensive strategy to mitigate risks posed by lithium batteries.

5.1.2 The multidisciplinary meeting focused its attention on developing high-level performance standards as a basis for more detailed standards to mitigate risks posed by a fire developing inside a package containing lithium batteries or cells and determined that they could be met at either the package or battery/cell level. The high-level performance standards are provided in Appendix D to the report on this agenda item. It was reported that the multidisciplinary meeting could not reach a consensus on whether there should be consideration of the effects of an external fire event on the package. Some participants believed that FAA Technical Centre test results demonstrating that direct involvement in a fire event originated by cargo other than lithium batteries/cells or heat from an externally-suppressed fire could cause batteries to emit flammable gases capable of collecting, igniting and resulting in an explosion in a closed compartment made it essential to consider. Others believed that an external fire standard would be impractical to implement and suggested that there was no precedent for such a standard for any other types of dangerous goods in the Technical Instructions and was therefore unwarranted. The multidisciplinary meeting recommended that an external group develop the detailed performance standards. The Secretary reported to DGP that SAE International was being requested to address the issue. This organization was seen as being the most appropriate to take on the task as they were a non-lobbying technical society with world-wide presence. Participation would be open to all interested parties.

5.1.3 Recognizing that the development of performance standards would take time to develop, the multidisciplinary meeting made interim recommendations (see Appendix D to the report on this agenda item). These included a recommendation for operators to perform safety risk assessments in order

to establish if they could manage the risks associated with the transport of lithium batteries on aircraft to an acceptable level of safety, transporting lithium ion batteries at a reduced state of charge, and instituting cargo loading controls such as limiting the number of batteries loaded in one place and segregating them from other dangerous goods. The multidisciplinary meeting also recommended that guidance on how to conduct and evaluate a safety risk assessment be developed for operators and regulators.

5.2 FLIGHT OPERATIONS PANEL (FLTOPSP) POSITION ON TRANSPORT OF LITHIUM BATTERIES (DGP/25-WP/51)

5.2.1 The Secretary of the Flight Operations Panel (FLTOPSP) reported on discussions related to lithium batteries at the panel's second meeting (FLTOPSP/2, Montréal, 12 to 16 October 2015). FLTOPSP had been informed of the outcome of the three International Multidisciplinary Lithium Battery Transport Coordination Meetings and provided background information on the DGP/25 proposals to ban the transport of lithium ion batteries on passenger aircraft and to remove the Section II provisions from Packing Instructions 965 and 968. FLTOPSP was also provided with a status report by the ICCAIA on coordinated efforts between DGP, the Airworthiness Panel (AIRP) and other industry safety groups with respect to their concerns with cargo compartment fire protection capabilities on a fire involving high-density lithium batteries. FLTOPSP/2 developed a position statement centred on the safe operation of aircraft and asked that it be provided to DGP/25 for consideration during its discussions on lithium batteries. The FLTOPSP Secretary stressed the need for collaboration between the two panels on the issue and quoted a statement in the foreword to Annex 6, Part I which referred to an element of the safety of an operation being the intrinsic safety of the aircraft, i.e. its level of airworthiness. He reminded the DGP of the extended diversion time operations (EDTO) Standards in Annex 6 and advised that cargo fire suppression systems would need to be capable of suppressing a fire for the amount of time it would take to proceed to an aerodrome and land the aeroplane safely. If this was not possible, risk-based alternatives approved by the State of the Operator would need to be put into place. The operator's accountable officer would be ultimately responsible in evaluating the risks.

5.2.2 The statement developed by the FLTOPSP was as follows:

“The Flight Operations Panel is of the opinion that lithium batteries and cells should be transported in aircraft engaged in commercial air transport operations as cargo only if acceptable criteria can be identified to carry out appropriate safety risk management activities in order to ensure the safe carriage of lithium batteries and cells.

As a minimum, such criteria should include:

- a) capabilities of the operator;
- b) type of operation (i.e. passenger, cargo);
- c) overall capability of the airplane and its systems;
- d) packing, packaging, and quantity of batteries and cells;
- e) containment characteristics of ULDs;

- f) the specific hazards and safety risks associated with each battery and cell type to be carried alone or in combination; and
- g) the chemical composition of the batteries and cells.”

5.2.3 The FLTOPSP secretary stressed that while the statement was reached by consensus, a number of members were of the opinion that an outright ban on the transport of lithium batteries as cargo on passenger aircraft should be imposed until a safe method of transport was established.

5.2.4 Members of the DGP noted that the last two elements in the list of criteria (sub-paragraphs 5.2.2 f) and g) above) would be impossible for operators to determine. It was reported that the FLTOPSP, recognizing that test results indicated that two of the variables which contributed to the outcome of a lithium battery fire were battery type and chemical composition, saw this information to be a necessary component of an effective risk assessment and that the absence of it would need to be factored in.

5.2.5 In relation to the need for a safety risk assessment, the FLTOPSP Secretary reported that the FLTOPSP was of the opinion that it was essential for it to be involved, along with other relevant panels, in the development of any criteria for safety risk management activities. He recommended a joint multidisciplinary working group take on the task of developing the criteria.

5.2.6 The FLTOPSP secretary also informed the meeting of a draft new provision in Annex 6, Part I that had been recently sent to States for comment (SL AN 11/1.1.30-15/9) recommending that the diversion time to an aerodrome where a safe landing could be made would not exceed the cargo compartment fire suppression time capability of the aeroplane reduced by a safety margin specified by the State of the Operator. He noted that fifteen minutes was an operational safety margin commonly retained for that purpose. He reminded the meeting of the potential impact the transport of lithium batteries could have on certification for extended diversion time operations and explained that the new provision would apply to all operations.

5.2.7 The meeting agreed that operators needed to carry out appropriate safety risk management activities in order to determine whether they could ensure the safe carriage of lithium batteries and cells. It was noted that the Technical Instructions did not contain any provisions related to an operator's responsibility to conduct safety risk assessments. Although efforts had been taken during the previous biennium to strengthen the relationship between Annexes 6, 18 and 19 which did result in the addition of new notes in Chapter 8 of Annex 18 referring to Annex 19 and specifying that the carriage of dangerous goods was included in the scope of the operator's safety management system (SMS), no such provisions were added to the Technical Instructions. It was suggested that these notes should also be included in the Technical Instructions and that the need for operators to conduct safety risk assessments on the transport of dangerous goods as part of their safety management system also needed to be highlighted. The meeting fully supported such an approach and an amendment to Part 7 of the Technical Instructions introducing such provisions was agreed.

5.3 **TRANSPORT OF LITHIUM ION BATTERIES AS CARGO BY AIR (DGP/25-WP/24)**

5.3.1 A proposal to forbid the transport of lithium ion batteries on passenger aircraft was presented. The proposal was a follow-up to discussions at DGP-WG/15 on a paper jointly presented by

ICCAIA and IFALPA raising concerns that a fire involving high-density lithium batteries could exceed the capability of aircraft cargo compartment fire protection systems. The two organizations recommended that high-density packages of lithium ion batteries and cells be prohibited from transport as cargo on passenger aircraft until such time as safer methods of transport were established and implemented. Although DGP-WG/15 shared concerns with the risks posed, the development of performance-based standards was seen as the best way forward and not a prohibition. The need for a definition for high-density shipments of lithium batteries was raised at DGP-WG/15, but determining a single quantifiable measurement for high density was seen as not possible because of the variable effects battery chemistry, cargo compartment characteristics, and loading configurations had on the potential for and degree of thermal propagation. As such, high-density quantities of lithium batteries could be any number of batteries or cells having the potential to overwhelm cargo compartment fire protection features. It was noted that recent FAA Technical Center tests had demonstrated that as little as three cells were capable of generating enough gas to cause an explosion and compromise an aircraft's fire protection system. Determining what would be considered high density was also complicated by the absence of any mechanism in the Technical Instructions to limit the number of packages of lithium ion batteries loaded in a single cargo compartment.

5.3.2 While supporting the performance-based approach towards mitigating risks posed by lithium batteries, the proposer could not support the continued transport of lithium ion batteries on passenger aircraft until such time that the detailed performance standards were developed and implemented. Accordingly, he proposed an amendment to the entry for UN 3480 — **Lithium ion batteries** in the Technical Instructions to establish a prohibition on passenger aircraft. The proposer noted that he would support a prohibition on cargo aircraft as well, but did not include this as part of his proposal because of the lack of support shown for such a ban at previous meetings.

5.3.3 Many panel members supported the proposal for the reasons outlined above. They saw a ban as a temporary measure until appropriate performance-based standards were developed and implemented. In the absence of such standards, these members believed a ban was the only way to achieve an acceptable level of safety. Although not included in the proposal, they supported provisions for an approval process in cases where cargo aircraft were not available.

5.3.4 The majority, however, believed that the alternative mitigating measures developed by the meeting (i.e. reducing state of charge (see paragraph 5.4), limiting the number of Section II packages to one per consignment and one per overpack (see paragraph 5.5)) would bring the risks to an acceptable level and that these measures would not have the detrimental effect to world-wide demand and commerce that a ban would have. They believed that a ban would result in an increase in undeclared shipments and that this would be a risk to safety. Those who opposed a ban also believed it should be up to each operator to determine whether they could mitigate the risks to an acceptable level based on their own unique assessment.

5.3.5 Those who supported the ban did not agree that the alternative measures developed by the meeting resulted in an acceptable level of safety (see paragraphs 5.4 and 5.5). One member suggested that leaving it to the *operator* to determine whether they could mitigate risks to an acceptable level went against the philosophy of the Technical Instructions which prohibited specific articles or substances listed by name in Table 3-1 from transport unless the *Instructions* provided for an acceptable level of safety. Notwithstanding, there were further concerns with whether all operators were in a position to conduct an effective risk assessment without proper guidance. It was noted that the Third Multidisciplinary Meeting had recommended the development of guidance material for operators and regulators on how to evaluate a safety risk assessment, but this had yet to be developed.

5.3.6 The majority of panel members did not support the ban. The amendment was therefore not agreed.

5.4 **STATE OF CHARGE REQUIREMENT FOR LITHIUM ION BATTERY (UN 3480) SHIPMENTS (DGP/25-WP/22)**

5.4.1 An amendment to Packing Instruction 965 requiring UN 3480 — **Lithium ion batteries** to be shipped at a state of charge between 15 and 30 per cent inclusive was proposed. The proposer cited recommendations made by the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting (Cologne, Germany, 9 to 11 September 2014) to limit the state of charge to 30 per cent during transport. The limit was set based on test results which demonstrated that propagation of thermal runaway could be greatly reduced or eliminated at this level. However, representatives of the battery industry had argued against a limit of 30 per cent suggesting that prolonged low voltage following cell discharge could lead to undesirable effects and compromise cell performance. They indicated that this was possible at approximately 10 per cent state of charge. The representatives from the battery industry had proposed a limit of 55 per cent state of charge to address a need to store cells after air transport for prolonged periods of time, stating that a discharge rate of 2 per cent per month was typical. Recognizing that propagation of thermal runaway had been demonstrated in tests on cells at a state of charge of 50 per cent, the proposer did not support a limit of 55 per cent and argued that it would be the shippers responsibility to ensure that degraded cells were not introduced into transport. He proposed including a lower permitted limit of charge of 15 per cent to address the battery representative's concerns by ensuring that lithium ion cells would remain above a 10 per cent state of charge during transport.

5.4.2 Information was provided by a member of the battery industry to demonstrate that various types of lithium batteries posed different hazards in transport and that setting one state of charge at which all batteries were required to be transported was inappropriate. He noted that some batteries had long logistical supply chains and that there was a need to ship them at a higher state of charge in order for the battery to be viable once it reached its destination. He estimated that over half of the batteries produced could be shipped at 30 per cent state of charge, but that there needed to be a mechanism to allow for higher states of charges for others.

5.4.3 Experts in aircraft cargo fire safety research and development from the FAA Technical Centre, while agreeing that safe states of charge were dependent on battery type, indicated their tests demonstrated that propagation of thermal runaway did not occur for the majority of cells tested when the state of charge was reduced to 30 per cent. They stressed that this was true for the majority of cells but could be higher or lower depending on the battery type. They also suggested that while 30 per cent was shown to be a safe rate for the majority of cells today, there was no guarantee that this would remain constant in the future as battery technology evolved.

5.4.4 While all panel members agreed that limiting the state of charge to 30 per cent would be a significant safety enhancement that should be required, some did not believe this measure would eliminate the risk recognizing that the limit would not remove the potential for thermal propagation for all cell and battery types. One member cautioned that it would also not eliminate the risk from the effects of an external fire on lithium batteries and the potential for these batteries to vent flammable gases and lead to an explosive atmosphere. Noting that non-compliance had often been cited as a reality with respect to the transport of lithium batteries, they were also concerned with the potential for shippers to either intentionally or unintentionally disregard the requirement with no way for operators to verify. Others did

not support such an argument on the basis that shippers signed a declaration of compliance and the safe transport of dangerous goods had always depended on a degree of trust throughout the transport chain.

5.4.5 Some members believed that if a shipper could demonstrate safety at a higher rate of charge they should be able to ship at those rates, while others opposed this on the basis that there was no consistent approach to determine a safe rate. A suggestion to include provisions for a higher state of charge under the State approval process was supported by the majority of panel members.

5.4.6 After much discussion, the panel agreed to limit the state of charge to 30 per cent and to allow for higher states of charge with the approval of the State of Origin and the State of the Operator. The proposal for a lower limit of 15 per cent was withdrawn by the presenter as it was agreed that the concern raised by the battery industry related to cell degradation was a facilitation issue that the shipper would need to control.

5.4.7 The next questions to consider were whether this limitation should apply to passenger and cargo aircraft and whether it should apply to all sections of Packing Instructions 965. Some strongly opposed a limit on cargo aircraft as they suggested this would effectively ban from air transport certain lithium ion batteries which needed to be shipped at higher states of charge. A large majority supported the limit on all aircraft recognizing the enhancement to safety and also recognizing the added complexity that setting a limit for passenger but not for cargo aircraft would bring.

5.4.8 With regard to which sections the limits should apply, there was agreement to apply the limit to Sections IA and IB. In light of the fact that the panel decided not to eliminate Section II from Packing Instructions 965 and 968 (see paragraph 5.5), whether or not the limit should apply to Section II garnered much more discussion. Recognizing the significant benefit to safety limiting the state of charge to 30 per cent would provide, many panel members could not justify allowing Section II batteries to be shipped at unlimited states of charge. Others believed the additional restrictions (see paragraph 5.5) which limited the number of packages per consignment to one and allowing only one package of Section II batteries to be placed in an overpack provided an acceptable level of safety and that limiting the state of charge was excessive.

5.4.9 The panel ultimately agreed to a limit of 30 per cent state of charge for batteries and cells shipped on either passenger or cargo aircraft regardless of whether they were packaged in accordance with Section IA, IB or II of Packing Instructions 965. The panel also agreed to provisions allowing a shipper to consign lithium ion batteries at a higher state of charge with the approval of the appropriate authorities of the State of Origin and of the State of the Operator. The high-level performance standards developed by the Third International Multidisciplinary Lithium Battery Transport Coordination Meeting were included in the Supplement to the Technical Instructions as guidance for States considering applications for approvals (see Appendix C to the report on this agenda item). A representative of the battery industry proposed not to include in the guidance material the high-level performance standard aimed at preventing pressure pulses from venting gases sufficient to dislodge cargo compartment overpressure panels or cause damage to the cargo liner as he did not believe CAAs had the necessary expertise to issue an approval based on this criterion. This argument was countered by a view that it was critical to keep this element as it addressed the most recent FAA test results that demonstrated the potential for flammable gases emitted from venting cells to collect, ignite and result in an explosion in closed compartments and to compromise required Halon concentrations necessary to suppress a fire. It was noted that it would be the CAA's responsibility to consult with necessary experts before issuing approvals. The element was maintained.

5.5 **DELETION OF SECTION II PROVISIONS FOR LITHIUM ION (UN 3480) AND LITHIUM METAL (UN 3090) BATTERY SHIPMENTS (DGP/25-WP/21) AND SECTION II OF PACKING INSTRUCTIONS 965 AND 968 FOR UN 3090 AND UN 3480 (DGP/25-WP/29)**

5.5.1 Two proposals to eliminate the exceptions provided for UN 3480 — **Lithium ion batteries** and UN 3090 — **Lithium metal batteries** in Section II of Packing Instructions 965 and 968 were presented. It was suggested that this would support the following statements and recommendations made by the United States Federal Aviation Administration (FAA), the Boeing Company, Airbus Industries, and the Third International Multidisciplinary Lithium Battery Transport Coordination Meeting:

- a) a safety alert for operators issued by the United States Federal Aviation Administration (FAA) in 2010 recommending that operators load bulk shipments of Section II batteries in Class C cargo compartments or locations where alternate fire suppression was available;
- b) a multi-operator message issued by the Boeing Company in 2015 advising operators who transport lithium batteries to conduct a safety risk assessment which took into account, among other factors, the types and quantities of lithium batteries carried, the quantity per flight, their location within the cargo compartment, and proximity to other dangerous goods; and
- c) an in-service information article issued by Airbus Industries in 2015 advising operators who transport lithium batteries to conduct a risk assessment which took into account, among other factors, information on the quantity and density of lithium battery shipments and the types of lithium batteries being shipped. Airbus further recommended that all shipments of lithium batteries be identified and notified and that a policy to notify the flight crew of all lithium battery shipments be established; and
- d) interim recommendations from the Third International Multidisciplinary Lithium Battery Transport Coordination Meeting (see paragraph 5.1.3 and Appendix A to the report on this agenda item) including safety risk assessments by operators who wished to transport lithium batteries which would require consideration of information on the types and quantities of lithium batteries and cells being transported.

5.5.2 The first proposal maintained that the relief from the requirements provided by Section II of Packing Instructions 965 and 968 — including the requirements to provide a dangerous goods transport document, perform an operator acceptance check, and notify the pilot in command of the shipment — made it impossible for operators to perform an effective safety risk analysis. Additionally, there was no way for operators to control the number of packages of Section II batteries loaded on the aircraft, making it difficult for operators who chose to transport lithium batteries to apply effective risk mitigation. The second proposal also maintained that the multi-tiered regulatory structure for lithium batteries, particularly Packing Instructions 965 and 968 which contained three levels (Sections IA, IB and II), had become increasingly complicated and difficult for shippers and operators to sustain. The proposed amendments removed Section II provisions from Packing Instructions 965 and 968 and the first proposal

also consolidated Sections IA and IB into a single packing instruction. There was little support for consolidating Sections IA and IB as it was felt this would have multimodal implications without any significant improvements to safety. This part of the amendment was therefore withdrawn.

5.5.3 Several panel members supported the elimination of Section II for the same reasons outlined by the proposers. They did not believe it was feasible to obtain information related to the types and quantities of lithium batteries and cells being transported as cargo in accordance with Section II, and this information was listed as essential components to an effective safety risk assessment by all parties who had recommended they be conducted (see paragraph 5.5.1). One participant outlined the manual, labour-intensive process his airline had taken to determine the quantities and types of batteries as part of his operator's safety risk assessment, but it was suggested by others that this would not be practically feasible for most operators. Additionally, operators would need to have this lithium battery and cell type and quantity information on a continuous basis in order to effectively apply operational mitigation measures to prevent a high density of battery packages from being loaded in a cargo compartment, and this type of a manual process would be difficult if not impossible to sustain. It was suggested that even if the information could be accessed through a manual process at the initial point of acceptance by the first operator, it would be difficult to access it consistently throughout the transport cycle, particularly in the case of interline transfers of these Section II packages between operators.

5.5.4 Other panel members did not support the elimination of Section II batteries. They recognized a need for individuals and retailers to transport "one or two" batteries through e-commerce and believed these small quantities posed minimal risk and should therefore not be subject to full regulation. While they agreed a method needed to be established to ensure shippers could not abuse the benefits the relief from full regulation provided by consolidating several packages into one consignment, they feared that removing the exceptions would result in an increase in undeclared shipments. They thought an alternate approach to preventing high-density shipments would be more appropriate. Accordingly, an alternate amendment was developed which retained Section II while limiting the number of packages per consignment to one and allowing only one package of Section II batteries to be placed in an overpack. This was additional to the requirement applied to lithium ion batteries that was developed by the meeting for shippers to limit the state of charge of the batteries to 30 per cent (see paragraph 5.4).

5.5.5 There was considerable discussion on whether forbidding the use of overpacks for packages of lithium batteries would be more effective than restricting their use to one package of Section II lithium batteries. Some members argued against allowing any packages of Section II batteries in an overpack out of concern that shippers would find ways to abuse the provision. Others felt that forbidding the use of overpacks for Section II batteries was inappropriate, noting that packages of batteries were often accompanied by non-dangerous goods such as manuals and other material associated with the batteries in an overpack. They also suggested that the overpack could offer the batteries an additional source of protection, particularly in cases where the package was small. They believed that the proposed wording for limiting overpacks to one Section II package would eliminate the potential for a shipper to consign multiple packages of Section II batteries. It became clear during discussions, however, that there were different interpretations of what constituted an overpack in relation to Section II batteries and recognized that these differing interpretations would likely occur among shippers as well; a note clarifying what was meant by "overpack" was therefore proposed for inclusion with the proposed overpack restrictions. The majority believed that the overpack restriction combined with this note would eliminate the potential for multiple packages of lithium batteries to be consigned in one shipment.

5.5.6 There was discussion on also reducing the quantity of cells or batteries permitted in a package from eight cells/two batteries to four cells/one battery. Although there was some support for this

reduction, the majority believed the current limitations were appropriate given the significant improvements to safety that were provided by reducing the state of charge for lithium ion batteries (see paragraph 5.4). While agreeing the limit to state of charge was a significant mitigating measure for lithium ion batteries, those supporting a reduction in the number of cells or batteries in a package argued that additional mitigating measures were needed in light of the fact that there was no guarantee the state of charge limit would be safe for all cells and batteries and no guarantee that all cells and batteries would actually be shipped below this limit, recognizing that shippers of Section II batteries were not subject to the full training requirements of the Technical Instructions. There were also concerns that operators could inadvertently load multiple consignments of Section II lithium batteries from different shippers in one location, and reducing the number permitted in a package would reduce this risk. Additionally, limiting the state of charge would only be applicable to lithium ion batteries and not to lithium metal batteries which, although forbidden on passenger aircraft, were permitted on cargo aircraft.

5.5.7 Several panel members maintained that the elimination of Section II was the most appropriate approach. They did not feel confident that the additional restrictions would remove the potential for high-density batteries to be loaded in one cargo compartment location. This was of particular concern when considering the FAA Technical Center had demonstrated that as little as three lithium batteries involved in a fire could compromise the ability of an aircraft's fire protection system. They also had concerns with the fact that those shipping Section II batteries were only required to receive undefined "adequate instruction" and were not subject to the full training requirements of the Technical Instructions. They questioned whether shippers who only had "adequate instruction" would be able to fully comply with the Section II provisions, including the new requirement for 30 per cent state of charge (see paragraph 5.4). These members did not believe the additional restrictions would eliminate the risks lithium batteries posed and believed an acceptable level of safety would not be achieved.

5.5.8 All panel members agreed that limiting the number of packages per consignment to one and allowing only one package of Section II batteries to be placed in an overpack combined with a reduced state of charge requirement for lithium ion batteries (see paragraph 5.4) was significantly safer than what the current transport requirements provided. The revised amendment which retained Section II with additional restrictions was agreed by the majority of members.

5.5.9 The panel agreed that the amendments to Section II and the requirement for a reduced state of charge should be incorporated in the current edition of the Technical Instructions by way of an addendum as they addressed risks to safety. In the event that the Council would approve the amendments, the panel discussed what would be an appropriate implementation date. Some felt immediate implementation was necessary, believing that there were currently unmitigated risks. Representatives of the battery industry outlined the complex process that would need to be undertaken throughout the supply chain to make batteries compliant with the new provisions, particularly in relation to the reduced state of charge. Panel members, however, did not support delaying implementation of these significant safety measures in response to industry needs. All panel members agreed that the amendments should become applicable as soon as possible after Council approval. They agreed that ninety days after Council approval but not earlier than 1 April 2016 would be appropriate. The battery industry representatives emphasized that adoption of this implementation date was setting the industry up to fail. Panel members noted that shippers not able to comply with the revised provisions would need to find alternate means of transport as was the case for any item of dangerous goods which could not be prepared for transport in accordance with established regulations. The Secretary emphasized that she would bring the panel's recommendation for a 1 April 2016 applicability date to the ANC and the Council, but that it would be ultimately up to the Council to decide on a date.

5.6 MITIGATION MEASURES FOR LITHIUM BATTERIES ON ALL-CARGO AIRCRAFT (DGP/25-WP/23)

5.6.1 Additional restrictions for the loading of UN 3090 — **Lithium metal batteries** and UN 3480 — **Lithium ion batteries** were proposed for inclusion in Part 7;2 of the Technical Instructions. The proposer acknowledged that while lithium metal batteries were forbidden on passenger aircraft and additional restrictions for lithium ion batteries on passenger aircraft were being considered, risks posed by lithium batteries on cargo aircraft could not be ignored. Significant quantities of both types of batteries were transported on all-cargo aircraft and these aircraft generally carried batteries in larger quantities than on passenger aircraft in cargo compartments that did not necessarily have the same fire suppression capability as was available on most passenger aircraft. On the basis that there had been a lack of support for previous proposals prohibiting lithium metal and lithium ion batteries as cargo on all-cargo aircraft and recognizing that performance-based standards would take some time to develop, temporary measures pending a comprehensive solution that would mitigate hazards were proposed. These included requirements that batteries be loaded in a Class C aircraft cargo compartment or a compartment with the most capable fire suppression system, segregation from other dangerous goods, and separation from other lithium battery shipments in an effort to reduce battery density in a single location.

5.6.2 Because of extensive and lengthy discussions devoted to the development of mitigating measures to address risks associated with the transport of lithium ion batteries as cargo on passenger aircraft, time for a comprehensive discussion on this proposal was limited. The presenter, while maintaining his position that a ban on the transport of lithium ion batteries as cargo on passenger aircraft was the only mitigating measure that would achieve an acceptable level of safety for passenger aircraft, acknowledged that the measures agreed by the panel would improve safety and was encouraged that they would also apply to cargo aircraft. Nevertheless, the presenter believed additional measures to address cargo aircraft were necessary to take into account the larger quantities transported and the fire suppression capabilities available to such aircraft.

5.6.3 While there was strong support for the new provisions proposed for inclusion in Part 7;2 in principle, the panel believed they should be less prescriptive and more performance-based so as to allow for flexibility in achieving their intent. It was recognized that different operators would have different mitigating tools available to them based on the size of their operation and the types of cargo compartments and fire suppression systems available on their aircraft. The provisions would also need to provide enough flexibility to allow for the use of fire containment covers, fire resistant containers and unit load devices that could contain or suppress a lithium battery fire. It was noted that the ability to reduce the density of batteries at any single location would be difficult if not impossible when it came to consignments of excepted lithium batteries (Section II) since they were not subject operator acceptance checks. While the need for segregation from other dangerous goods was supported, it was suggested that such provisions should be aligned with other dangerous goods segregation requirements in Part 7;2.2. It was further suggested that some of the operational controls for loading lithium batteries extended beyond the purview of the DGP and that other panels should be consulted on the issue.

5.6.4 A decision on adopting an amendment was not taken due to the limited time available to address the comments raised by panel members. Discussions would continue during the next biennium.

5.7 CLARIFICATION ON THE ASSIGNMENT OF UN NUMBERS TO VEHICLES POWERED BY LITHIUM BATTERIES (DGP/25-WP/25)

5.7.1 It was noted that Packing Instructions 950 (UN 3166 assigned to flammable liquid powered vehicles (as proposed in DGP/25-WP/13)), 951 (UN 3166 assigned to flammable gas powered vehicles (as proposed in DGP/25-WP/13)) and 952 (UN 3171 assigned to battery-powered vehicles and equipment (as proposed in DGP/25-WP/13)) referred to lithium batteries installed in a vehicle, machine or equipment having to meet the provisions of Part 2;9.3. The wording in the introductory text of Part 2;9.3, however, suggested that lithium batteries of any configuration must be assigned to UN 3090 — Lithium metal batteries, UN 3091 — Lithium metal batteries packed with or contained in equipment, UN 3480 — Lithium ion batteries or UN 3481 — Lithium ion batteries packed with or contained in equipment with no mention of UN 3166 or UN 3177. An amendment to the packing instructions which removed reference to the introductory text of Part 2;9.3 and focused on the subparagraphs of the provision was agreed.

5.8 REVISIONS TO SPECIAL PROVISION A181 (DGP/25-WP/26)

5.8.1 It was noted that Special Provision A181 specified what marking was required on a package containing both lithium batteries packed with and lithium batteries contained in equipment and also what marking was required on a package containing both lithium metal and lithium ion batteries. The special provision did not, however, specify what description was required on the dangerous goods transport document, which part of which packing instructions applied, or what quantity limits applied. New text was proposed for inclusion in Special Provision A181 to address this. Recognizing that batteries packed in accordance with Section II of Packing instructions 966 for lithium ion batteries packed with equipment and 969 for lithium metal batteries packed with equipment were not subject to other parts of the Instructions and therefore Special Provision A181 would not apply, similar text was proposed for inclusion in both packing instructions.

5.8.2 It was agreed that new provisions indicating that packages containing both lithium metal and lithium ion batteries were subject to the “Q” value requirements in Parts 4;1.1.9 and 5;4.1.5.8 were redundant. The amendment, subject to the removal of the references to “Q” value requirements, was agreed.

5.9 ACTIVE BAGGAGE TAGS FITTED WITH LITHIUM BATTERIES (DGP/25-WP/31)

5.9.1 An amendment to the passenger provisions in Table 8-1 was proposed which specifically referenced electronic baggage tags in the entry for portable electronic devices. The nature of some of these devices required them to be active during transport and lithium batteries were often used for this purpose. It was noted that Section II of Packing Instructions 967 and 970 allowed lithium battery powered devices meeting industry standards to be active during transport, but that no such allowance was provided in the passenger provisions. The amendment proposed was based on existing provisions of Packing Instructions 967 and 970 and also included requirements for the device to be certified to a specified standard or to a national equivalent of that standard.

5.9.2 There was agreement that there were two issues that needed to be addressed. One related to the provisions for passengers and crew in Part 8 of the Technical Instructions and the other related to electronic interference with aircraft systems.

5.9.3 With respect to the passenger provisions, several panel members commented on efforts to move away from introducing an exhaustive list of articles into Table 8-1 and to instead re-organize the list by grouping articles more generically. The proposal, however, was adding another entry to the table even though there was already an entry that addressed lithium batteries. On the other hand, these articles were unique in that the provisions for passengers and crew allowed for dangerous goods in checked baggage, carry-on baggage or on the person while the active baggage tags were intended to be attached to the outside of baggage. This made the potential for damage to the battery a concern. Although it was recognized that the batteries were very small and would not likely pose a risk if damaged, predicting where technology would evolve and whether or not the size and characteristics of the battery would change was impossible to do. Although a requirement for the device to be certified was supported in principle, it was reported that there were already different technologies and different standards around the world and it would be difficult to require one standard that would apply to all. The attractiveness of having such a device was understood, as losing luggage was a reality of travel and the device was an effective way to prevent this from happening.

5.9.4 With respect to the potential for electronic interference, it was agreed that addressing this problem was beyond the purview of the DGP. The Secretary would advise the FLTOPSP Secretary and the ANC of the issues raised and report back to the DGP.

5.9.5 An ad hoc working group met to address comments raised during discussion. The group developed a revised proposal which replaced the reference to a specific standard to instead refer more generically to defined standards for electromagnetic radiation to ensure that the operation of the device did not interfere with aircraft systems. The provision was based on existing provisions in Packing Instructions 967 and 970 for active devices such as radio frequency identification tags which also referred to defined standards for electromagnetic radiation. The revised proposal also increased the lithium metal content limit provided in the original proposal (0.3 grams) to 1 gram with the recognition that there were products containing these larger quantities on the market and 1 gram was less than what was currently permitted for passengers carrying portable electronic devices containing lithium metal batteries.

5.9.6 The revised amendment was agreed.

5.10 **REVIEW OF THE MEANING OF “EQUIPMENT” FOR THE PURPOSES OF LITHIUM BATTERIES PACKED WITH AND CONTAINED IN EQUIPMENT (DGP/25-WP/33)**

5.10.1 Confusion with respect to what constituted equipment for the purpose of determining whether an article should be considered as a battery and assigned to UN 3090 — **Lithium metal batteries** or UN 3480 — **Lithium ion batteries** or if it was equipment and assigned to UN 3091 — **Lithium metal batteries packed with or contained in equipment** or UN 3481 — **Lithium ion batteries packed with or contained in equipment**. It was noted that battery chargers for lithium ion batteries were often consigned as UN 3481 — **Lithium ion batteries packed with equipment** and suggested that this was inappropriate. An amendment to Packing Instructions 966, 967, 969 and 970 was proposed to clarify that an article must be powered by the lithium batteries contained in it or packed with

it in order for it to be considered as UN 3091 or 3481. The proposed new text was included in the introductory part of the packing instructions so that it would apply to all sections.

5.10.2 While there was an objection to the proposal raised by a representative of the battery industry, none were raised by panel members. It was noted that an informal paper was submitted to the 47th Session of the UN Sub-Committee which was well received, and a formal proposal had been submitted to its 48th Session. Recognizing that waiting for a decision from the UNCOE would mean an amendment to the Technical Instructions would only be applicable in the 2019-2020 Edition, the panel agreed to adopt the amendment before it was considered at the UN. The panel did not see this to be an issue as the amendment did not introduce any new requirements, it simply clarified the intent of existing ones. The amendment was agreed.

5.11 **EMERGENCY LOCATING BEACONS WHEN CARRIED BY PASSENGERS (DGP/25-WP/38)**

5.11.1 A new sub entry under “Portable electronic devices” was proposed to allow for personal portable emergency location devices containing lithium metal cells or batteries exceeding the lithium content limits imposed on other portable electronic devices. It was suggested that this new provision was justified on the basis that it was a life-saving device and there was precedence for allowing higher lithium content for other life-saving devices under the entry for “Portable medical electronic devices containing lithium metal cells or batteries”. Provisions for other life-saving devices were also included with the passenger provisions such as avalanche rescue packs and inflatable life jackets. It was noted that passengers were currently carrying emergency personal location beacons powered by lithium metal batteries with a lithium content exceeding the 2 g limit imposed for portable electronic devices. The proposer believed that enabling the lawful carriage of the devices in a way that enabled operators to monitor the risk would benefit safety. Accordingly, the proposed provision included a requirement for operator approval and restricted the carriage to devices intended for personal use. Provisions for spare batteries were not included, recognizing that the emergency locating beacons were designed to be powered by batteries with a long shelf life.

5.11.2 There was little support for the proposal. Although it was recognized that higher limits for lithium batteries were allowed for medical needs, the panel did not agree that there was justification in categorizing this device the same way as they were not essential to health. Panel members stressed the importance of regulating based on safety considerations and not market needs. In any event, results of research conducted in one State on the types of emergency location devices on the market today indicated that the lithium metal content of most of them fell within the current limits for portable electronic devices.

5.11.3 The panel also reiterated its position on moving away from attempting to create an exhaustive list of dangerous goods permitted to be carried by passengers and crew in Table 8-1 but rather to re-organize by grouping articles more generically.

5.11.4 The amendment was not agreed.

5.12 **LITHIUM METAL BUTTON CELLS (DGP/25-WP/39)**

5.12.1 The meeting was invited to consider methods for distinguishing lithium metal button cells from other types of lithium metal cells. It was noted that test results had demonstrated small lithium metal

button cells containing up to .3 g of lithium metal did not present the same level of risk that other larger batteries did in that a thermal runaway event did not propagate from one button cell to the next as had been demonstrated to be the case with larger cells. The Second International Multidisciplinary Lithium Battery Transport Coordination Meeting concluded that these button cells might not present a significant hazard in transport and recommended that a method be established to distinguish lithium metal button cells from other types of lithium metal cells (Recommendation 14/14).

5.12.2 Asking the UNCOE to consider a new entry in the dangerous goods list for lithium metal button cells had been raised as a potential method of creating more granularity to distinguish between cells which posed different risks at past DGP meetings. It was suggested, however, that this would introduce a relatively lengthy timeframe for adoption and that an alternate approach whereby additional light-type text was added to the proper shipping name could be applied in the Technical Instructions in the same manner as what had been applied to aerosol entries. Recognizing that test results demonstrating no thermal propagation between cells applied to cells with less than 0.3 g lithium content, it was further suggested that this 0.3 g limit be specified within the additional light-type text. It was suggested that a maximum net quantity per package of 35 kg on cargo aircraft and 5 kg on passenger aircraft would be appropriate.

5.12.3 A special provision excepting lithium metal button cells from the Technical Instructions was developed for packages with a maximum net quantity per package of not more than 1 kg. The meeting was also asked to consider whether provisions for de minimis quantities of lithium metal button cells which would not be subject to the Instructions would be appropriate. Recognizing that the current provisions for de minimis quantities were based on excepted quantity codes and that excepted quantity provisions did not apply to articles, a separate section in Part 3;5.6 based on the current de minimis provisions was developed for consideration by the panel.

5.12.4 Recognizing that any method to distinguish lithium metal button cells from other types of lithium metal cells would require an understanding of what constituted a button cell, it was proposed to include the definition for button cell provided in Section 38.3 of the UN *Manual of Tests and Criteria* in Part 1;3 of the Technical Instructions.

5.12.5 Although there was support in principle for establishing a mechanism to distinguish small lithium metal button cells which had been shown to present the same level of risk that other batteries posed, there was little support for the approach taken in the working paper. Several members found the varying levels of regulation to be overly complicated and some were strongly opposed to the provisions that would except small quantities of such batteries from the Instructions. Some members, while supporting the eventual adoption of provisions that would allow for the transport of these batteries on passenger aircraft until the regulations for all batteries were more stable and believed consideration of such provisions should only be given once performance-based packaging standards were developed. It was suggested that the performance-based packaging standards would potentially allow for the transport of button cells without having to address them uniquely.

5.12.6 While requesting the UN Sub-Committee to introduce a new UN number for button cells in the dangerous goods list had been raised as an approach to distinguish button cells from other batteries and cells in the past, it was suggested that the Sub-Committee might not support such an approach as it was normally cautious when introducing new entries. The Chairman of the UN Sub-Committee also expressed caution in bringing forward any proposals to the UN to create new entries with a view towards creating further exceptions within transport regulations.

5.12.7 Comments raised during the discussion would be taken into account and incorporated in a formal proposal during the next biennium.

5.13 **DANGEROUS GOODS INCIDENT INVOLVING LITHIUM BATTERIES (DGP/25-IP/1)**

5.13.1 The meeting was informed of a dangerous goods incident involving lithium ion batteries that resulted in a fire. Smoke was detected after the cargo had been unloaded from the aircraft while it was being placed on a wooden pallet. It emanated from one box contained in a woven plastic bag which was one of several from a consignment on the aircraft pallet.

5.13.2 The investigation of the incident revealed that:

- a) documentation which indicated that the battery was of a type that had been subjected to the tests specified in the UN *Manual of Tests and Criteria* appeared to be counterfeit. It was suggested that this indicated an unlikelihood that the battery type had been subjected to the required tests;
- b) The air waybill incorrectly indicated the consignment contained lithium ion batteries packed with equipment when they were in fact lithium ion batteries packed on their own. The operator which carried the batteries prohibited lithium ion batteries on their own. It was suggested that statement on the air waybill may have been deliberate to avoid that operator's prohibition;
- c) The lithium battery handling labels visible on the outer plastic woven bags were not the correct specification and did not provide the required information; and
- d) It was likely that the cause of the battery igniting was due to the way in which it was handled. It was suggested that the handling was not such that it would be expected to cause a fire involving a battery that was of a type that passed the required tests.

5.13.2.1 The panel expressed its appreciation for receiving the information on this incident. Members noted that wilful non-compliance was an on-going concern that needed to be addressed through effective enforcement. The complexity of the supply chain for lithium batteries, however, made effective oversight and appropriate enforcement measures difficult to achieve. There were numerous entities who needed to play a role in achieving compliance, including cell manufacturers, battery manufacturers, and all manufacturing entities who used these cells or batteries downstream. These could potentially be from different States and were often beyond the scope of CAAs oversight responsibilities. The Secretary raised concern with the level of responsibility members of the battery industry were expecting of civil aviation authorities, recognizing that aviation authorities did not typically have any oversight authority over manufacturing entities in their States. Recognizing that the manufacturing process was critical to safety, ensuring entities that did have the authority were providing effective oversight was something that needed to be addressed. She noted that while so much emphasis was placed on complying with the applicable tests in the *Manual of Tests and Criteria*, there was no mechanism for entities down the supply chain to ensure that these test requirements had been met.

5.13.2.2 A representative of the battery industry noted that members of his association were very sensitive to the issue of non-compliance and took measures to ensure non-compliant entities were not part

of their supply chain. He noted that his association had started a list to document shippers who appeared to have knowingly violated the dangerous goods regulations. He suggested that effective reporting was critical to this process and welcomed panel members to report all incidents of non-compliance to his organization.

5.14 RECOMMENDATIONS

5.14.1 In light of the foregoing discussions, the meeting developed the following recommendations:

Recommendation 5/1 — Development of performance-based packaging standards for the safe transport of lithium batteries as cargo by air

That performance-based packaging standards for the safe transport of lithium batteries as cargo by air be developed as a matter of priority by an external standard-setting organization with the participation of experts in the fields of dangerous goods, flight operations, airworthiness and lithium battery technology.

Recommendation 5/2 — Development of guidance material for operators and regulators on how to conduct and evaluate a safety risk assessment for the transport of lithium batteries by air

That a joint working group composed of experts in the fields of dangerous goods, flight operations, airworthiness and safety management be established and tasked developing guidance material for operators and regulators on conducting and evaluating a safety risk assessment for the transport of lithium batteries by air.

Recommendation 5/3 — Amendment to lithium battery provisions for incorporation in the 2017-2018 Edition of the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284)

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

Recommendation 5/4 — Amendment to lithium battery provisions for incorporation in the 2015-2016 Edition of the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) to address immediate safety concerns

That provisions related to lithium batteries be amended as indicated in Appendix B to the report on this agenda item and incorporated in the 2015-2016 Edition of the Technical Instructions by way of an addendum.

APPENDIX A

**PROPOSED AMENDMENTS TO PROVISIONS RELATED TO
LITHIUM BATTERIES IN THE TECHNICAL INSTRUCTIONS FOR
THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR**

Part 3

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

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Table 3-2. Special provisions

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UN Model Regulations, SP 310, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2.1 f))
and DGP/25-WP/13 (see paragraph 2.3.1.1 c) of this report)

A88

Pre-production 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) of 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~~
- ~~d) a copy of the document of approval showing including 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.

 TIs UN

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 UN Model Regulations, SP 384, ST/SG/AC.10/42/Add.1, DGP/25-WP/3 (see paragraph 3.2.3.2.1 k)) and DGP/25-WP/13

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.

 DGP/25-WP/26 (see paragraph 5.8 of this report)

A181 When a package contains a combination of lithium batteries contained in equipment and lithium batteries packed with equipment, the following requirements apply:

- a) the shipper must ensure that all applicable parts of both packing instructions are met. The total mass of lithium batteries contained in any package must not exceed the limits for passenger aircraft or cargo aircraft, as applicable;
- b) the package must be marked UN 3091 **Lithium metal batteries packed with equipment**, or UN 3481 **Lithium ion batteries packed with equipment**, as appropriate. If a package contains both lithium metal batteries and lithium ion batteries packed with and contained in equipment, the package must be marked as required for both battery types. However, button cell batteries installed in equipment (including circuit boards) need not be considered-;
- c) the dangerous goods transport document must indicate UN 3091 **Lithium metal batteries packed with equipment** or UN 3481 **Lithium ion batteries packed with equipment**, as appropriate. If a package contains both lithium metal batteries and lithium ion batteries packed with and contained in equipment, then the dangerous goods transport document must indicate both UN 3091 **Lithium metal batteries packed with equipment** and UN 3481 **Lithium ion batteries packed with equipment**.

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Part 4**PACKING INSTRUCTIONS**

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

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DGP/25-WP/25 (see paragraph 5.7 of this report)

Packing Instruction 950

Passenger and cargo aircraft for UN 3166 only
(See Packing Instruction 951 for flammable gas-powered vehicles and engines or
Packing Instruction 952 for battery-powered equipment and vehicles)

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 [subparagraphs a\) to e\) of Part 2;9.3.1](#), unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, 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.

Packing Instruction 951

Cargo aircraft only for UN 3166 only
(See Packing Instruction 950 for flammable liquid-powered vehicles and engines or
Packing Instruction 952 for battery-powered equipment and vehicles)

...

ADDITIONAL PACKING REQUIREMENTS

...

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle, machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

- 1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;
- 2) if lithium batteries are installed, they must meet the provisions of [subparagraphs a\) to e\) of Part 2;9.3.1](#), unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and
- 3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

...

Packing Instruction 952

Passenger and cargo aircraft for UN 3171 only
(See Packing Instruction 950 for flammable liquid-powered vehicles and engines or
Packing Instruction 951 for flammable gas-powered vehicles and engines)

...

ADDITIONAL PACKING REQUIREMENTS

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle, machine or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

- 1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;
- 2) if lithium batteries are installed in a vehicle, they must meet the provisions of [subparagraphs a\) to e\) of Part 2;9.3.1](#), unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle and must be protected in such a manner so as to prevent damage and short circuits; and
- 3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

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Packing Instruction 965

Passenger and cargo aircraft for UN 3480

UN Model Regulations, SP 188, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3
(see paragraph 3.2.4.1.1 d))

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.

4A.1 General requirements

- Part 4:1 requirements must be met.
- Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity. Cells and/or batteries at a state of charge greater than 30 per cent of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

Note.— Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN Manual of Tests and Criteria.

Table 965-IA

UN number and proper shipping name	Net quantity per package	
	Passenger	Cargo
UN 3480 Lithium ion batteries	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.

Packing Instruction 965

- Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

IA.3 Outer packagings

Boxes

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

Drums

Aluminium (1B2)
Fibre (1G)
Other metal (1N2)
Plastics (1H2)
Plywood (1D)
Steel (1A2)

Jerricans

Aluminium (3B2)
Plastics (3H2)
Steel (3A2)

Editorial amendment in first paragraph under IB was incorporated in 2015-2016 Edition by way corrigendum

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 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).
- Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity. Cells and/or batteries at a state of charge greater than 30 per cent of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

Note.— Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN Manual of Tests and Criteria.

Table 965-IB

Contents	Net quantity per package	
	Passenger	Cargo
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 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.

UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.2.5.1.1 b) and c))

- Each package must be ~~labelled~~ marked with ~~a the appropriate~~ lithium battery handling label mark (Figure ~~5-32~~ 5-3) in addition to the appropriate 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 and DGP/25-WP/3 (see paragraph 3.2.4.1.1)

- 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

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/25-WP/3 (see paragraphs 3.5.1.4.1 and paragraph 3.5.1.1.1)

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~~
- ~~— Paragraphs 1 and 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).~~
- ~~— Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity.~~

Note.— Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN Manual of Tests and Criteria.

Table 965-II

Contents	<i>Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh</i>	<i>Lithium ion cells with a Watt-hour rating more than 2.7 Wh, but not more than 20 Wh</i>	<i>Lithium ion batteries with a Watt-hour rating more than 2.7 Wh, but not more than 100 Wh</i>
1	2	3	4
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

The limits specified in columns 2, 3 and 4 of Table 965-II must not be combined in the same package.

Packing Instruction 965

UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.5.1.1.1, 3.2.4.1, 3.2.5.1.1 b) and c)) and

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 and DGP/25-WP/3 (see paragraph 3.2.4.1)

- ~~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.~~
- A shipper is not permitted to offer for transport more than one package prepared according to this section in any single consignment.
- 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/25-WP/3 (see paragraph 3.5.1.1.1)

- 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/25-WP/3 (see paragraph 3.5.1.1.1)

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/25-WP/3 (see paragraph 3.5.1.1.1) (pending outcome of working group on performance standards) and DGP/25-WP/3 (see paragraph 3.2.5.1.1 b))

II.4 Overpacks

Not more than one package prepared in accordance with this section may be placed into an overpack. When the packages ~~are~~ is 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".

Note.— For the purpose of Section II, an overpack is an enclosure used by a single shipper that contains no more than one package prepared in accordance with this section. For shipments prepared in accordance with Section IA and/or IB, this limit of one package of Section II batteries per overpack still applies.

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/25-WP/3
(see paragraph 3.2.4.1.1 d))

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.

DGP/25-WP/33 (see paragraph 5.10 of this report)

For the purpose of this packing instruction, "equipment" means apparatus for which the lithium cells or batteries will provide electrical power for its operation.

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.

UN number and proper shipping name	Package quantity (Section I)	
	Passenger	Cargo
UN 3481 Lithium ion batteries packed with equipment	5 kg of lithium ion cells or batteries	35 kg of lithium ion cells or batteries

Packing Instruction 966

I.2 Additional requirements

- Lithium ion cells and batteries must be protected against short circuits.
- Lithium ion cells or batteries must:
 - be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements; or
 - be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a 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.

I.3 Outer packagings

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

DGP/25-WP/3 (see paragraph 3.5.1.4.1)

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~~
- ~~— Paragraphs 1 and 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).

Packing Instruction 966

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

DGP/25-WP/3 (see paragraph 3.5.1.1.1) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b and c))

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 and DGP/25-WP/3 (see paragraph 3.2.4.1)

- ~~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.

DGP/25-WP/26 (see paragraph 5.8 of this report)

- Where a package contains a combination of lithium batteries contained in equipment and lithium batteries packed with equipment that meet the limits for lithium cells or batteries of Section II, the following additional requirements apply:
 - the shipper must ensure that all applicable parts of both packing instructions are met. The total mass of lithium batteries contained in any package must not exceed 5 kg;
 - 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.

Packing Instruction 966

DGP/25-WP/3 (see paragraph 3.5.1.1.1):

II.3 Outer packagings

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

~~Strong outer packagings~~

DGP/25-WP/3 (see paragraph 3.2.5.1.1 b))

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/25-WP/3 (see paragraph 3.2.4.1.1 d))

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.](#)

DGP/25-WP/33 (see paragraph 5.10 of this report)

[For the purpose of this packing instruction, "equipment" means apparatus for which the lithium cells or batteries will provide electrical power for its operation.](#)

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).

Packing Instruction 967

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 Lithium ion batteries contained in equipment	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

DGP/25-WP/3 (see paragraph 3.5.1.4.1)

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~~
- ~~— Paragraphs 1 and 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.

Packing Instruction 967

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).

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

DGP/25-WP/3 (see paragraph 3.5.1.1.1) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b and c)):

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 and DGP/25-WP/3 (see paragraph 3.2.4.1)

- ~~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.

Packing Instruction 967

DGP/25-WP/3 (see paragraph 3.5.1.1.1):

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/25-WP/3 (see paragraph 3.2.5.1.1 b))

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/25-WP/3
 (see paragraph 3.2.4.1.1 d))

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.

Packing Instruction 968

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 Lithium metal batteries	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.

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.

Packing Instruction 968

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 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.

UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.2.5.1.1 b) and c))

- Each package must be ~~labelled~~ marked with ~~a the appropriate~~ lithium battery handling label mark (Figure 5-32 ~~5-3~~) in addition to the appropriate Class 9 hazard label and the cargo aircraft only label (Figure 5-26 ~~5-28~~).

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 and DGP/25-WP/3 (see paragraph 3.2.4.1)

- ~~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

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/25-WP/3 (see paragraph 3.5.1.4.1)

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~~
- ~~— Paragraphs 1 and 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

<i>Contents</i>	<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/25-WP/3 (see paragraph 3.5.1.1.1) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b) and c))

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 ~~5-28~~).
 - 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 and DGP/25-WP/3 (see paragraph 3.2.4.1) and DGP/25-WP/3 (see paragraph 3.5.1.1.1)

- ~~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.~~
- A shipper is not permitted to offer for transport more than one package prepared according to this section in any single consignment.
- 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/25-WP/3 (see paragraph 3.5.1.1.1):

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/25-WP/3 (see paragraph 3.5.1.1.1) (pending outcome of working group on performance standards) and DGP/25-WP/3 (see paragraph 3.2.5.1.1 b))

II.4 Overpacks

Not more than one package prepared in accordance with this section may be placed into an overpack. When the packages ~~are~~ is placed in an overpack, the lithium battery ~~handling label~~ mark and the cargo aircraft only label (Figure ~~5-26~~ 5-28) 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".

Note.— For the purpose of Section II, an overpack is an enclosure used by a single shipper that contains no more than one package prepared in accordance with this section. For shipments prepared in accordance with Section IA and/or IB, this limit of one package of Section II batteries per overpack still applies.

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/25-WP/3 (see paragraph 3.2.4.1.1 d))

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.

DGP/25-WP/33 (see paragraph 5.10 of this report)

For the purpose of this packing instruction, "equipment" means apparatus for which the lithium cells or batteries will provide electrical power for its operation.

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).

Packing Instruction 969

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 3091 Lithium metal batteries packed with equipment	5 kg of lithium metal cells or batteries	35 kg of lithium metal cells or batteries

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)

Packing Instruction 969

DGP/25-WP/3 (see paragraph 3.5.1.4.1)

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
- Paragraphs 1 and 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.

II.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

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

DGP/25-WP/3 (see paragraph 3.5.1.1.1) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.2.4.1 and 3.2.5.1.1 e))

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.

Packing Instruction 969

UN Model Regulations, SP 188 g), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.4.1)

- ~~— 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.

DGP/25-WP/26 (see paragraph 5.8 of this report)

- ~~— Where a package contains a combination of lithium batteries contained in equipment and lithium batteries packed with equipment that meet the limits for lithium cells or batteries of Section II, the following additional requirements apply:~~
- ~~— the shipper must ensure that all applicable parts of both packing instructions are met. The total mass of lithium batteries contained in any package must not exceed 5 kg;~~
- ~~— 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.

DGP/25-WP/3 (see paragraph 3.5.1.1.1):

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/25-WP/3 (see paragraph 3.2.5.1.1 b))

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/25-WP/3 (see paragraph 3.2.4.1.1 d))

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.

DGP/25-WP/33 (see paragraph 5.10 of this report)

For the purpose of this packing instruction, "equipment" means apparatus for which the lithium cells or batteries will provide electrical power for its operation.

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 rigid 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 Lithium metal batteries contained in equipment	5 kg of lithium metal cells or batteries	35 kg of lithium metal cells or batteries

I.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
- The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

Packing Instruction 970

I.3 Outer packagings

Boxes

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/25-WP/3 (see paragraph 3.5.1.4.1)

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~~
- ~~— Paragraphs 1 and 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/25-WP/3 (see paragraph 3.5.1.1.1) and UN Model Regulations, SP 188 f), ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraphs 3.2.4.1 and 3.2.5.1.1 b) and c)):

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 and DGP/25-WP/3 (see paragraph 3.2.4.1). Amendment replacing “ion” with “metal” was incorporated in 2015-2016 Edition by way of corrigendum.

- ~~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 metal batteries, in compliance with Section II of P1970” 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/25-WP/3 (see paragraph 3.5.1.1.1):

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/25-WP/3 (see paragraph 3.2.5.1.1 b))

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”.

...

Part 5

SHIPPER'S RESPONSIBILITIES

...

Chapter 2

~~PACKAGE MARKINGS~~ **MARKING**

...

DGP/25-WP/3 (see paragraphs 3.2.5.1.1 b) and c)):

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 preceded by the letters "UN" 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 ion 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:

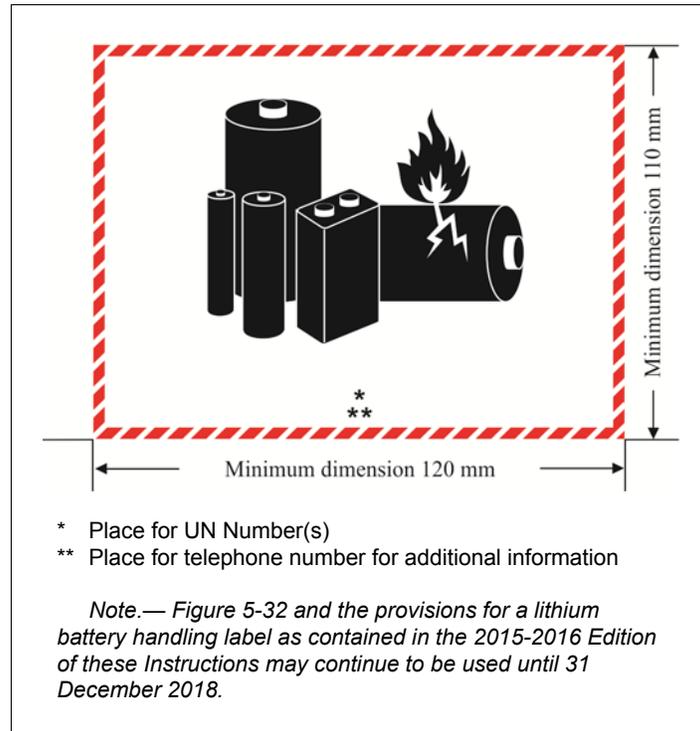


Figure 5-3. Lithium battery mark

Renumber subsequent figures and update references accordingly

...

Chapter 3

LABELLING

...

3.5 LABEL SPECIFICATIONS

3.5.1 Class hazard label specifications

...

3.5.1.1 Labels must satisfy the provisions of this section and conform, in terms of colour, symbols and general format, to the specimen labels shown in Figures 5-3 [5-4](#) to 5-24 [5-26](#).

...

- 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 pictorial symbol on the Class 9 label for lithium cells and batteries (Figure 5-26). 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/25-WP/3 (see paragraph 3.2.5.1)

In addition to new text related to the Class 9 label for lithium batteries, further amendments to subparagraph e) are made for the sake of harmonization with the UN Model Regulations as shown below.

- 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)~~ On labels other than those for material of Class 7, the insertion of any text (other than the class or division number or compatibility group) in the space below the symbol must be confined to particulars indicating the nature of the risk and precautions to be taken in handling. In the case of the Class 9 label for lithium cells and batteries (Figure 5-26), no text other than the class mark must be included in the bottom part of the label.

...

3.5.2 Handling labels

...

UN Model Regulations, paragraph 5.2.1.9, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.5.1.1 b))

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).~~

...

UN Model Regulations, paragraph 5.2.5, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.5.1.1 c))

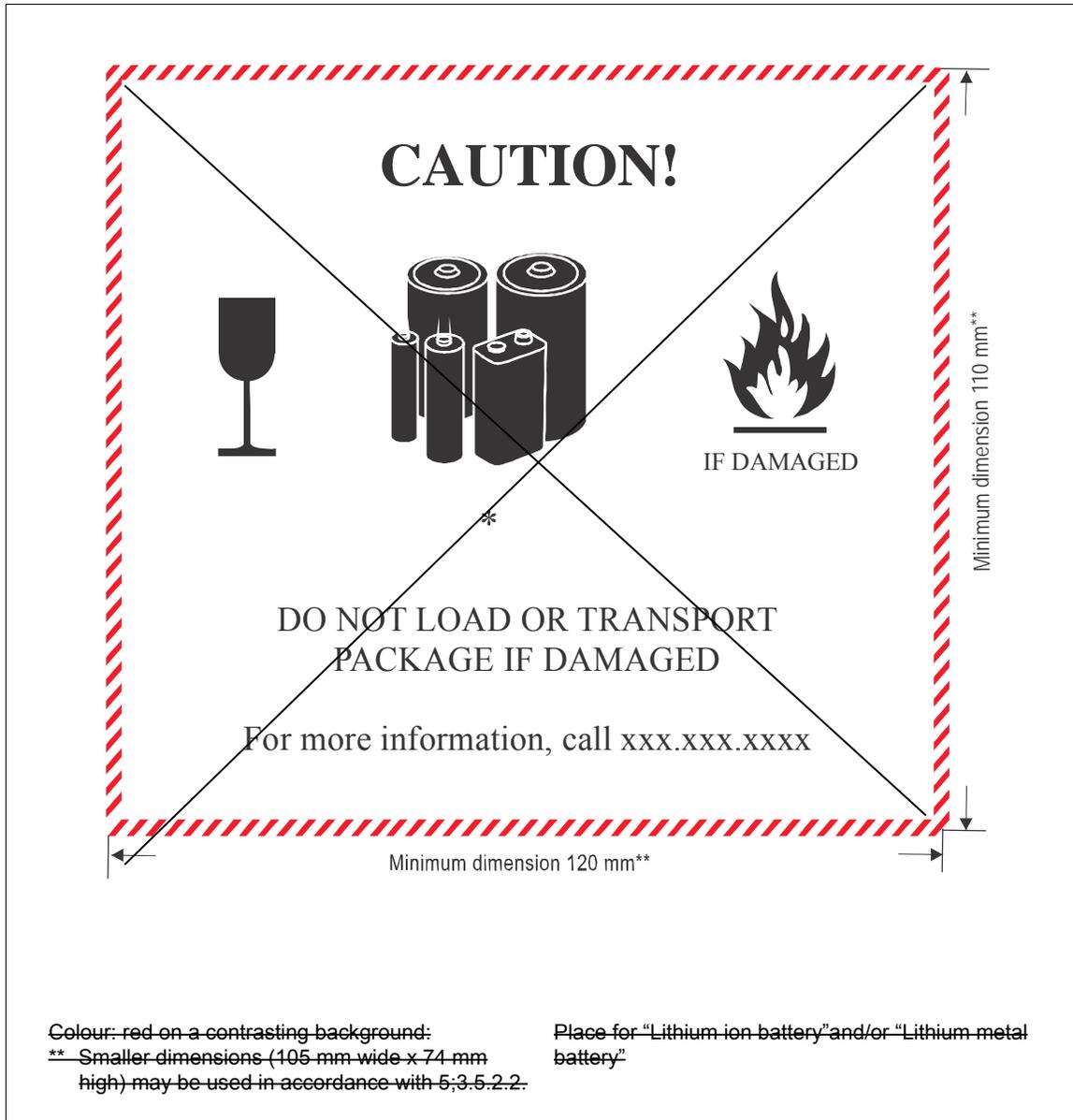


Figure 5-32. Lithium battery handling label

UN Model Regulations, paragraph 5.2.2.2.2, ST/SG/AC.10/42/Add.1 and DGP/25-WP/3 (see paragraph 3.2.5.1)

Insert the following new Figure 5-26:

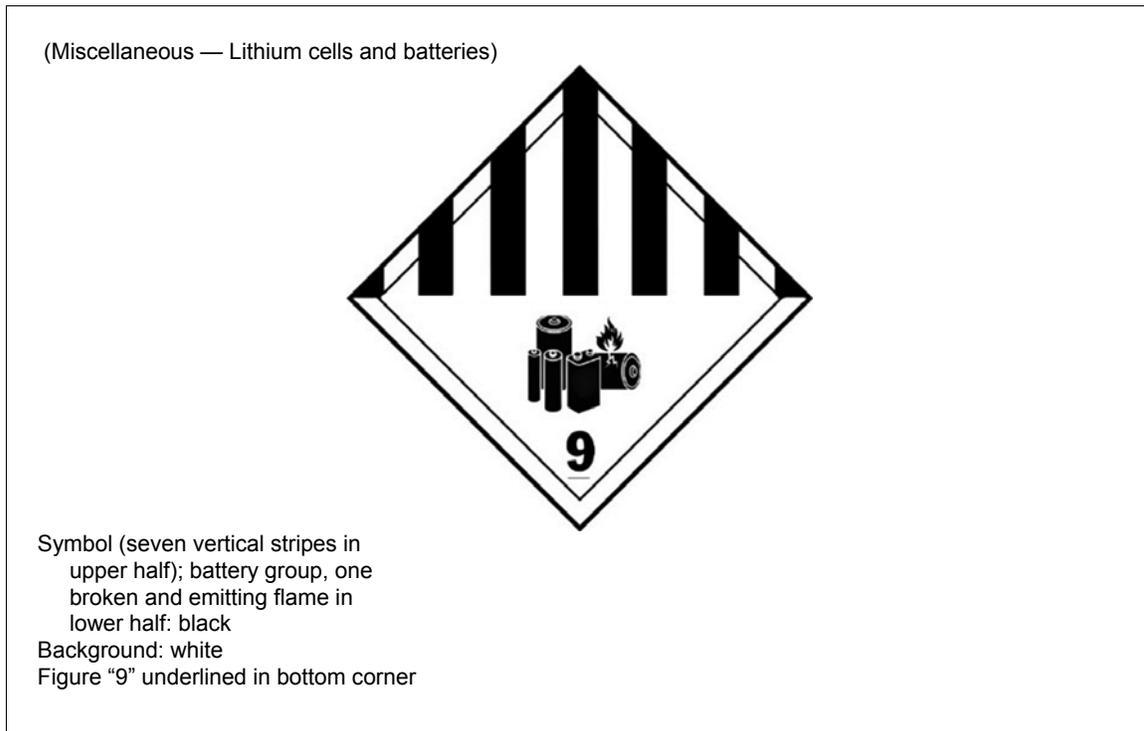


Figure 5-26. Miscellaneous dangerous goods — lithium batteries, Class 9

Renumber subsequent figures accordingly and revise references throughout Technical Instructions as applicable.

...

Part 7

OPERATOR'S RESPONSIBILITIES

...

INTRODUCTORY NOTES

Note 1.— Annex 19 includes safety management provisions for air operators. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859).

Note 2.— The carriage of dangerous goods is included in the scope of the operator's safety management system (SMS).

Note 3.— This Part details the responsibilities of operators with regard to the acceptance, handling and loading of dangerous goods. However, nothing contained herein should be interpreted as requiring an operator to transport a particular article or substance or as preventing an operator from imposing special requirements on the transport of a particular article or substance. Also, nothing in this Part is intended to preclude a ground handling agent from carrying out some or all of the functions of an operator. However, such ground handling agents are subject to the operator's responsibilities of Part 7.

...

Chapter 1

ACCEPTANCE PROCEDURES

...

1.7 CONDUCTING SAFETY RISK ASSESSMENTS

Operators engaged in commercial air transport operations should include a safety risk assessment process for the transport of dangerous goods as part of their approved safety management system to comply with Annex 6 and 19. This safety risk assessment should include appropriate information to result in implementation of safety measures that ensure the safe transport of dangerous goods including lithium batteries and cells as cargo.

...

Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

...

Table 8-1. Provisions for dangerous goods carried by passengers or crew

<i>Items or articles</i>	<i>Location</i>			<i>Approval of the operator(s) is required</i>	<i>The pilot-in-command must be informed</i>	<i>Restrictions</i>
	<i>Checked baggage</i>	<i>Carry-on baggage</i>	<i>On the person</i>			

...

Consumer articles

...

DGP/25-WP/31 (see paragraph 5.9 of this report)

<p>4920) Portable electronic devices (such as watches, calculating machines, cameras, cellular phones, laptop computers, camcorders, <u>electronic baggage tags</u>)</p> <hr/> <p>Portable electronic devices (including medical devices) 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)</p>	Yes	Yes	Yes	No	No	<p>a) carried by passengers or crew for personal use;</p> <p>b) should be carried as carry-on baggage;</p> <p>c) each battery must not exceed the following:</p> <ul style="list-style-type: none"> — for lithium metal batteries, a lithium content of not more than 2 grams; or — for lithium ion batteries, a Watt-hour rating of not more than 100 Wh; <p>d) if devices are carried in checked baggage, measures must be taken to prevent unintentional activation; and</p> <p><u>e) if devices are carried outside the baggage, e.g. electronic baggage tags, the device must provide adequate protection for the battery fitted inside the device;</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			
						<p>f) <u>electronic baggage tags which are not capable of generating a dangerous evolution of heat may be transported when intentionally active. Devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems. Devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport. The device in or on checked baggage must be designed with a minimum of two independent means to turn off completely, turn off cellular or mobile functions, or a combination of both when airborne.</u></p> <p>g) <u>the electronic baggage tag may only contain one lithium battery and the device must not exceed the following:</u></p> <ul style="list-style-type: none"> — <u>for lithium metal batteries and cells, a lithium metal content of 1.0 gram with no cells in the battery or device larger than 0.3 grams; or</u> — <u>for lithium ion batteries and cells, a Watt-hour rating of 2.7 Wh;</u> <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>

...

APPENDIX B

**PROPOSED AMENDMENTS TO PROVISIONS RELATED TO
LITHIUM BATTERIES IN THE TECHNICAL INSTRUCTIONS FOR
THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR
RECOMMENDED FOR INCORPORATION IN THE 2015-2016 EDITION
OF THE TECHNICAL INSTRUCTIONS BY WAY OF AN ADDENDUM**

Packing Instruction 965

Passenger and cargo aircraft for UN 3480

...

IA. SECTION IA

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

4A.1 General requirements

— Part 4;1 requirements must be met.

— Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity. Cells and/or batteries at a state of charge greater than 30 per cent of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

Note.— Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN Manual of Tests and Criteria.

...

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).

— Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity. Cells and/or batteries at a state of charge greater than 30 per cent of their rated capacity may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

Note.— Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN Manual of Tests and Criteria.

...

Packing Instruction 965

II. SECTION II

With the exception of Part 1;2.3 (General — Transport of dangerous goods by post), 5;1.1 g) and j) (Shipper's responsibilities — General requirements), 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.

...

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).
- Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity.

Note.— Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN Manual of Tests and Criteria.

...

II.2 Additional requirements

...

- A shipper is not permitted to offer for transport more than one package prepared according to this section in any single consignment.
- 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.
- 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.

...

II.4 Overpacks

Not more than one package prepared in accordance with this section may be placed into an overpack. When ~~the packages~~ is placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word "Overpack".

Note.— For the purpose of Section II, an overpack is an enclosure used by a single shipper that contains no more than one package prepared in accordance with this section. For shipments prepared in accordance with Section IA and/or IB, this limit of one package of Section II batteries per overpack still applies.

...

Packing Instruction 968

Cargo aircraft only for UN 3090

DGP/25-WP/3 (see paragraph 3.5.1.4.1)

II. SECTION II

...

II.2 Additional requirements

...

- A shipper is not permitted to offer for transport more than one package prepared according to this section in any single consignment.
- 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.

...

II.4 Overpacks

Not more than one package prepared in accordance with this section may be placed into an overpack. When ~~the packages are~~ is placed in an overpack, the lithium battery handling label and the cargo aircraft only label (Figure 5-26) required by this packing instruction must either be clearly visible or the labels must be affixed on the outside of the overpack and the overpack must be marked with the word "Overpack".

Note.— For the purpose of Section II, an overpack is an enclosure used by a single shipper that contains no more than one package prepared in accordance with this section. For shipments prepared in accordance with Section IA and/or IB, this limit of one package of Section II batteries per overpack still applies.

APPENDIX C

PROPOSED AMENDMENTS TO THE SUPPLEMENT TO THE
TECHNICAL INSTRUCTIONS

Part S-3

DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND QUANTITY LIMITATIONS

(ADDITIONAL INFORMATION
FOR PART 3 OF THE
TECHNICAL INSTRUCTIONS)

Chapter 6

SPECIAL PROVISIONS

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Table S-3-4. Special Provisions

Supplementary special provisions

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DGP/25 (see paragraph 5.4.9 of this report)

A331 assigned to UN 3480 in the Supplement

A331 Lithium ion cells or batteries may be offered for transport at a state of charge greater than 30 per cent of their rated capacity with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities. When considering an approval, at a minimum, the following criteria should be considered to mitigate risks posed by a lithium cell or battery heat, smoke or fire event inside a package at the cell, battery or package level:

- a) no hazardous amount of flame is allowed outside the package;
- b) the external surface temperature of the package cannot exceed the amount that would ignite adjacent packing material or cause batteries or cells in adjacent packages to go into thermal runaway;
- c) no hazardous fragments can exit the package and the package must maintain structural integrity; and
- d) the quantity of flammable vapour emitted must be less than the amount of gas that when mixed with air and ignited could cause a pressure pulse that could dislodge the overpressure panels of the aircraft cargo compartment or damage the aircraft cargo compartment liners.

APPENDIX D**HIGH-LEVEL PERFORMANCE STANDARDS DEVELOPED BY THE
THIRD INTERNATIONAL MULTIDISCIPLINARY LITHIUM
BATTERY TRANSPORT COORDINATION MEETING AND
RECOMMENDATIONS FOR INTERIM MEASURES****1. HIGH-LEVEL PERFORMANCE STANDARDS**

1.1 The Third International Multidisciplinary Lithium Battery Transport Coordination Meeting meeting agreed the following standards to be appropriate to mitigate the risks posed by a fire developing inside a package containing lithium batteries or cells and determined that they could be met at either the package or battery/cell level:

- a) No hazardous amount of flame is allowed outside the package;
- b) The external surface temperature of the package cannot exceed the amount that would ignite adjacent packing material or cause batteries or cells in adjacent packages to go into thermal runaway [100°C];
- c) No hazardous fragments can exit the package and the package must maintain structural integrity; and
- d) The quantity of flammable vapour must be less than the amount of gas that when mixed with air and ignited could cause a pressure pulse in a [2.83 m³] volume that could dislodge the overpressure panels of the compartment or damage the cargo liner [3.45 kPa].

Note.— [2.83 m³] volume is representative of the empty volume in the forward cargo compartment of a 737-200 aircraft with a 70 percent cargo load factor which when ignited could cause a pressure pulse that, according to airframe manufacturers' specifications, could dislodge the overpressure panels of the compartment or damage the cargo liner [3.45 kPa].

It could be assumed that smoke released outside the package may not be a consideration if the event is contained within the package.

2. INTERIM RECOMMENDATIONS

2.1 Noting that the development of performance standards could take several years to develop, the meeting was asked to consider interim measures that operators could consider as part of a risk mitigation strategy. The need for a multi-layered mitigation strategy was emphasized.

2.2 The meeting recommended that operators perform a safety risk assessment in order to establish if they could manage the risks associated with the transport of lithium batteries as cargo on passenger or all-cargo aircraft to an acceptable level of safety. In order to perform a safety risk assessment, information on the types and quantities of lithium batteries and cells being transported would

need to be considered. The very limited capabilities of the fire protection system in a lithium battery fire event would also need to be considered.

2.3 The meeting also recommended that guidance on how to conduct and evaluate a safety risk assessment be developed for operators and regulators.

2.4 **Mitigation measures**

2.4.1 Some mitigation measures were suggested, including shipping lithium ion batteries at a reduced state of charge and introducing additional cargo loading controls.

Reduced state of charge

2.4.2 The results of tests conducted at the FAA Technical Centre demonstrated that propagation of thermal runaway did not occur for the majority of cells tested when the state of charge was reduced to 30 per cent. Representatives of the battery industry reported, however, that a 30 per cent state of charge was not appropriate for all battery types and that reducing it to that level could introduce a new safety risk if the battery was not shipped from origin to final destination within a short period of time as their test results had shown the potential for cell degradation at lower states of charge for certain cells and batteries. Regardless, there was agreement that transporting lithium ion batteries at a reduced state of charge could be an effective mitigation measure for certain cells and batteries, whilst recognizing that regulating and overseeing this type of a measure would be difficult.

Cargo loading controls

2.4.3 Other interim measures suggested included additional cargo loading controls such as limiting the number of batteries loaded in one place and segregating them from other dangerous goods. The feasibility of implementing such measures for batteries shipped under Section II of the packing instructions for lithium batteries was raised, recognizing that these batteries are not fully declared dangerous goods. Likewise, illegally undeclared and both intentionally and unintentionally misdeclared lithium batteries effected the feasibility of implementing such measures. The subject of Section II batteries and misdeclared/undeclared batteries was also raised in relation to safety risk assessments and risk mitigation and whether or not an operator could perform an effective assessment and implement effective mitigation measures without knowing what quantities or types of batteries were being offered for transport.

2.4.4 Loading lithium batteries under fire resistant containment covers or unit load devices equipped with fire suppression systems was considered as another potential mitigation measure, although the FAA Technical Centre test results demonstrating the potential for flammable gases emitted from venting lithium ion cells to collect, ignite and result in an explosion in closed compartments needed to be considered. Further testing by the FAA Technical Centre revealed that the gas vented from eight 18650 cells was enough to cause such a condition. It was reported, however, that new developments in fire resistant containment covers and ULD construction for freighter aircraft were showing the potential to safely contain the hazards from lithium ion cells.

- Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:**
- 6.1: Development of a global framework for the sharing of dangerous goods incident and accident information**

**6.1.1 REPORT OF THE DANGEROUS GOODS PANEL
WORKING GROUP ON REPORTING**

6.1.1.1 Work on the development of a dangerous goods incident reporting system began following the Twenty-Third Meeting of the DGP at the request of the Air Navigation Commission (ANC) during its review of the report of the First Dangerous Goods Panel (DGP) Working Group of the Whole on Lithium Batteries Meeting (Montréal, 6 to 10 February 2012) (DGP-WG/LB/1). The working group had initially recommended that incidents involving lithium batteries be reported to ICAO for publishing on a publicly-accessible website. It was recognized that such information provided tools for identifying causal factors and potential gaps in regulations. The ANC subsequently asked the Secretariat to consider developing a dangerous goods incident reporting system to extend beyond lithium batteries to all dangerous goods.

6.1.1.2 Work on the system began in an ad hoc working group through correspondence and short face-to-face meetings during panel working group meetings, but it was determined that the work was too complex to progress without a dedicated face-to-face meeting. Accordingly, a DGP Working Group on Reporting was convened in Rio De Janeiro in August 2015.

6.1.1.3 The working group placed much importance on clearly determining the objective of the system. Keeping the ANC's initial directive to develop a system which could be used as a tool to identify causal factors and potential gaps in regulations in mind, the group was not clear on what resulting actions would be expected from this. Would it simply be a source of information for the ICAO Secretariat and its governing bodies or available to Contracting States? Would it be used to determine whether changes to dangerous goods regulations or more training and/or research was necessary? Would it be analysed and evaluated for trend monitoring, or regional or State-based concerns where ICAO could commit additional resources. Should occurrence reporting be limited to dangerous goods accidents and serious incidents; or should it include other occurrences; whilst State Safety Programs were expected to generate information, and which could be electronically transmitted to ICAO; there would be an impost on technical and administrative resources. The group determined that more guidance in this respect was needed from the ANC.

6.1.1.4 Regardless of what was expected of the system, the group considered that the effectiveness of the system would be dependent on the quality and consistency of information provided by States. In looking at the current reporting requirements in Annex 18 and the Technical Instructions, the group identified several gaps between Annex 18 and the Technical Instructions and areas which needed clarification with respect to reporting and oversight responsibilities and decided that addressing these would be the first priority. Harmonizing with applicable provisions in related Annexes was an underlining goal of this exercise, and as such the group worked towards ensuring alignment between Annexes 13 — *Aircraft Accident and Incident Investigation* and Annex 19 — *Safety Management*. This also involved the development of new and revised definitions for terms which would provide sufficient granularity in reporting. The group began developing guidance material on reporting and oversight responsibility for States which was envisaged for incorporation in the Supplement to the Technical Instructions.

6.1.1.5 Draft amendments to Annex 18, the Technical Instructions and the Supplement were more substantial than initially intended, but a significant amount of work was still necessary before having a complete package. For this reason, the group considered that the preferred approach was to inform the panel of its progress and to solicit questions and feedback.

6.1.1.6 There were no objections from the panel to the approach taken by the working group, and it was agreed that the working group would continue developing comprehensive reporting provisions in Annex 18, the Technical Instructions and guidance material for the Supplement.

- Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:**
6.2: Development of competency-based training provisions for dangerous goods

6.2.1 COMPETENCY-BASED TRAINING FOR DANGEROUS GOODS PERSONNEL AND STATE EMPLOYEES (DGP/25-WP/37)

6.2.1.1 Finalized training provisions and guidance material developed by the DGP Working Group on Training were presented to the meeting. The material included revised training provisions for Part 1;4 of the Technical Instructions and guidance material to support it. The guidance material included a competency-based framework for dangerous goods personnel. The material also included a competency framework for State employees for inclusion in the Supplement to the Technical Instructions. It was proposed to include the revised training provisions; in a new Attachment 4 to the Technical Instructions as a transitional measure along with its supporting guidance material. The guidance material would remain in Attachment 4 in future editions of the Technical Instructions, and it was anticipated that the revised training provisions would be moved to Part 1;4, replacing the current Part 1;4 provisions, in the 2019-2020 Edition of the Technical Instructions.

6.2.1.2 Concerns related to a proposed new provision (Part 1;4.1) intended to address entities not assigned responsibilities in the Technical Instruction but for whom dangerous goods training was still required (such as cabin crew) and to clarify that entities involved with handling general (non-dangerous goods) cargo were still required to be trained for awareness of dangerous goods were raised by the panel. It was suggested that requiring dangerous goods training for entities such as freight forwarders who did not handle dangerous goods was beyond the scope of Annex 18 and the Technical Instructions. The group concluded that the scope of Annex 18 was a much broader issue than just training and recommended that it be considered by the full panel. The subject was therefore raised in a separate working paper under Agenda Item 1 (see paragraph 1.3 of this report). The text would be revised during the transition period to reflect the outcome of work on clarifying the scope of Annex 18 and also on input provided by States.

6.2.1.3 Tables 1-4 and 1-5, which included subject matter related to dangerous goods transport with which various categories of personnel should be familiar, were removed from the training provisions in the revised Part 1;4. It was recognized that this would be a significant change since, although these tables were always intended as guidance, they were widely considered to be mandatory requirements and many training programmes around the world had been developed based on these tables. The panel determined, however, that developing competency-based training programmes would make the need for including the table(s) in the Technical Instructions obsolete and that providing them would be a hindrance to the goal of transitioning training programmes from subject-matter to function-driven ones commensurate with responsibilities. Instead, a new matrix tool to aid training developers in determining the knowledge personnel performing specific functions should maintain. It was envisaged that this 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 would reinforce the need to determine training needs commensurate with responsibilities.

6.2.1.4 There were strong objections from removing the tables from one panel member who, although supporting the argument against maintaining the tables in theory, believed they were of value in outlining the minimum training requirements, especially in States and in organizations which did not have

sufficient resources and expertise to determine dangerous goods training needs. He suggested that the revised training provisions would mean that States would need to re-approve training programmes and this would be an onerous task. He also had serious concerns that without the guidance these tables provided, entities would end up with limited training programmes which could negatively affect safety. He therefore suggested that the tables be maintained as a parallel option towards compliance at least until more information on the effectiveness of implementation was gathered.

6.2.1.5 The panel appreciated the concerns raised concerning removal of Tables 1-4 and 1-5 and some members suggested that these highlighted the need for the material to be distributed as widely as possible to States and industry for consideration and comment. Revisions to the material would be made depending on the comments received, and the panel might even determine that a longer than two-year transition period was necessary. It was stressed that the goal of the new requirements was not any different to what the current training requirements were intended to do, i.e. to ensure all employees were trained to perform the dangerous goods duties they were assigned competently. A competency-based approach was one method of achieving this goal, but there was no requirement to employ this approach, only to achieve the intended outcome. Panel members were confident that a function-based approach towards training would result in more competently trained employees than the current provisions which focused on subject matter did.

6.2.1.6 The new provisions put more emphasis on the need for continuous assessment of personnel. There were some concerns that the guidance on assessing personnel, the dangerous goods training programme and the distinction between the two needed to be further clarified. There was some discussion on who was responsible for assessing instructor qualifications and what the scope of the State's role in overseeing this was. It was suggested that this be clarified in the guidance material.

6.2.1.7 A note stating that all training courses should include provisions for dangerous goods carried by passengers and crew was included in the revised training provisions. Because it could be considered not in line with the concept of competency based training, the panel was asked to consider whether or not it should be retained. Some panel members did not support retaining the note. They believed it went against competency-based training principles in that this specific knowledge was not necessary to perform all dangerous-goods related functions competently. Others believed the note should be included as an outreach tool with the recognition that there was potential for all categories of personnel to be passengers. This had been the original reasoning behind recommending training on passenger provisions for all categories of personnel in current Table 1-4. Following much discussion, a revised note which focused on providing information on the provisions for dangerous carried by passengers or crew rather than on personnel being trained was agreed.

6.2.1.8 There were no objections to publishing the proposed revisions to Part 1;4 and the guidance material to support it in a new Attachment 4 to the 2017-2018 Edition of the Technical Instructions. Once approved by the ANC and the Council, the material would also be provided on the ICAO public website for public consultation. Specific questions would be posed to States and industry on areas identified by the panel as needing further consideration. If necessary, revisions to the material would be developed by the DGP Working Group on Training for consideration by the panel based on comments received. If the comments were to suggest a lack of readiness for States and industry to implement the new provisions, consideration would be given to extending the transition period. Otherwise, the revised Part 1;4 training provisions would be proposed for incorporation in the 2019-2020 Edition of the Technical Instructions as mandatory requirements. The guidance material would remain in Attachment 4.

6.2.1.9 The panel also agreed to incorporate the competency framework for State employees in the 2019-2020 Edition of the Supplement to the Technical Instructions. Comments on this framework would also be sought from States through the issuance of a State letter.

Recommendation 6/1 — Amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2017-2018 Edition to include competency-based training provisions

That provisions related to competency-based training be provided in a new Attachment 4 to the 2017-2018 Edition of the Technical Instructions for the purpose of review and feedback from States and industry..

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Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:

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

6.3.1 JOINT TASK FORCE OF THE DANGEROUS GOODS PANEL AND THE AVSEC PANEL

6.3.1.1 At the request of the Secretary General, a joint task force to develop guidance material on countering the potential use of dangerous goods in an act of unlawful interference had been formed. This was in response to the increasing importance the ICAO Council was placing on the need for coordination between the Aviation Security Panel (AVSECP) and the DGP.

6.3.1.2 The task force had completed some initial work in 2013 and a report was presented to the DGP/25 and the AVSECP/25 (see paragraph 5.4 of the DGP/24 Report). There had been little progress on the work of the task force since that time. Nevertheless, the DGP recommended that efforts to engage with AVSECP should continue.

- Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:**
- 6.4: Consideration of transitional measures for amendments to the Technical Instructions**

6.4.1 TRANSITIONAL CONSIDERATIONS (DGP/25-WP/40)

6.4.1.1 Allowing a transitional period before new editions of the Technical Instructions became mandatory was considered at DGP-WG14 and DGP-WG15. The panel did not support adding a standard transition period for all of the provisions, but did agree that consideration be given to a transitional period for certain changes where it was deemed appropriate to allow shippers time to comply with the requirements in the new edition of the Technical Instructions.

6.4.1.2 The meeting agreed to a three-month transitional period before shippers were required to apply the new classification criteria and UN numbers for engines. A note was added under new Special Provision A208 and under the dangerous goods transport document requirements (5;4.1.4.1) to this effect (see Appendix A to the report on Agenda Item 2).

6.4.1.3 A proposal to reduce the transition period provided for the lithium battery mark from two years to one year was not supported as it was believed this would cause difficulties for multi-modal transport.

APPENDIX A**PROPOSED TRAINING PROVISIONS FOR INCLUSION IN NEW
ATTACHMENT 4 TO THE TECHNICAL INSTRUCTIONS****Attachment 4****PROPOSED NEW TRAINING PROVISIONS
(APPLICABLE FROM 1 JANUARY 2019)****INTRODUCTORY CHAPTER****PROPOSED REVISIONS TO THE TRAINING PROVISIONS**

The training provisions are undergoing an extensive review by the Dangerous Goods Panel (DGP) which will result in revisions to Part 1;4 and the addition of new guidance material in an attachment to these Instructions. Proposed revisions to Part 1;4 are temporarily included as part of this attachment in this edition of the Instructions for the purpose of review and feedback to ICAO by relevant parties.

Chapter 1 of this attachment provides the proposed new training requirements which will replace current Part 1;4 in the 2019-2020 Edition of these Instructions. Chapters 2 to 4 provide guidance material on implementing a competency-based approach to training specific to dangerous goods which will stay in this attachment as Chapters 1 to 3 in the 2019-2020 Edition of the Technical Instructions.

The proposed revisions to Part 1;4 and guidance material can also be found on the ICAO public website at www.icao.int/safety/DangerousGoods. Comments on the revised training provisions are welcome and should be submitted through that website by 31 March 2017. Based on comments received, further amendments to the proposed new provisions may be made by the DGP for further consideration at its twenty-sixth meeting which will be held during the fourth quarter of 2017.

Chapter 1

PROPOSED NEW PART 1, CHAPTER 4 — DANGEROUS GOODS TRAINING (Applicable from 1 January 2019)

Replace Part 1, Chapter 4 of the Technical Instructions with the following:

INTRODUCTORY NOTE

The objective of a dangerous goods training programme is to ensure that persons are competent to perform their assigned functions. An approach to achieving this objective is provided in Chapter 2 to Attachment 4.

Chapter 4

DANGEROUS GOODS TRAINING

*Parts of this Chapter are affected by State Variations AE 2, BR 7, CA 11, HK 1;
see Table A-1*

4.1 GENERAL REQUIREMENTS

Whether or not training requirements for entities involved in the transport of non-dangerous goods as cargo were within the scope of Annex 18 and the Technical Instructions was discussed at DGP/25. It was agreed that the scope was not clearly defined (see paragraph 1.2 of the DGP/25 Report). The following alternative provisions are therefore tentatively proposed and will be finalized based on the outcome of work to clarify the scope of Annex 18 (see DGP/25 Report on Agenda Item 1, paragraph 1.2).

[The employer must ensure that personnel are competent to perform any function described in these Instructions for which they are responsible prior to performing any of these functions. This must be achieved through training and assessment.]

[The employer must ensure that personnel with responsibilities for the processing, acceptance or handling of cargo, mail or passengers or of checked and/or carry-on baggage are competent to perform the function for which they are responsible prior to performing any of these functions. This must be achieved through training and assessment.]

Note.—Guidance on developing a competency-based approach to training is provided in Chapter 2 to Attachment 4.

4.2 TRAINING PROGRAMMES

4.2.1 The employer must establish and maintain a dangerous goods training programme.

Note.— A training programme includes elements such as design methodology, assessment, initial and recurrent training, instructor qualifications and competencies, training records and evaluation of the effectiveness of training.

4.2.2 All operators must establish a dangerous goods training programme regardless of whether or not they are approved to transport dangerous goods as cargo.

4.2.3 Personnel must be trained and assessed commensurate with the functions for which they are responsible prior to performing any of these functions. Personnel that have received training but that are assigned to new functions must be assessed to determine their competence in respect of their new function. If competency is not demonstrated, appropriate additional training must be provided. Personnel must be trained to recognize the hazards presented by dangerous goods, to safely handle them and to apply appropriate emergency response procedures.

[*Note.— In order to prevent the introduction of undeclared dangerous goods into air transport, any person who performs functions that may indirectly impact the movement of cargo, COMAT, baggage, passengers, or mail such as passenger or cargo reservation personnel and engineering personnel should also be trained.*]

4.2.4 Security personnel who are involved with the screening of passengers and crew and their baggage and cargo or mail must be trained irrespective of whether the operator on which passenger or cargo is to be transported carries dangerous goods as cargo.

4.2.5 Personnel must receive recurrent training and assessment within 24 months of previous training and assessment

to ensure that competency has been maintained. However, if recurrent training and assessment is completed within the final three months of validity of the previous training and assessment, the period of validity extends from the month on which the recurrent training and assessment was completed until 24 months from the expiry month of that previous training and assessment.

4.2.6 Training courses may be developed and delivered by or for the employer.

Note.— General information on the provisions for dangerous goods carried by passengers and crew (see Part 8) should be included in training courses, as appropriate.

4.2.7 The employer must maintain a record of training and assessment for personnel.

4.2.7.1 The record of training and assessment must include:

- a) the individual's name;
- b) the most recent training and assessment completion month;
- c) a description, copy or reference to training and assessment materials used to meet the training and assessment requirements;
- d) the name and address of the organization providing the training and assessment; and
- e) evidence which shows that personnel have been assessed as competent.

4.2.7.2 Training and assessment records must be retained by the employer for a minimum period of 36 months from the most recent training and assessment completion month and must be made available upon request to personnel or the appropriate national authority.

4.2.8 Dangerous goods training programmes for operators must be approved by the appropriate authority of the State of the Operator in accordance with the provisions of Annex 6 — *Operation of Aircraft*.

4.2.9 Dangerous goods training programmes required for entities other than operators and designated postal operators should be approved as determined by the appropriate national authority.

4.3 INSTRUCTOR QUALIFICATIONS AND COMPETENCIES

4.3.1 Unless otherwise provided for by the appropriate national authority, instructors of initial and recurrent dangerous goods training must demonstrate or be assessed as competent in instruction and the function that they will instruct prior to delivering such training.

4.3.2 Instructors delivering initial and recurrent dangerous goods training must at least every 24 months deliver such courses, or in the absence of this attend recurrent training.

4.4 DESIGNATED POSTAL OPERATORS

4.4.1 Staff of designated postal operators must be trained commensurate with their responsibilities. The subject matter to which their various categories of staff should be familiar with is indicated in Table 1-4.

4.4.2 Dangerous goods training programmes for designated postal operators 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.

Table 1-4. Content of training courses for staff of designated postal operators

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

CATEGORIES

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

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

Chapter 2

GUIDANCE ON A COMPETENCY-BASED APPROACH TO DANGEROUS GOODS TRAINING

2.1 INTRODUCTION

ICAO has recognized that the implementation of a competency-based approach to training for safety-critical functions is essential to ensure that enough qualified and competent personnel support the air transport system. This chapter provides guidance to Contracting States in implementing a competency-based approach to dangerous goods training and assessment for personnel involved in the transport of cargo, mail, passengers and baggage by air. The *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) contains greater detail on competency-based training and assessment.

2.2 COMPETENCY-BASED TRAINING AND ASSESSMENT

2.2.1 Conventional dangerous goods training is typically designed around the job title and is subject-matter driven (e.g. Table 1-4 in Part 1;4 of this edition of the Technical Instructions lists the subject matter relating to dangerous goods which various categories of personnel should be familiar). Competency-based training is designed to ensure that personnel can perform the function for which they are responsible.

2.2.2 The development of competency-based training and assessment is based on a systematic approach whereby competencies and their standards are defined, training is based on the competencies identified, and assessments are developed to determine whether these competencies have been achieved.

2.2.3 Competencies describe what a competent person's performance on the job should be. The PANS-TRG defines competency as "a combination of skills, knowledge and attitudes required to perform a task to the prescribed standard".

2.2.4 A critical feature of competency-based training is continuous assessment to ensure training is efficient and effective in order to provide the skills, knowledge and attitudes required to perform the function.

Note.— Competency-based training and assessment is described in more detail in the PANS-TRG, Chapter 2, 2.2.

2.3 COMPETENCY-BASED PROVISIONS IN ICAO

2.3.1 Competency-based approaches are used to prepare professionals for a variety of domains besides aviation (e.g. medical education, the oil and gas industry, pharmaceutical industry, social work, teacher education).

2.3.2 In 2006, ICAO introduced the multi-crew pilot licence (MPL) in Annex 1 — *Personnel Licensing*. This was the first competency-based training provision developed by ICAO. It resulted from the work of the Flight Crew Licensing and Training Panel (FCLTP) whose goal was to develop provisions that would not put conventional pilot training methods out of compliance but would allow an alternative training path that made use of contemporary instructional methods. The FCLTP developed the first edition of the PANS-TRG to provide detailed procedures to assist States and the industry in implementing the MPL.

2.3.3 Since then, ICAO has introduced several competency frameworks in its provisions related to the following:

- a) aircraft maintenance personnel (PANS-TRG, Doc 9868);
- b) flight procedure designers (*The Quality Assurance Manual for Flight Procedure Design* (Doc 9906), Volume 2);
- c) flight validation pilots (Doc 9906, Volume 6);
- d) designated medical examiners (*Manual of Civil Aviation Medicine* (Doc 8984)); and
- e) air traffic controllers and air traffic safety electronics personnel (PANS TRG, Doc 9868)

2.4 BENEFITS OF COMPETENCY-BASED TRAINING TO THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

2.4.1 Supports safety management systems (SMS)

2.4.1.1 Annex 19 requires operators conducting international commercial air transport in accordance with Annex 6, Part I or Part III, to implement an SMS. An operator's SMS addresses the aviation activities that are related to the safe operation of the aircraft. These aviation activities include the carriage of dangerous goods in the scope of the operator's SMS. Other entities in the dangerous goods transport chain should be encouraged to implement a similar safety system.

2.4.1.2 Implementing SMS requires that all personnel understand the safety philosophy and embrace a disciplined and standardized approach for SMS. Personnel need to know their roles and responsibilities with respect to dangerous goods and have the requisite competencies to perform their functions within the SMS. Therefore, the depth of training each person receives should be appropriate to the functions they perform. This could range from a familiarization level to expert-level for dangerous goods professionals. To ensure that personnel have the knowledge, skills and abilities to support SMS, training activities should follow the competency-based approach.

2.4.1.3 The "Swiss-Cheese" Model of accident causation proposes that complex aviation systems are extremely well defended by layers of defences making single-point failures rarely consequential in such systems (see paragraph 2.3 of the *Safety Management Manual (SMM)* (Doc 9859)). The model illustrates that accidents involve successive breaches of multiple system defences and that all accidents include a combination of both active conditions (actions or inactions that have an immediate adverse effect) and latent conditions (conditions that exist in the aviation system well before a damaging outcome is experienced). Doc 9859 identifies training as one of the three main groups of defences in aviation and identifies deficiencies in training as a latent condition. The importance of clearly-defined competency-based training is essential for the design and delivery of training programmes aimed at developing qualified personnel better able to eliminate or mitigate risks related to the safe transport of dangerous goods by air.

2.4.2 Facilitates development of effective dangerous goods training and reduces risks

2.4.2.1 The application of competency-based training will benefit the safe transport of dangerous goods, which may reduce occurrences that could introduce risk to the aviation system. Currently the training requirement in the Technical Instructions is based on evidence that personnel have completed the dangerous goods course and successfully passed the test. This, however, does not guarantee that personnel can apply what was learned in the course while performing their functions. A competency-based training approach designs training and assessment that is specific to their functions and not just theoretical knowledge about dangerous goods.

2.4.2.2 The acceptance of dangerous goods for air transport requiring an operator to verify that the dangerous goods are properly prepared for transport can be used as an example. This verification is accomplished through a checklist process so as to prevent dangerous goods not properly prepared from being transported on the aircraft. However, if training has not adequately prepared personnel to complete this process, risks to the aircraft and its occupants may be introduced if an improperly prepared shipment is accepted and transported. In addition, without adequate ability to complete the acceptance process, the shipment may be rejected even though it is properly prepared. This can cause increased costs to the shipper and the operator and delay the shipment.

2.4.2.3 Another example would be the preparation of dangerous goods shipments which includes identifying, classifying, packaging, marking, labelling and documentation for the transport of dangerous goods. These functions are considered critical and key to the correct transport of dangerous goods. In competency-based training, shipper's knowledge, skills and abilities should result in demonstrating their proficiency to meet these functions. It is critical that dangerous goods shipments are prepared in compliance with the Technical Instructions prior to offering the shipment for transport to an operator. This should reduce the number of improperly-prepared shipments thus reducing cost and the introduction of risk into the aviation system.

2.5 DRIVING PRINCIPLES

2.5.1 The "function" approach

2.5.1.1 The Technical Instructions state that personnel must be trained in the requirements commensurate with their responsibilities. Responsibilities are not necessarily category/job specific as indicated in Tables 1-4 and 1-5 in Part 1;4 of this edition of the Technical Instructions. For example, in smaller operations, a person may perform many functions such as accepting dangerous goods and loading/securing dangerous goods on board an aircraft. This person's training must address all of the functions performed. Also, entities such as ground handling companies and freight forwarders may perform functions that are specific to a shipper or an operator. These entities must train their personnel commensurate with their responsibilities and functions they perform regardless of their job title. Concentrating on functions and responsibilities rather than a job title or description will ensure that a person is competent to perform the function in compliance with the Technical Instructions.

2.5.1.2 Tables 1-4 and 1-5 in Part 1;4 of this edition of the Technical Instructions refer only to the aspect of knowledge that personnel should have to perform their specific job, but do not cover the “how to” part of their job. The focus of competency-based training is to ensure that personnel can perform their job. Tables 1-4 and 1-5 in current Part 1;4 do not support a competency-based approach.

2.6 ROLES AND RESPONSIBILITIES IN A COMPETENCY-BASED APPROACH TO TRAINING

2.6.1 Employer

2.6.1.1 Employers need to determine the purpose and objective of the competency-based training programme based on the functions for which their personnel are responsible. A training programme includes elements such as design methodology, initial and recurrent training, assessment, instructor qualifications and competencies, training records and evaluation of its effectiveness.

2.6.1.2 Employers should ensure that training is designed and developed to establish clear links among the competencies to be achieved, learning objectives, assessment methods, and course materials.

2.6.2 Instructor

2.6.2.1 In competency-based training, the instructor facilitates the trainee’s progression towards the achievement of competencies. They also collect information about the effectiveness of the training materials which supports continuous improvement. See instructor competencies in PANS-TRG.

2.6.3 Trainee

2.6.3.1 In competency-based training, trainees are active participants in their learning process and the achievement of competencies as opposed to passive recipients of knowledge. The competency-based training programme provides them with a clear idea of their learning path towards competency through the training programme and beyond. The competency-based training should directly contribute to improving their performance on the job. Trainees’ feedback is essential in ensuring that competency-based training is effective.

2.6.4 Regulator

2.6.4.1 There are important differences between the ways the regulator would oversee a traditional training programme versus a competency-based training programme. In a traditional training programme, the authority may assess the course components and final test against the elements described in Part 1, Chapter 4, Tables 1-4 and 1-5 of this edition of the Technical Instructions. The fact that all components of any course are there (or appear to be there) and trainees pass the required test does not necessarily mean that they can perform their assigned functions competently.

2.6.4.2 Where competency-based training has been implemented, regulators should oversee the training programme to ensure that it actually produces personnel that can perform the function for which they are responsible in a specific operational setting and in compliance with the national regulatory framework.

2.7 DEVELOPING COMPETENCY-BASED TRAINING FOR DANGEROUS GOODS

2.7.1 Methods used to develop the ICAO competency framework

2.7.1.1 A competency framework for dangerous goods personnel and a complementary flowchart are provided in Chapters 3 and 4. The competency framework consists of competency units, competency elements and performance criteria which are defined in the PANS-TRG as:

- a) **Competency unit.** A discrete function consisting of a number of competency elements.
- b) **Competency element.** An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.
- c) **Performance criteria.** Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved.

2.7.1.2 All responsibilities of personnel involved in transport of dangerous goods by air are described by the following six functions which correspond to the competency units:

- a) classifying dangerous goods;

- b) preparing a dangerous goods shipment;
- c) processing/accepting cargo;
- d) managing cargo pre-loading;
- e) accepting passenger and crew baggage; and
- f) transporting cargo/baggage.

The flowchart in Chapter 3 illustrates the typical processes of performing these functions.

Note.— Reporting of dangerous accidents, incidents and other occurrences have not been included as a function as reporting may be required at any point after dangerous goods have been prepared for transport.

2.7.2 Methods to develop competency-based training

2.7.2.1 An employer conducts a training needs analysis to determine what they need as a result of training and what their resources are to achieve this result. This critical step will ensure that training fits the employer's purpose and is effective.

2.7.2.2 The employer selects the appropriate competencies associated with the functions that its personnel perform from the ICAO competency framework. In doing so, employers must consider their own operational and organizational environments. For example, one operator may accept dangerous goods shipments as cargo while another may not; a shipper may be dealing with a single class of dangerous goods, while another deals with many. In addition, an employer must consider domestic and international regulatory requirements that apply to their operations. Prior to proceeding with the development of competency-based training, where appropriate, employers should liaise directly with the regulator to ensure that their requirements are taken into account.

2.7.2.3 The employer then determines the level of knowledge and/or skills necessary to perform each of the customized competencies. For example, the person accepting dangerous goods will not require the same level of knowledge and/or skills related to classification as someone who is classifying dangerous goods. Chapter 5 provides a sample matrix tool that can be used to determine the knowledge personnel performing specific functions should maintain. Functions corresponding to the competency framework provided in Chapter 3 are listed across the columns of the table and subject matter (knowledge) is listed down the rows. The employer should indicate what knowledge is needed for a particular function within the organization with a check mark at the point at which the competency element and the knowledge element intersect.

2.7.2.4 The employer must study the target population (future trainees) with a view to identifying the knowledge, skills and attitudes that they already have, to collect information on preferred learning styles, and on the social and linguistic environments of prospective trainees, all of which could have an impact on the training design. The target population may be a mixture of experienced and newly recruited personnel, groups differing in age, etc. All this information is important for determining the knowledge, skills and attitudes already possessed by the target population and for designing the most appropriate programme of instruction.

2.7.2.5 The employer documents the result of the above work as its own customized competency framework. The training curriculum can then be developed based on this competency framework.

2.7.2.6 Competency-based training requires continuous assessment of the trainee's progress until they are competent to perform their assigned function. A trainee's assessment may be completed through a variety of tools including observation of job performance, tests or other practical exercises. In order for assessment tools to be effective, they must be valid and reliable both in terms of being an appropriate measure of the competency being tested and of obtaining consistent results with different raters and ratings.

2.7.2.7 To ensure its effectiveness, the employer should continuously evaluate the training programme. The purpose of this evaluation is to determine the extent to which the training fulfils the purpose for which it was designed. Where appropriate, corrective actions should be implemented and the training programme re-evaluated.

Chapter 3

DANGEROUS GOODS COMPETENCY FRAMEWORK

ABBREVIATIONS USED

<i>Abbreviation</i>	<i>Meaning</i>
CU	Competency unit
CE	Competency element
PC	Performance criteria

COMPETENCY FRAMEWORK

CU 1 Classifying dangerous goods

- CE 1.1 Evaluate substances or articles against classification criteria, as applicable
 - PC 1.1.1 Determine if it is dangerous goods
 - PC 1.1.2 Determine if it is forbidden under any circumstances
- CE 1.2 Determine dangerous goods description
 - PC 1.2.1 Determine class or division
 - PC 1.2.2 Determine packing group, if applicable
 - PC 1.2.3 Determine proper shipping name and UN number
 - PC 1.2.4 Determine if it is forbidden unless approval or exemption is granted
- CE 1.3 Review special provisions
 - PC 1.3.1 Assess if special provision(s) is applicable
 - PC 1.3.2 Apply special provision(s)

CU 2 Preparing dangerous goods shipment

- CE 2.1 Assess packing options including quantity limitations
 - PC 2.1.1 Consider limitations (de minimis quantities, excepted quantities, limited quantities, passenger aircraft, cargo aircraft only, special provisions)
 - PC 2.1.2 Consider State and operator variations
 - PC 2.1.3 Determine if all-packed-in-one can be used
 - PC 2.1.4 Select how dangerous goods will be shipped based on limitations and variations
- CE 2.2 Apply packing requirements
 - PC 2.2.1 Consider constraints of packing instructions
 - PC 2.2.2 Select packaging materials (absorbent, cushioning, etc.)
 - PC 2.2.3 Assemble package
- CE 2.3 Apply marks and labels
 - PC 2.3.1 Determine applicable marks
 - PC 2.3.2 Apply marks
 - PC 2.3.3 Determine applicable labels
 - PC 2.3.4 Apply labels
- CE 2.4 Determine if overpack can be used
 - PC 2.4.1 Apply marks if necessary
 - PC 2.4.2 Apply labels if necessary
- CE 2.5 Prepare documentation
 - PC 2.5.1 Complete the dangerous goods transport document
 - PC 2.5.2 Complete other transport documents (e.g. AWB)
 - PC 2.5.3 Include other required documentation (e.g. approvals/exemptions, etc.), as applicable
 - PC 2.5.4 Retain copies of documents as required

CU 3 Processing/accepting cargo

- CE 3.1 Review documentation
 - PC 3.1.1 Verify air waybill
 - PC 3.1.2 Verify dangerous goods transport document
 - PC 3.1.3 Verify other documents as applicable (exemptions, approvals, etc.)
 - PC 3.1.4 Verify State/operator variations
- CE 3.2 Review package(s)
 - PC 3.2.1 Verify marking
 - PC 3.2.2 Verify label
 - PC 3.2.3 Verify package type
 - PC 3.2.4 Verify package conditions
 - PC 3.2.5 Verify State/operator variations
- CE 3.3 Complete acceptance procedures
 - PC 3.3.1 Complete acceptance checklist, if applicable
 - PC 3.3.2 Provide shipment information for load planning
 - PC 3.3.3 Retain documents as required
- CE 3.4 Process/accept cargo other than dangerous goods
 - PC 3.4.1 Check documentation for indications of undeclared dangerous goods
 - PC 3.4.2 Check packages for indications of undeclared dangerous goods

CU 4 Managing cargo pre-loading

- CE 4.1 Plan loading
 - PC 4.1.1 Determine stowage requirements
 - PC 4.1.2 Determine segregation, separation, aircraft/compartment limitations
- CE 4.2 Prepare load for aircraft
 - PC 4.2.1 Check packages for indications of undeclared dangerous goods
 - PC 4.2.2 Check for damage and/or leakage
 - PC 4.2.3 Apply stowage requirements (e.g. segregation, separation, orientation)
 - PC 4.2.4 Apply ULD tags when applicable
 - PC 4.2.5 Transport cargo to aircraft
- CE 4.3 Issue NOTOC
 - PC 4.3.1 Enter required information
 - PC 4.3.2 Verify conformance with load plan
 - PC 4.3.3 Transmit to loading personnel

CU 5 Accepting passenger and crew baggage

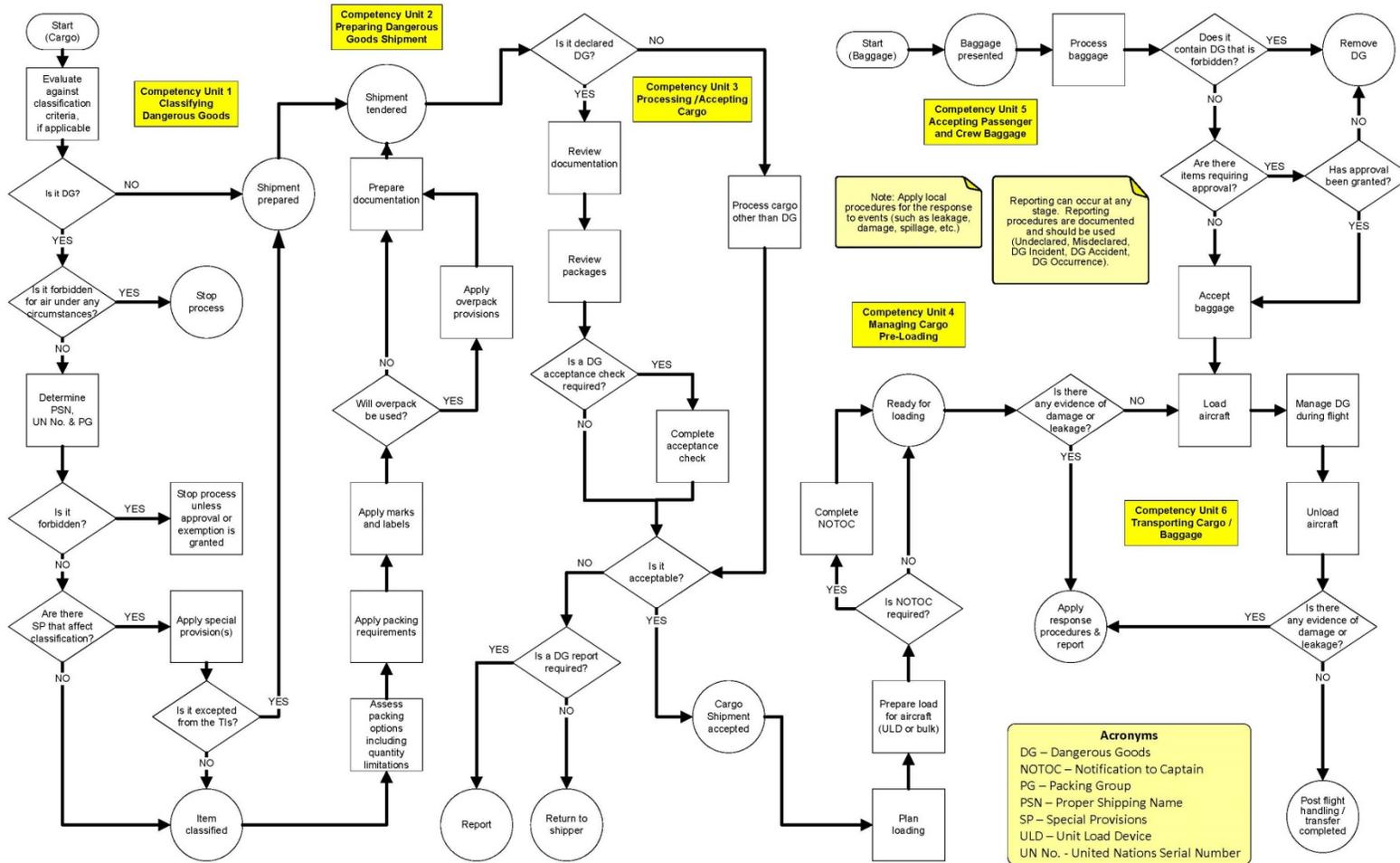
- CE 5.1 Process baggage
 - PC 5.1.1 Identify forbidden dangerous good
 - PC 5.1.2 Apply approval requirements
- CE 5.2 Accept baggage
 - PC 5.2.1 Apply operator requirements
 - PC 5.2.2 Advise pilot in command

CU 6 Transporting cargo/baggage

- CE 6.1 Load aircraft
 - PC 6.1.1 Transport cargo/baggage to aircraft
 - PC 6.1.2 Check packages for indications of undeclared dangerous goods
 - PC 6.1.3 Check for damage and/or leakage
 - PC 6.1.4 Apply stowage requirements (e.g. segregation, separation, orientation)
 - PC 6.1.5 Verify that NOTOC reflects against aircraft load
 - PC 6.1.6 Verify passenger baggage requirements if applicable
 - PC 6.1.7 Inform pilot-in-command and flight operations officer/flight dispatcher
 - CE 6.2 Manage dangerous goods during flight
 - PC 6.2.1 Detect presence of dangerous goods not permitted in baggage
 - PC 6.2.2 Apply procedures in the event of an emergency
 - PC 6.2.3 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
 - CE 6.3 Unload aircraft
 - PC 6.3.1 Apply specific unloading considerations as applicable
 - PC 6.3.2 Check packages for indications of undeclared dangerous goods
 - PC 6.3.3 Check for damage and/or leakage
 - PC 6.3.4 Transport cargo/baggage to facility/terminal
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Chapter 4

DANGEROUS GOODS FUNCTIONS — PROCESS FLOWCHART



Chapter 5

FUNCTION/KNOWLEDGE MATRIX TOOL

Competency elements

- 1.1 — Evaluate substances or articles against classification criteria, as applicable
 - 1.2 — Determine dangerous goods description
 - 1.3 — Review special provisions
 - 2.1 — Assess packing options including quantity limitations
 - 2.2 — Apply packing requirements
 - 2.3 — Apply marks and labels
 - 2.4 — Determine if overpack can be used
 - 2.5 — Prepare documentation
 - 3.1 — Review documentation
 - 3.2 — Review package(s)
 - 3.3 — Complete acceptance procedures
 - 3.4 — Process/accept cargo other than dangerous goods
 - 4.1 — Plan loading
 - 4.2 — Prepare load for aircraft
 - 4.3 — Issue NOTOC
 - 5.1 — Process baggage
 - 5.2 — Accept baggage
 - 6.1 — Load aircraft
 - 6.2 — Manage dangerous goods during flight
 - 6.3 — Unload aircraft
-

APPENDIX B**PROPOSED AMENDMENT TO THE SUPPLEMENT TO THE
TECHNICAL INSTRUCTIONS TO INCORPORATE GUIDANCE
MATERIAL ON COMPETENCY-BASED TRAINING FOR
DANGEROUS GOODS STATE EMPLOYEES****COMPETENCY FRAMEWORK FOR STATE EMPLOYEES****Part S-1****GENERAL****(ADDITIONAL INFORMATION
FOR PART 1 OF THE
TECHNICAL INSTRUCTIONS)**

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Insert new Chapter 4 as follows:

Chapter 4**GUIDANCE TO STATES ON COMPETENCY-BASED TRAINING FOR STATE
EMPLOYEES INVOLVED IN THE REGULATION AND OVERSIGHT OF TRANSPORT
OF DANGEROUS GOODS BY AIR****1.1 INTRODUCTION**

1.1.1 The objective of this chapter is to provide guidance to States in implementing competency-based training and assessment for personnel engaged in policies, regulation, inspection and supervision of work related to the transport of dangerous goods by air. It includes a competency framework for the uniform implementation of training and assessment required for State employees who must ensure compliance with their State's obligations and with Annex 18 — *The Safe Transport of Dangerous Goods by Air*.

1.1.2 It is noted that States use a variety of systems to exercise safety oversight in the transport of dangerous goods by air. ICAO's safety oversight audits have identified differences among States in their inspectors' performance standards and in the implementation of their respective civil aviation dangerous goods programmes. For example, one State may have a clearly-defined process for the approval of dangerous goods training programmes while another may not. Applying a common competency framework would result in harmonized performance standards of State employees.

1.1.3 A generic competency framework for State employees is at Attachment I to this chapter. This competency framework reflects safety-critical tasks and, when applied, will have a positive impact on specific dangerous goods functions and the ability of individuals to perform their jobs successfully and to the required standards. Each State must provide specific training for these functions to each of its employees involved in policy making, regulation and oversight of compliance of dangerous goods transported by air.

1.2 TERMINOLOGY

For the purpose of this chapter, the following terminology applies:

Air operator certificate. A certificate authorizing an operator to carry out specified civil air transport operations.

Competency. A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

Competency-based training and assessment. Training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

Competency element. An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.

Competency unit. A discrete function consisting of a number of competency elements.

Dangerous goods. Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.

Inspection method. Techniques that are used during the course of evaluating compliance with relevant regulations. The inspection methods include:

- a) observation: visually observing the performance of regulatory requirements for compliance with relevant regulations;
- b) interview: a technique by which questions or discussions with persons performing transportation functions are used to gather information concerning the transportation of dangerous goods;
- c) document review: reviewing paper or electronic records to determine whether required documents are properly prepared, contain accurate information, and maintained as required by the regulations;
- d) verification: using third party information to independently confirm whether regulatory requirements are being met; and
- e) procedure evaluation: ensuring appropriate written procedures, addressing all regulated activities undertaken, are in place.

Operations manual. A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Performance criteria. Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved.

Shipper. A person, organization or enterprise undertaking any of the shipper's responsibilities of Part 5 of the Technical Instructions.

COMPETENCY FRAMEWORK FOR STATE EMPLOYEES

1. SCOPE OF THE COMPETENCY FRAMEWORK

1.1 The scope of the competency framework concerns State employees involved in the regulation and oversight of the transport of dangerous goods by air based on obligations of States according to the Convention on International Civil Aviation:

- a) the State is responsible for implementing a system for determining compliance with Annex 18; and
- b) the application of the basic principles of a competency-based approach determines the performance level for State employees in carrying out their function to meet the State's obligations as defined by the Annex 18;

1.2 The competency framework has taken into account the "ICAO Safety Oversight Transport of Dangerous Goods Audit Checklist", itemizing the separate civil aviation dangerous goods programme activities required by a State:

- a) conduct initial review and approval of an operations manual and training programme on dangerous goods within the approval procedures for the AOC;
- b) conduct initial inspection of new operator or operator that intends to commence carriage of dangerous goods;
- c) conduct periodic inspection of the operator;
- d) conduct an ad-hoc inspection on dangerous shipping and handling procedures;
- e) conduct an investigation on dangerous goods accidents, incidents and other occurrences resulting from violations of the dangerous goods regulations;
- f) conduct a review of a revised operation manual on dangerous goods within the approval procedures for the AOC;
- g) conduct a review of a revised training programme for approval;
- h) conduct periodic inspection of shippers; and
- i) ensure that technical equipment required for inspection is being maintained and/or calibrated.

These activities have been included in the competency framework.

1.3 The details of the competency framework are based on common practices as applied by a number of States on training, operational procedures for inspection, surveillance and enforcement.

2. STRUCTURE OF THE DOCUMENT

2.1 Distinction is made between competencies of a "general nature" which are applicable to all State employees and competencies related to the actual "technical performance" of a State employee in relation to their specific tasks.

2.2 For task-related competencies, the basic competency framework is structured according to three levels defined in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868): competency units, competency elements, and performance criteria. Further detailing at these three levels is derived from job and task analyses of common practices in some States.

2.3 Regarding the responsibilities of State employees and the principles applicable to the definition of the competency framework, distinction has been made between different functional levels: strategic, managerial and operational.

2.4 Taking into account the above, the competency framework for State employees is based on:

- a) Core competencies applicable to all State employees:
 - core competencies and personal attributes; and
 - general awareness, knowledge and skills;

b) Competency units related to specific activities of State employees:

- support the development and implementation of a State dangerous goods programme
- approve an operator's dangerous goods system;
- conduct oversight of dangerous goods operations;
- conduct oversight of dangerous goods operations; and
- evaluate dangerous goods accidents, incidents and other occurrences

3. CORE COMPETENCIES APPLICABLE TO ALL STATE EMPLOYEES

Core competencies have not yet been identified for State employees. This will be done once the work of the Next Generation of Aviation Professionals Task Force progresses and will provide a standardized basis from which to work.

5. COMPETENCIES RELATED TO SPECIFIC ACTIVITIES OF STATE EMPLOYEES

Dangerous goods are articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions. The transport of dangerous goods is recognized as an integral part of a State's overall safety oversight programme. Each State must provide training to each of its dangerous goods employees which emphasizes a State's specific dangerous goods standards and regulations. Training should be designed so that it enables all State employees involved in dangerous goods oversight to perform their tasks. In the same manner in which States require industries performing dangerous goods related functions to be trained in the transport of dangerous goods, States should provide their employees with training commensurate with their responsibilities. Table S-1-1 identifies competencies related to the specific activities conducted by dangerous goods State employees.

Table S-1-1. Competency framework for State employees**COMPETENCY FRAMEWORK FOR DANGEROUS GOODS STATE EMPLOYEES****CU 1 Support the development and implementation of a State dangerous goods programme**

CE 1.1 Develop regulations

- PC 1.1.1 Apply procedures to develop national regulations on the air transport of dangerous goods
- PC 1.1.2 Monitor relevant changes to ICAO and other relevant international provisions that may impact national dangerous goods air transport regulations
- PC 1.1.3 Develop guidance on how to comply with national regulations

CE 1.2 Develop policies and procedures

- PC 1.2.1 Develop policies and procedures to approve an operator's manuals specific to dangerous goods
- PC 1.2.2 Develop policies and procedures to approve an operator's training program specific to dangerous goods
- PC 1.2.3 Develop policies and procedures to conduct oversight of entities performing any functions prescribed in national regulations for the air transport of dangerous goods
- PC 1.2.4 Develop surveillance work plan

CE 1.3 Develop tools to support the implementation of national regulations

- PC 1.3.1 Develop guidance material for entities performing any functions prescribed in national regulations for the air transport of dangerous goods
- PC 1.3.2 Develop training for personnel overseeing any function prescribed in national regulations for the air transport of dangerous goods
- PC 1.3.3 Develop public awareness materials related to dangerous goods

CU 2 Approve an operator's dangerous goods system

CE 2.1 Approve dangerous goods component of the operations manual

- PC 2.1.1 Verify the manual against the national regulations, policies and procedures for transport by air of dangerous goods
- PC 2.1.2 Recommend amendments to the operations manual as necessary
- PC 2.1.3 Verify that amendments in operations manual are completed
- PC 2.1.4 Issue the approval

CE 2.2 Approve dangerous goods training programme

- PC 2.2.1 Verify the training programme against the national regulations, policies and procedures for transport by air of dangerous goods
- PC 2.2.2 Verify that the training programme addresses all dangerous goods functions identified in the operations manual
- PC 2.2.3 Recommend amendments to the training programme as necessary
- PC 2.2.4 Verify that amendments to the training programme are completed
- PC 2.2.5 Issue the approval

CU3 Conduct oversight of dangerous goods operations

CE 3.1 Prepare for inspection

- PC 3.1.1 Analyze information on dangerous goods-related functions
- PC 3.1.2 Plan inspection activities

CE 3.2 Conduct inspection

- PC 3.2.1 Communicate scope and intent of inspection
- PC 3.2.2 Determine compliance with national regulations, policies and procedures for transport by air of dangerous goods

CE 3.3 Finalize inspection

- PC 3.3.1 Communicate inspection results
- PC 3.3.2 Document inspection results

CU 4 Evaluate dangerous goods accidents, incidents and other occurrences

CE 4.1 Conduct investigation

- PC 4.1.1 Gather evidence
- PC 4.1.2 Verify non-compliance against national regulations for dangerous goods transport by air

CE 4.2 Take corrective/appropriate action

- PC 4.2.1 Document specific areas of non-compliance
- PC 4.2.2 Apply national enforcement policy
- PC 4.2.3 Confirm effectiveness of corrective action

Agenda Item 7: Other business**7.1 APPROVAL OF WORKING GROUP REPORTS
(DGP/25-WP/2 AND DGP/25-WP/3)**

7.1.1 The meeting reviewed the narrative parts of the reports of the meetings of the 2014 and 2015 DGP Working Group Meetings, DGP-WG/14 (Rio de Janeiro, 20 to 24 October 2014) and DGP-WG/15 (Montréal, 27 April to 1 May 2015). The narratives were approved without comment. The amendments proposed by the working groups were reviewed under DGP/25-WPs/11, 12, 13, 14, 15, 16, 17, 18 (see Report on Agenda Item 2), 19 (see Report on Agenda Item 3) and 20 (see Report on Agenda Item 4) which contained a consolidation of these amendments.

**7.2 APPLICATION OF ANNEX 6 — STATES DEMANDING
APPROVAL OF OPERATORS FOR CARRIAGE OF
DANGEROUS GOODS AND DANGEROUS GOODS
TRAINING (DGP/25-WP/48)**

7.2.1 The meeting was reminded of the recent amendment to Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes* which resulted in a new Chapter 14 on dangerous goods (Amendment 38 to Annex 6, Part I which became applicable on 13 November 2014). The new chapter made it clear that it was the responsibility of the State of the Operator to authorize an operator to carry dangerous goods and also to approve an operator's dangerous goods training programme. It was noted, however, that several States required operators to seek a separate approval from them to carry dangerous goods to or from the State and that this normally involved a separate review and approval of the operator's dangerous goods training programme. Although this requirement was sometimes indicated in Attachment 3 to the Technical Instructions through State variations, not all States had advised ICAO. It was suggested that States wanting to approve foreign operators' dangerous goods training programmes should actually file a difference from the Standard in Annex 6, Part I which required Contracting States to recognize as valid an air operator certificate issued by another Contracting State provided that the requirements under which the certificate was issued are at least equal to the applicable Standards specified in Annex 6 and in Annex 19.

7.2.2 This separate approval process could also create conflicts with operators whose training had already been approved by their State in that the operator could not change their programme without the approval of their authority regardless of the opinion of another State. It was suggested that there was still a lack of understanding of States' responsibilities for approving operators dangerous goods training programmes and that efforts needed to provide clarification. It was noted that the subject had been discussed at the Second Meeting of the Flight Operations Panel (FLTOSP/2). The Secretary was asked to coordinate with those responsible for Annex 6 to consider what steps could be taken to address the issue. The Secretary suggested that at a minimum a letter to States clarifying their responsibilities in relation to oversight of foreign operators and/or further amendments to the new chapter on dangerous goods in Annex 6. The Secretary was also invited to raise the issue with the Air Navigation Commission.

**7.3 CONSIDERATION OF PROPOSAL TO THE 48TH
SESSION OF THE UN SUBCOMMITTEE OF EXPERTS
(DGP/25-WP/49)**

7.3.1 The meeting was made aware of a proposal that had been submitted to the UN Sub-Committee of Experts on the Transport of Dangerous Goods to except beverages, foods, medicines and cosmetics containing ethyl alcohol mixtures classified as a Packing Group II or III flammable liquids when in packagings suitable for retail sale or pharmaceutical distribution. It was noted that proposal was based on a long-standing special permit that had been formally adopted into one large State's domestic regulations. The meeting was asked to provide comments on the proposal for the Secretary to bring to the UN Sub-Committee during the discussion of the proposal at its 48th session.

7.3.2 A participant from the large State which had adopted similar provisions in their domestic regulations provided background information on the history and evolution of the provisions and noted that there had been no safety concerns associated with them.

7.3.3 There was little support offered for allowing such exceptions, noting that they were not provided for other flammable liquids subject to full regulation which were less flammable than the goods the proposed exceptions would apply to. Panel members did not believe there was justification to treat these substances any differently and asked that the Secretary bring this view to the UN Sub-Committee.

— END —