TWENTY-SIXTH MEETING OF THE
DANGEROUS GOODS PANEL (DGP) (2017)

LETTER OF TRANSMITTAL

To: President, Air Navigation Commission

From: Chairperson, Dangerous Goods Panel (DGP) (2017)

I have the honour to submit the report of the twenty- sixth meeting of the Dangerous Goods Panel (DGP) which was held in Montréal, from 16 to 27 October 2017.

Micheline Paquette
Chairperson

Montréal, 27 October 2017

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LIST OF RECOMMENDATIONS[*]

[*] 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-SIXTH MEETING

Montréal, 16 to 27 October 2017

HISTORY OF THE MEETING

1. DURATION

1.1 The twenty-sixth meeting of the Dangerous Goods Panel (DGP) was opened by Mr. Hajime Yoshimura, President of the ANC of the Air Navigation Commission in Montréal, at 1000 hours on 16 October 2017. The meeting was scheduled to end on 27 October, but the panel was able to complete its work on 25 October 2017.

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
A. Tusek		Australia
L. Cascardo	S. Dias	Brazil
M. Paquette	D. Evans A. Sultan E. Werszko	Canada
J. Jin	C. Chan H. Li Z. Qiu J. Wan Q. Yang	China
P. Tatin	T. Domingo	France
H. Brockhaus	G. Closhen S. Saurbier	Germany
P. Privitera	C. Carboni	Italy
H. Sugimoto	Y. Funai M. Ishii K. Nakano K. Takeda A. Uchizawa	Japan

Members	Advisers	Nominated By
T. Muller	E. Boon R. Dardenne K. Vermeersch	Netherlands
S. W. Park	S. M. Yoo	Republic of Korea
D. Kurdchenko		Russian Federation
L. Gqeke	T. Zembe	South Africa
R. Lobato Galeote	M. A. de Castro	Spain
H. Al Muhairi	K. Al Blooshi R. Hameed T. Howard A. Wagih	United Arab Emirates
E. Gillett	D. Warden	United Kingdom
A. Stubblefield	M. Givens R. Hill S. Kelley K. Leary J. McLaughlin D. Pfund	United States
D. Brennan	N. Careen P. Horner P. Oppenheimer	International Air Transport Association (IATA)
P. Rohrbach	D. Ferguson	International Coordinating Council of Aerospace Industries Associations (ICCAIA)
S. Schwartz		International Federation of Air Line Pilots' Associations (IFALPA)
Advisers		
N. McCulloch A. Altemos G. Leach		Dangerous Goods Advisory Council (DGAC)
K. Kojima		World Health Organization (WHO)

Observers:

M. Boehm W. Windisch	Austria
J. W. Bengtsson	Demark
N. Hagmann R. Cataldo	Switzerland
L. Calleja Barcena	European Aviation Safety Agency (EASA)
A. McCulloch R. McClelland	Global Express Association (GEA)
K. O'Shei	Medical Device Battery Transport Council (MDBTC)
E. Remy	North Atlantic Treaty Organization (NATO)
G. Kerchner	The Rechargeable Battery Association (PRBA)
B. Carrara H. Guedes	The Regional Oversight Safety System (SRVSOP)
J. Jeevarajan	Underwriters Laboratories (UL)

3. OFFICERS AND SECRETARIAT

3.1 Mrs. Micheline Paquette (Canada) was elected Chairperson of the meeting and Mr. Teun Muller (Netherlands) 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 Mrs. Haaba Baldeh 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 7 June 2017.

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 2019-2020 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 2019-2020 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 2019-2020 Edition

Agenda Item 5: Harmonization of *Guidance Material for the Dangerous Goods Panel (DGP) to Aid in the Preparation of the Technical Instructions and Supporting Documents* with revised dangerous goods provisions

Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:

6.1: Aviation security/dangerous goods coordination (Job card DGP.001.01)

6.2: Dangerous goods accident and incident reporting system (Job card DGP.002.01)

6.3: Mitigating risks posed by the carriage of lithium batteries by air (Job card DGP.003.01)

6.4 Scope of Annex 18 (Job card DGP.004.01)

6.5 Clarifying State oversight responsibilities in Annex 18 (Job card DGP.005.01)

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 members, advisers and observers to Montréal and to ICAO on behalf of the Air Navigation Commission (ANC). He expressed his hope that the two-week meeting would allow for the development of good relationships that would help strengthen discussions on some important issues.

6.2 He noted many changes in membership since the twenty-fifth meeting. Mr. Firkins, Mr. Carrara, Ms. Xu, Mr. Ros, Mr. Mirko, Mr. McLachlan and Mr. Rogers left the panel. They were replaced by Mr. Tusek nominated by Australia; Mr. Cascardo nominated by Brazil, Mr. Jin Junhao nominated by China, Ms. Lobato Galeote nominated by Spain, Mr. Kurdchenko nominated by the Russian Federation, Mr. Gillett nominated by the United Kingdom and Mr. Schwartz nominated by the International Federation of Air Line Pilots' Associations (IFALPA). In addition, the Commission approved the nomination of Mr. Gqeke, a new member from South Africa. These changes resulted in the

panel being composed of nineteen members nominated by sixteen States and three international organizations. On behalf of the panel, the President expressed appreciation for the contributions made by the departing members and extended a warm welcome to the new members.

6.3 The President briefed the panel on ANC recommendations and Council decisions since the twenty-fifth meeting of the DGP. The Commission had considered the DGP/25 Report and recommended to the Council the acceptance of all of the panel's recommendations. The Council had approved the amendments for the 2017 to 2018 Edition of the Technical Instructions, its Supplement and the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods*, all of which became applicable on 1 January 2017. The Council had also approved amendments that DGP/25 proposed be incorporated in the 2015-2016 Edition of the Technical Instructions. These were a prohibition on the transport of Catecholborane by air and additional restrictions on the transport of lithium batteries, which were incorporated in Addendum No. 3 to the 2015-2016 Edition.

6.4 The President noted that the proposed amendments to the lithium battery provisions had generated much discussion within the Commission and the Council which ultimately concluded with the Council's decision to forbid their carriage as cargo on passenger aircraft through Addendum No. 4 to the 2015-2016 Edition of the Technical Instructions. The Commission had recommended this ban to the Council as a temporary measure until controls were in place to adequately mitigate the risks. These included:

a) provisions and supporting guidance material for operators to conduct safety risk assessments on the carriage of dangerous goods by air; and

b) performance-based package standards for lithium batteries.

The Flight Operations Panel (FLTOPSP) had been tasked with developing the safety risk assessment provisions in coordination with DGP and the Airworthiness Panel, and an SAE International Lithium Battery Packaging Committee had been established to develop the performance-based standards. DGP/26 would be provided with updates during the meeting including a briefing on the status of the SAE at which members of the ANC would attend. The President noted that both the Commission and the Council had emphasized the need for a mechanism to establish greater granularity with respect to classification of different battery types so that the varying risks they posed could be communicated and mitigated appropriately. He was encouraged that an informal working group had been established by the UN Sub-Committee of Experts on the Transport of Dangerous Goods to consider such a hazard-based system.

6.5 The Commission appreciated that the working group of the panel had reacted quickly to introduce measures aimed at addressing the potential safety risks that had been inadvertently introduced through security measures implemented in certain States on certain routes in March 2017. The Commission supported the working group's recommendation for the introduction of additional safety measures when carrying portable electronic devices in checked baggage to mitigate against these risks. These were incorporated in Addendum No. 2 to the 2017-2018 Edition of the Technical Instructions. He noted that since that time a temporary multidisciplinary cargo safety group (CSG) had been established to further assess the risk in coordination with an Aviation Security Panel (AVSECP) force on improvised explosive devices (IEDs). The CSG developed several recommendations, some of which were addressed to the DGP. The Council had not yet reviewed the report these recommendations were contained in, but for the sake of efficiency the ANC had recommended that the panel consider some of them during DGP/26.

6.6 The President noted that the Commission was exploring ways to achieve an overarching, multidisciplinary approach to cargo safety and a mechanism to ensure proper coordination among the relevant panels. He provided the panel with an overview of the *Directives for Panels of the Air Navigation Commission* (Doc 7984) and the ANC all panels website. He encouraged panel members to read Doc 7984 in order to familiarize themselves with the objectives of ANC panels, its methodologies and the roles and responsibilities of each member. The website provided a centralized resource for all ANC panels including membership lists, panel reports, job cards and terms of reference for each ANC panel. He encouraged panel members to use this site as a resource for understanding the work of other panels and to facilitate coordination with them.

6.7 The President expressed concern with the panel's inability to reach consensus on important decisions and emphasized the importance the ANC placed on working towards solutions that all panel members could agree to. Decisions required the support of a clear majority of members. If consensus was not possible, the decision needed to be clearly reflected in the meeting report together with the views and arguments of the minority. He noted the purpose of ANC panels, which was to advance, within specified time frames, the solution of specialized problems or the development of standards for the planned evolution of air navigation. He emphasized that although each member had been nominated by their government or organization, they were by the Air Navigation Commission as an expert in the field of dangerous goods. They were there a personal capacity representing their own professional views, which may not necessarily be those of their administration or organization.

6.8 The President stressed that he, members of the Commission and members of the Secretariat were available for advice or assistance and looked forward to an informal debriefing to discuss the panel's achievements at the end of the meeting.

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

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

1.1 DRAFT AMENDMENTS TO ANNEX 18 (DGP/26-WP/10)

1.1.1 Training

1.1.1.1 The panel developed substantive amendments to the definitions in Chapter 1, the training provisions in Chapter 10 and the compliance provisions of Chapter 11 under Agenda Item 6 (see paragraph 6.4.1 of the report under Agenda Item 6).

1.1.2 Classification

1.1.2.1 The United Nations Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals, at its eighth session (Geneva, 9 December 2016), concluded that the words "risk" and "hazard" were used interchangeably and not always correctly throughout the UN Recommendations on the Transport of Dangerous Goods — Model Regulations (subsequently referred to in this report, for the sake of brevity, as "UN Model Regulations"). Amendments were incorporated in the 20th revised edition of the UN Model Regulations to correct this. Corresponding amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) are recommended under Agenda Item 2 of this Report. A consequential amendment to the classification provisions of Chapter 3 to Annex 18 is necessary and is therefore proposed.

1.1.3 Segregation for toxic and infectious substances

1.1.3.1 An amendment removing segregation requirements for toxic and infectious substances from Chapter 8 was agreed at DGP/25 (Montréal, 19 to 30 October 2015) (see paragraph 1.1 of the DGP/25 Report). The provision was redundant, as it referred to detailed segregation requirements no longer appearing in the Technical Instructions. Because the amendment was a minor one and not safety related, it had been agreed to wait until more substantive amendments to Annex 18 were recommended before bringing the proposal to the Air Navigation Commission (ANC) for preliminary review and before sending it out to States for comments. It was agreed that the amendment should be brought to the ANC for preliminary review with the classification provisions of Chapter 3 and the substantive amendments proposed to Chapters 1, 10 and 11 under Agenda Item 6 (see paragraph 6.4.1 of the report under Agenda Item 6).

1.2 RECOMMENDATIONS

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

RSPP **Recommendation 1/1 — Amendment to classification and segregation provisions for toxic and infectious substances in Annex 18**

That comments from States be sought on a proposed amendment to Annex 18 related to classification and to segregation requirements for toxic and infectious substances as presented in the appendix to the report on this agenda item.

1.2.2 A recommendation that comments from States be sought on a proposed amendment to Annex 18 related to training and compliance was developed under Agenda Item 6 (see paragraph 6.4.2 and Recommendation 6/3 of the report under Agenda Item 6). It is presented in the appendix to the report on this agenda item for the purpose of maintaining all amendments to Annex 18 in one place.

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APPENDIX

PROPOSED AMENDMENT TO ANNEX 18

CHAPTER 1. DEFINITIONS

See paragraph 6.4.1 of the report under Agenda Item 6:

. . .

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Freight forwarder. A person or organization who offers the service of arranging the transport of cargo by air.

. . .

See paragraph 1.1.1 of the report under Agenda Item 1:

CHAPTER 3. CLASSIFICATION

The classification of an article or substance shall be in accordance with the provisions of the Technical Instructions.

Note.— The detailed definitions of the classes of dangerous goods are contained in the Technical Instructions. These classes identify the potential ~~risks~~ hazards associated with the transport of dangerous goods by air and are those recommended by the United Nations Committee of Experts on the Transport of Dangerous Goods.

. . .

See paragraph 1.1.2 of the report under Agenda Item 1:

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.~~

8.7.3~~2~~ 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.

. . .

See paragraph 6.4.1 of the report under Agenda Item 6:

CHAPTER 10. TRAINING PROGRAMMES

10.1 Establishment of training programmes

10.1.1 Initial and recurrent dangerous goods training programmes shall be established and maintained ~~in accordance with the Technical Instructions~~ 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.

10.1.2 In order to prevent the entry into air transport of dangerous goods as cargo or mail not prepared in accordance with the Standards and Recommended Practices of this Annex and the detailed provisions of the Technical Instructions, initial and recurrent dangerous goods training programmes shall be established and maintained by or on behalf of entities other than a), d) or e) above that do not process, handle or accept dangerous goods.

. . .

See paragraph 6.4.1 of the report under Agenda Item 6:

CHAPTER 11. COMPLIANCE

. . .

11.5 Undeclared dangerous goods

11.5.1 States shall implement measures with the aim of:

a) preventing undeclared dangerous goods from being offered for transport; and

b) preventing passengers and crew from taking dangerous goods on board an aircraft which they are not permitted to carry.

11.5.2 States shall ensure that operators establish procedures with the aim of:

a) preventing undeclared dangerous goods from being loaded on an aircraft; and

b) preventing passengers and crew from taking dangerous goods on board an aircraft which they are not permitted to carry.

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Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2019-2020 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/26-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 eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by the 2016 DGP Working Group Meeting (DGP-WG/16, Montréal, 17 to 21 October 2016) and 2017 DGP Working Group Meeting (DGP-WG/17, Montréal, 24 to 28 April 2017).

2.1.1.2 The amendments were agreed, subject to the replacement of "markings" with "mark" in Note 2 of Chapter 5 to align with corrections to the twentieth revised edition of the UN Model Regulations contained in the report of the Sub-Committee of Experts on the Transport of Dangerous Goods (subsequently referred to in the report, for the sake of brevity, as "the UN Sub-Committee) at its fifty-first session (Geneva, 3 to 7 July 2017).

2.1.2 Definition of Training Record (DGP/26-WP/26)

2.1.2.1 A new definition for training record was proposed for inclusion in Part 1;3. It was suggested that there was an inference in the training provisions that the training record qualified whether or not an employee was trained in accordance with the Technical Instructions and that the employee would then not be subject to initial training if they changed employers. Although intended as guidance material, the tables in Part 1;4 (Tables 1-4 and 1-5) which identified subject matter in the Technical Instructions that various categories of personnel should be familiar had been used in some States as a tool to qualify whether an employee had been adequately trained. There was concern that the proposed new training provisions (see paragraph 2.1.4), which focused on competencies rather than subject matter, would not allow for this. The new definition defined a training record as a document that confirmed qualification. The intent was that a training record so defined could be provided to new employers to validate that the new employee had been adequately trained.

2.1.2.2 There was little support for the proposal. The proposed definition conflicted with Part 1;4.2.5 which listed several elements required to be included with a record of training. It was also suggested that an employer could not validate that a new employee had been adequately trained to perform the functions assigned to him based solely on a document from a previous employer. Validation would be dependent on the employer's particular operational setting. While a competency-based approach to training and assessment made this concept clear, it was not a new requirement in the new provisions. It was also noted that training records were referred to in Part 6 of the Technical Instructions with respect to training of inspectors tasked with periodic inspection and certification of cylinders and closed cryogenic receptacles and that a definition might contradict the intent of those provisions.

2.1.2.3 The proposed amendment was not agreed.

2.1.3 Dangerous Goods Transported as Replacements by the Operator (DGP/26-WP/31)

2.1.3.1 DGP-WG/16 and DGP-WG/17 were asked to consider removing "unless otherwise authorized by the State of the Operator" which preceded each of the provisions requiring articles or substances intended as replacements for those subject to the exceptions for dangerous goods of the operator to be transported in accordance with the Technical Instructions (Part 1;2.2.2, 2.2.3 and 2.2.4). It was argued that the lack of any reference to an approval or an exemption meant that other States involved in the transport of such goods would not have a say in how the operator shipped the replacements and that there was no requirement for an equivalent level of safety. It was suggested that this provided too much flexibility and could lead to a lack of international harmonization and the introduction of risks should the State of the Operator decide to allow the exceptions when the dangerous goods were being transported as replacements. While some at DGP-WG/16 and DGP-WG/17 did not see a problem, others did agree clarification was needed. Some thought referring to an approval instead of "authorized" would be more appropriate, as this would make it clear the provisions for an approval in Part 1;1.1.2 applied and that an overall level of safety in transport equivalent to the level provided in the Technical Instructions was achieved. Others believed removing the phrase would be most appropriate, as this would make the granting of an exemption from all States concerned necessary. Following DGP-WG/17, the Air Navigation Commission (ANC) requested DGP to consider clarification with respect to the exceptions for dangerous goods of the operator in Part 1;2.2 (see paragraph 6.3.6 Agenda Item 6 of this report).

2.1.3.2 A new amendment was proposed to DGP/26 in an attempt to address the issues raised at the working group meetings with respect to the degree of flexibility provided to the State of Operator in allowing exceptions while taking the ANC's concerns into account. The amendment:

a) combined the items in Part 1;2.2.1 related to electronic devices in one unique paragraph and separated the provisions related to spare batteries into a new sub-paragraph;

b) required approval by the States concerned to allow the exceptions for dangerous goods required to be aboard an aircraft in accordance with airworthiness requirements and for devices installed with batteries being transported as replacements; and

c) required approval by the State of the Operator to allow the exceptions for the articles listed in 1;2.2.1 b) and c).

2.1.3.3 While there was sympathy for the concerns raised, there was little support for an amendment to the Technical Instructions. The provisions were long-standing, and there had never been any signs of abuse or adverse effects on safety. It was noted that the use of the term "authorization" instead of "approval" was intentional. It allowed for the operator, with the authorization of the State, to determine methods of mitigating the risks posed by transporting its company material that might be unavoidably different from what would be required by the Technical Instructions. It was not intended, however, to relieve the operator from any responsibility of maintaining an equivalent level of safety. There were concerns that the amendment could have a detrimental impact on current operations which were not considered unsafe. It was suggested that a better approach would be to develop guidance material to clarify the intent of the provisions. The need for consistency with respect to the intent of authorization versus approval was also raised, noting that the terms were used in Annex 6. There were

concerns raised that the lack of guidance or minimum criteria for determining when an authorization could be granted gave too much leeway to the operator. The Secretariat advised that the Flight Operations Panel (FLTOPSP) had identified that ICAO documents did not specify the underlying safety criteria to determine when an authorization, approval or acceptance would be required and that the ANC had tasked that panel with defining and clarifying their use (ANC Job card OPSP.018.03). The Secretary would bring the issues raised during the discussion to the attention of FLTOPSP. The proposer noted his appreciation for the comments raised and would use them to reconsider how to address the issue.

2.1.4 Amendments to Training Provisions Developed by the DGP Working Group on Training (DGP/26-WP/39) and Guidance Material for Dangerous Goods Training Developed by the DGP Working Group on Training (DGP/26-WP/40)

2.1.4.1 Revised training provisions which supported a competency-based approach to training and assessment had been included in Attachment 4 to the 2017-2018 Edition of the Technical Instructions for the purpose of review and feedback to ICAO by States, international organizations and industry. Feedback was provided in response to State letter AN11/2.1-16/91 and to a survey that had been provided on the ICAO public website. A summary of the feedback was provided to DGP-WG/17 (see paragraph 3.2.1.6 of the DGP-WG/17 Report contained in DGP/26-WP/3). The DGP Working Group on Training (DGP-WG/Training) met prior to DGP-WG/17 in Ottawa (18 and 19 April 2017) to address feedback received and in Washington, D.C. from 17 to 21 July 2017 to progress outstanding work identified at DGP-WG/17. This resulted in revisions to the provisions contained in Attachment 4 to the 2017-2018 Edition as outlined below.

Training provisions proposed to replace provisions in Part 1;4 of the 2017-2018 Edition

2.1.4.2 The chairman of DGP-WG/Training briefed the panel on proposed revisions to the mandatory provisions contained in Attachment 4, Chapter 1 developed by the group. DGP-WG/Training recommended that these provisions replace the provisions contained in Part 1;4 of the 2017-2018 Edition of the Technical Instructions. Provisions for a transitional period were proposed through a note at the beginning of Part 1;4, allowing for the training requirements contained in Part 1;4 of the 2017-2018 Edition of the Technical Instructions to be used until 31 December 2020. This was supported by the panel, although not everyone saw it as necessary. It was proposed to include the Part 1;4 provisions from the 2017-2018 Edition in Attachment 4 to the 2019-2020 Edition for ease of use. This was also supported by the panel.

2.1.4.3 The Chairman of the UN Sub-Committee was present and noted that the Secretary had briefed that body on the proposed new training provisions. The Sub-Committee was supportive, with the understanding that they enhanced what was already provided for in the UN Model Regulations. This was important because of the multimodal nature of dangerous goods transport. The Sub-Committee did note that the high-level requirements for general awareness, function-specific and safety training in the UN Model Regulations had been removed and requested that it be maintained. He suggested that the experience of the aviation mode would encourage other modes to enhance training in the same way, and maintaining this framework would facilitate integration. The panel agreed to maintain the high-level requirements for general awareness, function-specific and safety training that was contained in Part 1;4.2.1 of the 2017-2018 Edition.

2.1.4.4 There had remained concerns that removing the tables in Part 1;4 (Tables 1-4 and 1-5) that identified subject matter in the Technical Instructions for which various categories of personnel should be familiar would create problems in States that used these tables as a tool to qualify training. While supporting the competency-based approach, there was a desire by some to maintain what they called the "qualification" approach afforded by the tables. Additional guidance material was developed to address these concerns (see paragraph 2.1.4.8 under this item of the report).

2.1.4.5 DGP-WG/Training could not reach consensus on whether dangerous goods training for personnel employed by entities not handling dangerous goods should be mandated. The issue had been debated over many meetings and was discussed in greater detail under Agenda Item 6.4 — Scope of Annex 18 (see paragraph 6.4.1 under Agenda Item 6 of this report). Some members considered training as a requirement that had been in effect for many years through the application of Tables 1-4 and 1-5 and the provisions of Part 1;4.1.1. The removal of the tables resulted in the removal of this requirement. They believed this was an unintended consequence that needed to be rectified and that removing the mandatory status went beyond the mandate of the group. Others had not interpreted the existing provisions to be mandatory. They believed that requiring training for personnel not performing any functions in the Technical Instructions contradicted the principles of competency-based training and assessment and went beyond the scope of Annex 18. Members from States with a legal framework to mandate training for these employees thought it necessary to expand the scope of Annex 18 if it did not already cover them. DGP-WG/Training concluded that a decision on the issue would need to be made by the full panel.

2.1.4.6 The full panel raised similar arguments for and against. Those supporting a mandatory requirement argued that these entities played a role in preventing undeclared dangerous goods from entering the cargo stream, and removing this long-standing requirement would have a detrimental effect on safety which would be difficult to justify. Others, while agreeing that the risk of undeclared dangerous goods entering the cargo stream needed to be mitigated, maintained that mandating training for personnel employed by entities not performing any functions in the Technical Instructions was not possible within the legal framework of their States and that other measures were available to mitigate the risk (see paragraph 6.4.1 under Agenda Item 6 of this report). Unable to reach consensus, a decision was made through a show of hands. A clear majority supported a mandatory requirement. It was decided to include the provision as a mandatory requirement in proposed paragraph 4.1.2 of Part 1, Chapter 4 to the Technical Instructions (see Appendix A to the report on this agenda item).

2.1.4.7 There was over-all support for the material developed and agreement that it should be incorporated in the 2019-2020 Edition with a transitional period of two years before becoming mandatory.

Guidance material proposed for inclusion in a new ICAO Circular

2.1.4.8 The chairman of DGP-WG/Training briefed the panel on proposed revisions to the guidance material contained in Attachment 4, Chapters 2 through 5 of the 2017-2018 Edition of the Technical Instructions. It had been modified to align with the competency-based training and assessment provisions contained in Amendment 5 to the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) which would become applicable in November 2020. Amendment 5 resulted in revised definitions and terminology that necessitated the following consequential changes to the dangerous goods guidance material:

a) the competency-based framework included in Attachment 4, Chapter 3 of the 2017-2018 Edition was converted to a dangerous goods task list. While the content and

structure of the framework stayed the same, reference to "competency units" and "competency elements" had been replaced with references to "tasks";

b) a new generic ICAO competency framework for dangerous goods personnel was developed. It contained a selected group of competencies used to predict successful performance on the job and on which an adapted competency model to reflect an employer's specific requirements could be derived;

c) new guidance material to support the use of the generic ICAO competency framework, adapted competency model, and task list.

2.1.4.9 DGP-WG/Training developed adapted task lists that would typically be performed in certain well-defined roles and for which training and assessment would therefore be required. The group also revised the function/knowledge matrix tool provided in Attachment 4, Chapter 5 of the 2017-2018 Edition of the Technical Instructions. Some cells in the matrix were shaded to identify knowledge elements that would normally be irrelevant for a corresponding task. Although the adapted task lists and matrix tool were intended as guidance, there were concerns that employers would use them as written for their own training programmes without considering their specific needs. However, the adapted task list and matrix tool did alleviate concerns raised by others with respect to the removal of the tables in Part 1;4 of the 2017-2018 Edition (see paragraph 2.1.4.4 of this report).

2.1.4.10 The panel believed the guidance material would be helpful, recognizing that it may need to be further adapted and enhanced once experience using it was gained. DGP-WG/Training recommended that the material be included in a new ICAO circular and that an electronic version of it be made freely available on the ICAO public website. The panel agreed to this approach.

2.1.4.11 The chairman of DGP-WG/Training noted that there was more work that needed to be done with the Supplement. The material needed to be aligned with Amendment 5 to PANS-TRG, and guidance to States for approving dangerous goods training programmes needed to be aligned with the competency-based approach to training and assessment. The work would continue during the next biennium.

2.1.4.12 The panel expressed its appreciation to the chairman and the working group for the work done.

2.1.5 Dangerous Goods Training of Personnel Employed by or Interacting with the Aviation Industry in Areas of Engineering And Maintenance (DGP/26-WP/52)

2.1.5.1 The meeting was advised of a recent dangerous goods incident involving ten aircraft services units which are classified as UN 3356 **— Oxygen generator, chemical** but were offered for transport on a passenger aircraft by an aviation maintenance entity, in coordination with freight forwarding agencies, as UN 1072 **— Oxygen compressed**. The generator was labelled as unserviceable, which, in accordance with Special Provision A111, is forbidden for transport by air. There were also discrepancies between the documentation, marking and labelling. The investigation of the incident revealed that none of the employees had ever received any dangerous goods training. The incident raised concerns with whether the training provisions in the Technical Instructions were sufficient and whether a clear requirement for aviation engineering and maintenance employees to be trained should be added. The

panel was invited to consider requiring dangerous goods training for personnel in areas such as engineering and maintenance.

2.1.5.2 There was sympathy for the issue raised. Panel members noted challenges in ensuring aviation maintenance personnel were aware that certain aircraft parts were subject to dangerous goods requirements when transported as cargo. It was suggested that addressing the issue in another Annex may be a more effective approach. The proposer expressed appreciation for the comments received and would consider submitting a proposal to address the issue over the next biennium.

2.2 AMENDMENTS TO PART 2 OF THE TECHNICAL INSTRUCTIONS: CLASSIFICATION OF DANGEROUS GOODS

2.2.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 2 (DGP/26-WP/12)

2.2.1.1 The meeting reviewed amendments to Part 2 of the Technical Instructions to reflect the decisions taken by UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/16 and DGP-WG/17.

2.2.1.2 The amendments were agreed, subject to the following:

a) Provisions for samples of energetic materials to be assigned to UN 3223 **— Self-reactive liquid type C** or UN 3224 **— Self-reactive solid type C** were added as a new Part 2;0.5.4 for the sake of alignment with the UN Recommendations. They were added to address a need to transport substances for further testing in order to determine whether the substance was a candidate for an explosive of Class 1, for which transport as samples was prohibited, or a self-reactive substance of Division 4.1, for which transport as samples was permitted. It was noted that the UN provisions did not include an indication of how to describe the substances on the transport document. A requirement for the proper shipping name to be supplemented with the word "sample" was added to the Technical Instructions, with the assumption that it was an inadvertent omission by the UN Sub-Committee. The Secretary would seek confirmation from the UN Sub-Committee at its Fifty-second session (Geneva, 27 November to 6 December 2017).

b) New provisions for classification of articles containing dangerous goods n.o.s. were added as a new Part 2;0.6 for the sake of alignment with the UN Recommendations. The following modifications were made in the Technical Instructions:

1) The UN Recommendations included a note referring to UN 3363 —**Dangerous goods in apparatus** or **Dangerous goods in machinery** for articles without an existing proper shipping name and containing only dangerous goods within the permitted limited quantity amounts specified in the dangerous goods list of the UN Recommendations. The note was replaced with a new paragraph 2;0.6.0 in the Technical Instructions which took into account the different method of determining quantity limits for UN 3363 in the Technical Instructions. Consequential amendments were made to Special Provision A107, which was

assigned to UN 3363, including a provision allowing for transport with the approval of the State of Origin and State of the Operator when the quantity of dangerous goods exceeded the limits permitted in the assigned packing instruction (962) while meeting the limits established in the UN Recommendations.

2) Revisions were made to align with corrections to the twentieth revised edition of the UN Model Regulations contained in the report of the Sub-Committee at its fifty-first session (Geneva, 3 to 7 July 2017).

c) A new requirement for manufacturers and subsequent distributors of cells or batteries to make the test summary available was added as a new Part 2;9.3.1 g) for the sake of alignment with the UN Recommendations. The UN Sub-Committee agreed, at its 51st Session (Geneva, 3 to 7 July 2017), that this test summary should only be required from 1 January 2020 for lithium cells or batteries initially manufactured on or after 1 July 2003. This would only be reflected in the 21st revised edition of the UN Model Regulations, but the Sub-Committee recommended that it be taken into account by modal organizations when aligning the provisions of the twentieth revised edition of the Recommendations. Accordingly, the panel agreed to include the provisions.

2.3 AMENDMENTS TO PART 3 OF THE TECHNICAL INSTRUCTIONS: DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

2.3.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 3 (DGP/26-WP/13)

2.3.1.1 The meeting reviewed amendments to Part 3 of the Technical Instructions to reflect the decisions taken by UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/16 and DGP-WG/17.

2.3.1.2 The amendments were agreed, subject to the following:

a) Consequential amendments were made to Special Provision A107 for the sake of alignment with the new provisions for classification of articles containing dangerous goods n.o.s. (see 2.2.1.2 b) of this report).

b) It was agreed to assign A176, which specified requirements for metal hydride storage systems, to UN 3529 (engines and machines powered by flammable gas fuel cells). It had been already assigned to UN 3528 (engines and machinery powered by flammable liquid fuel cells) and UN 3166 (vehicles powered by flammable liquid fuel cells). The corresponding UN special provision (SP356) was not assigned to UN 3528 or UN 3529 in the Model Regulations, although it was assigned to all proper shipping names for UN 3166. The UN Sub-Committee would be advised of the revision.

c) Minor corrections and editorial amendments were made for the sake of clarity and to align with corrections to the twentieth revised edition of the UN Model Regulations contained in the report of the Sub-Committee at its fifty-first session (Geneva, 3 to 7 July 2017).

2.3.2 **Revision to Special Provision A78 (DGP/26-WP/7)**

2.3.2.1 It was noted that Special Provision A78 applied to radioactive material with one or more subsidiary hazards. It was also noted that this special provision did not include any restrictions for the constituent which contributed to the subsidiary hazard when it was listed as forbidden in Table 3-1. An amendment to Special Provision A78 was therefore proposed to forbid the transport of radioactive material when the constituent which most predominantly contributed to a subsidiary hazard was forbidden. The amendment also included provisions for an approval when Special Provision A1 or A2 was assigned to the constituent.

2.3.2.2 While there were no objections to the amendment in principle, the last paragraph of Special Provision A78 already contained restrictions which conflicted with the revised text. A revised amendment was agreed.

2.3.3 **Revision to Special Provision A67 (DGP/26-WP/8)**

2.3.3.1 Packing Instruction 872 applied to UN 2800 — **Batteries, wet, non-spillable** and contained testing provisions used for the purpose of classification. It was suggested that including the classification criteria in a packing instruction was inconsistent since the assignment of packing instructions to dangerous goods was based on their classification. An amendment was therefore proposed which moved the classification criteria from Packing Instruction 872 to Special Provision A67 and deleted a reference to Packing Instruction 872 from the passenger provisions for mobility aids. It was noted that these provisions were already included in the corresponding special provision in the UN Model Regulations (SP 238).

2.3.3.2 There were no objections to the proposal, although it was noted that the existing provisions did not align with the UN Model Regulations. Whether or not the deviation was intentional was questioned. It was agreed that there may be a need for alignment and clarity, but this should be addressed separately during the next biennium. The amendment was agreed.

2.3.4 **Aerosols (DGP/26-WP/25)**

2.3.4.1 The panel was invited to consider whether unique UN numbers should be assigned to groups of aerosols having the same class or division and, when applicable, subsidiary hazard. It was suggested that this would allow for clearer communication of the specific hazards posed.

2.3.4.2 It was noted that the same issue had been raised at the UN Sub-Committee years ago and that the addition of more UN numbers for aerosols had not been supported. The chairman of the UN Sub-Committee was present and acknowledged that the committee was mindful in adding new entries unless there was a good reason. He noted that additional UN numbers were considered to address modal transport conditions, but normally only when there was a need to differentiate operationally based on the hazards. An industry observer familiar with the shipment of aerosols noted that members of his industry were content with the status quo.

2.3.4.3 The presenter appreciated the comments received and would consider whether or not to take further action.

2.4 AMENDMENTS TO PART 4 OF THE TECHNICAL INSTRUCTIONS: PACKING INSTRUCTIONS

2.4.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 4 (DGP/26-WP/14)

2.4.1.1 The meeting reviewed amendments to Part 4 of the Technical Instructions to reflect the decisions taken by UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/16 and DGP-WG/17.

2.4.1.2 The amendments were agreed, subject to the following:

a) Amendments to Packing Instruction 218 of the Technical Instructions made to reflect the decisions taken by UNCOE did not appear in the twentieth revised edition of the UN Recommendations. The amendments were revised for the sake of alignment with the published edition.

b) Text in Packing Instruction 220 had been erroneously deleted. It was reinstated.

c) Provisions for samples of energetic materials classified as UN 3223 **— Self-reactive liquid type C** or UN 3224 **— Self-reactive solid type C** in accordance with the new provisions in Part 2;0.5.4 (see 2.2.1.2 a) of this report) were added to Packing Instruction 459 for the sake of alignment with the UN Recommendations. The panel considered the structure of the provisions overly complicated. Editorial revisions were made to provide better clarity. The Secretary would inform the UN Sub-Committee of the changes.

d) References to the classification criteria for lithium batteries contained in Part 2;9.3 were modified in Packing Instructions 950-952 and 965-970 taking into account the new provisions added to 2;9.3.1.

2.4.2 Vehicles Powered by Flammable Gas and Flammable liquid (DGP/26-WP/4)

2.4.2.1 A requirement for assigning vehicles powered by a flammable liquid and a flammable gas to UN 3166 — **Vehicle, flammable gas powered** had been contained in Special Provision A203. It was noted that Special Provision A203 would be deleted from the 2019-2020 Technical Instructions, but the requirement in A203 would be incorporated into a new Special Provision A214 (see paragraph 2.3.1 of this report).

2.4.2.2 While the wording included in Special Provision A214 clearly identified the correct classification for vehicles that were powered by both a flammable liquid and a flammable gas, what was not apparent was that the shipper must comply with the applicable parts of Packing Instruction 950 that related to the flammable liquid in the fuel tank in addition to all of the applicable parts of Packing Instruction 951.

2.4.2.3 An amendment incorporating references to the requirements in Packing Instruction 950 for flammable liquid fuel tanks in Special Provision A214 and Packing Instruction 951 was proposed to address this. The amendment to Packing Instruction 951 was agreed, but the panel did not believe the amendment to Special Provision A214 was necessary.

2.4.3 Additional Packing Requirements for UN 1308 (DGP/26-WP/6)

2.4.3.1 The Technical Instructions permitted single packagings for UN 1308 — **Zirconium suspended in a flammable liquid** when assigned to Packing Group I or II. However, the UN Model Regulations did not. An amendment to Packing Instructions 360-366 forbidding their use was therefore proposed for the sake of alignment.

2.4.3.2 The amendment was agreed in principle, but a revision to the wording to align more closely with the wording in the UN Model Regulations was suggested and agreed, i.e. "For Packing Groups I and II, only combination packagings are permitted." It was noted that a proposal to replace the UN wording with "Single packagings … were not permitted" at the UN Sub-Committee had raised concerns as this would imply that composite packagings were allowed, which was not the case.

2.4.3.3 It was also agreed to introduce the gross mass package limit of 75 kg included in the UN Model Regulations. The proposer had not included this limit, recognizing that the packing instruction would limit the total quantity per package to 60 L. It was suggested, however, that the density of UN 1308 made it possible for the gross mass limit to exceed 75 kg while not exceeding the 60 L quantity per package limit.

2.4.3.4 The amendment, as revised, was agreed.

2.4.4 Packing Instruction 958: UN 2590 (DGP/26-WP/9)

2.4.4.1 A number of inconsistencies between the Technical Instructions and the UN Model Regulations with respect to asbestos were identified at DGP-WG/17, and a new packing instruction had been proposed to address them (see paragraph 3.2.4.4 of the DGP-WG/17 Report contained in DGP/26-WP/3). The working group agreed that some of the inconsistencies identified needed to be addressed, some were deliberately inconsistent, and some needed more consideration. A new amendment was proposed to DG/26 based on the working group's discussions.

2.4.4.2 The amendment proposed to DGP/26 removed the prohibition on the transport of UN 2212 — **Asbestos, amphibole** on both passenger and cargo aircraft, added a new packing instruction assigned to UN 2212 and UN 2590 — **Asbestos, chrysotile** and introduced limited quantity provisions for both. Removing the prohibition had also been proposed at DGP-WG/17, but the working group wanted to assess the original reasoning for forbidding it before making a decision. The proposer noted that UN 2212 had historically been considered a greater health hazard than UN 2590 (permitted on both passenger and cargo aircraft), but had since been shown not to be the case and that both were equally harmful. However, there was no data provided to the panel to support this. It was recognized that the risk to health was based on long-term exposure, but the panel maintained that the potential risk to operator employees, passengers and crew needed to be considered. It was noted that there were recirculation systems on most aircraft that would allow particles that got into the air to be drawn back into the passenger compartment. There was a suggestion to allow transport on cargo aircraft only, but a counter argument was that this should only be justified if there were additional mitigating measures on a cargo aircraft to reduce the risk that were not

available on a passenger aircraft. It was noted that consideration could be given to the fact that fresh air was circulated to the cockpit. However, panel members did not believe there was a need to transport these substances in high quantities, although there might be cases when samples needed to be transported. It was therefore agreed to maintain the prohibition for UN 2212 but to assign Special Provision A2 to it, allowing for transport on cargo aircraft with the approval of the States of the Operator and Origin. A consequential amendment to Table S-3-1 for UN 2212 was also agreed.

2.4.4.3 The panel concluded that the assignment of Packing Instruction 958 to UN 2590 would be maintained in lieu of a new packing instruction but agreed that amendments were needed for the sake of consistency and alignment with the UN Model Regulations. These included the addition of combination packaging provisions, the introduction of single packagings that were permitted in the UN Model Regulations but not the Technical Instructions, and revision to the additional packing requirements for both combination and single packagings to align with the intent of the UN Model Regulations while maintaining the limitations of the Technical Instructions. The limited quantity provisions proposed were removed as there was no support for them from the panel.

2.4.4.4 The revised amendment was agreed.

2.5 AMENDMENTS TO PART 5 OF THE TECHNICAL INSTRUCTIONS: SHIPPER'S RESPONSIBILITIES

2.5.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 5 (DGP/26-WP/15)

2.5.1.1 The meeting reviewed amendments to Part 5 of the Technical Instructions to reflect the decisions taken by UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/17.

2.5.1.2 The amendments were agreed, subject to:

a) the relocation of new labelling provisions for articles containing dangerous goods n.o.s. to the Supplement to the Technical Instructions (the panel had agreed that these articles should be forbidden for transport by air); and

b) the removal of a specific measurement requirement for the width of the line forming the diamond shape of hazard labels.

The specific width requirement, which had been introduced into the eighteenth revised edition of the UN Recommendations, had caused problems in that consignments were being rejected during the acceptance check if the width was at least 2 mm. The issue was brought to the attention of the Sub-Committee at its 51st Session. The Sub-Committee agreed that specifying a minimum thickness for the line was not necessary for safety and agreed to adopt an amendment in the twentieth revised edition of the UN Model Regulations. It invited organizations responsible for modal regulations to amend their respective instruments accordingly.

2.6 AMENDMENTS TO PART 6 OF THE TECHNICAL INSTRUCTIONS: PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

2.6.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 6 (DGP/26-WP/16)

2.6.1.1 The meeting reviewed amendments to Part 6 of the Technical Instructions to reflect the decisions taken by UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/17.

2.6.1.2 The amendments were agreed.

2.7 AMENDMENTS TO PART 7 OF THE TECHNICAL INSTRUCTIONS: OPERATOR'S RESPONSIBILITIES

2.7.1 Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 7 (DGP/26-WP/17)

2.7.1.1 The meeting reviewed amendments to Part 7 of the Technical Instructions to reflect the decisions taken by UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/16 and DGP-WG/17.

2.7.1.2 The amendments were agreed, subject to:

a) editorial amendments in Part 7;2.2.1.2 and removal of redundant text;

b) removal of references to substances stabilized by temperature control and polymerizing substances in Part 7;2.13. The text had been added to the UN Recommendations, but the panel agreed that it should not be included in the Technical Instructions as these substances were forbidden for transport by air.

2.7.2 Accessibility of Engines Loaded on Cargo Aircraft (DGP/26-WP/5)

2.7.2.1 Engines were classified as Class 9 and assigned to UN 3166 prior to the 2017-2018 Edition of the Technical Instructions. Although flammable gas powered engines were permitted on cargo aircraft only, as a Class 9 article they were not subject to the specific loading requirements for packages or overpacks of dangerous goods bearing the "Cargo aircraft only" label in Part 7;2.4.1. Large aircraft engines could therefore be loaded without having to be accessible to the flight crew during flight. Such engines were normally loaded on the main deck near the aircraft centre of gravity in accordance with weight and balance restrictions. Amendments incorporated in the 2017-2018 Edition of the Technical Instructions assigned UN 3529 to Division 2.1 and UN 3528 to Class 3 and restricted UN 3529 to cargo aircraft only. This meant that UN 3529 would be subject to the accessibility requirements in Part 7;2.4.1. This caused difficulties because engines would not likely be accessible if loaded near the aircraft centre of gravity. It was noted that the UN Sub-Committee's decision to reclassify was not based on any safety concerns but rather to address a specific need for land transport. An amendment which

added UN 3528 and UN 3529 to the list of exceptions from the specific loading requirements for packages or overpacks bearing the "Cargo aircraft only" in Part 7;2.4.1 was therefore proposed.

2.7.2.2 While there were no objections to adding UN 3529 to the list of exceptions from a safety perspective, some panel members were uncomfortable with excepting individual substances or articles from the provisions as this went against the philosophy of excepting based on hazards. There was agreement that the general philosophy should be adhered to, but the panel was forced to deal with the decision the UN Sub-Committee made to change the classification, despite the fact that the hazards had not changed. With that in mind, there were no panel members who believed the accessibility requirements were necessary for these engines.

2.7.2.3 Some panel members questioned the need for including UN 3528 in the list of exceptions, since the cargo aircraft only label was not required on these Class 3 engines and they were therefore not subject to the loading requirements. It was explained that although the label was not necessary, some shippers wanted to ensure that their engine consignment went on a cargo aircraft. Several concerns were raised with this approach:

a) using a cargo aircraft only label for reasons other than safety would weaken the message the label conveyed;

b) adding UN 3528 to the list of exceptions deviated from the general principle of the provision and would therefore cause confusion; and

c) using a label indicating that dangerous goods were forbidden on a passenger aircraft when they were not was a contradiction.

2.7.2.4 Despite the concerns raised, there was sympathy that not adding the item to the list would alter existing practices and that these practices did not have a negative impact on safety. An explanation for including UN 3528 in the list of exceptions would be provided in the *DGP Guidance Document to Aid in Preparation of the Technical Instructions and Supporting Documents* (see report on Agenda Item 5).

2.7.2.5 The amendment was agreed as proposed.

2.7.3 **Loading of Cargo Aircraft (DGP/26-WP/24)**

2.7.3.1 Specific loading requirements for packages or overpacks of dangerous goods bearing the "Cargo aircraft only" label were included in Part 7;2.4.1 of the Technical Instructions. This provision applied to packages or overpacks of dangerous goods which needed to be loaded for carriage by a cargo aircraft in either a Class C aircraft cargo compartment, in a unit load device equipped with a fire detection/suppression system equivalent to that required by the certification requirements of a Class C aircraft cargo compartment, or accessible to a crew member or other authorized person so that they could handle and separate the packages or overpacks from other cargo in the event of an emergency. The panel was invited to consider clarifying what was meant by "accessible". Members reported various methods employed for achieving compliance with this requirement within their States, but there was a lack of data demonstrating whether or not having these packages or overpacks accessible actually resulted in effective emergency response.

2.7.3.2 The discussion revealed inconsistent assumptions among dangerous goods, airworthiness, and operations experts. An airworthiness expert noted that design regulations did not take accessibility as

a form of emergency response into account for Class E compartments. He cited the ability to identify and respond to a threat being dependent on adequate visibility as an example, since there were no design requirements for aircraft systems to eliminate smoke from the compartment for this purpose. He also suggested that standard side-by-side loading configurations did not leave enough space for adequate access, although cargo operations experts described some of their loading methods which did allow for this. Expecting a crew member to leave the cockpit to respond to an emergency was suggested as another contradiction, since two-man crew in the cockpit requirements would not allow for this. However, it was also noted that flight crew were provided with a level of discretion to employ any measures necessary in the event of an emergency.

2.7.3.3 There was agreement that assumptions underlying cargo accessibility requirements needed to be reviewed. The provisions had been in the Technical Instructions since their inception, and much had changed since that time in terms of aircraft design standards and operations. It was noted that accessibility was one measure referred to as justification for allowing dangerous goods on cargo aircraft which were not permitted on passenger aircraft. It was suggested that coordination among airworthiness, operations and dangerous goods experts was needed to ensure this justification was still valid.

2.7.3.4 The meeting expressed its appreciation to the panel member for bringing the issue forward and recommended that a job card on the subject be submitted to the ANC for approval (see paragraph 2.9 of this report).

2.7.4 **Information to the Pilot-In-Command (DGP/26-WP/27)**

2.7.4.1 Table 7-9 listed dangerous goods not required to appear on the notification to the pilot-in-command (NOTOC). It was reported that the fact that this table defined what was *not* required as opposed to other provisions in the Technical Instructions which defined what *was* required had caused some operators to query whether they could be more stringent. A note recommending that information concerning all dangerous goods be provided to the pilot-in-command was therefore proposed for inclusion under Table 7-9.

2.7.4.2 There was concern that the amendment would cause more confusion. The title of the table did not in any way imply that the items listed could not appear on the NOTOC, the table simply listed items that were not required to be listed. There was nothing to preclude anyone from being more stringent. The amendment was not agreed.

2.7.5 **ULD Tag Provisions (DGP/26-WP/30)**

2.7.5.1 It was noted that while Part 7;2.8.3 required the information on the identification tag displayed on the exterior of unit load devices to be legible and visible when placed inside a protective tag holder, there was no requirement for the information to be legible when it wasn't inside a protective tag holder. There had been incidents where the tag itself was visible but the information on it was not at all times. An amendment to Part 7;2.8.2 was proposed to make it clear that the requirement applied regardless of whether or not the tag was in a protective holder.

2.7.5.2 The amendment was not agreed. Panel members believed the provisions made it clear that the information needed to be legible, but requiring that the information be visible at all times implied that it would need to be reproduced on each side of the tag. This was not considered necessary. The requirement for a border of prominent red hatchings to appear on both sides was deemed to be sufficient.

2.7.6 **Transport of Magnetized Material (DGP/26-WP/32)**

2.7.6.1 The panel was invited to discuss concerns raised by some operators with how to implement provisions related to the transport of magnetized material. Some occurrences with UN 2807 — **Magnetized material** had been reported involving interference with aircraft instruments. It was questioned whether the cumulative effect of several magnetized articles could cause interference even if each article on its own did not meet the classification criteria for magnetized material. How operators were expected to comply with the requirements of the Technical Instructions was raised, since the magnetic strength specifications were not normally provided with magnetized material, and it was unlikely that passengers would know whether they were carrying magnetized material classified as dangerous goods.

2.7.6.2 Incidents involving magnetic interference were extremely rare. One panel member noted that airworthiness experts within his State considered that the limits established in the Technical Instructions for packages transported as cargo were very conservative and should not cause any problems with commercial aircraft. The member nominated by the International Federation of Air Line Pilots' Associations (IFALPA) noted that although very rare, there were isolated cases when a larger number of magnetized items had been carried by passengers and cumulatively they did have an effect on aircraft systems. He suggested that measures to raise passenger awareness should be implemented.

2.7.6.3 It was suggested that operations and airworthiness experts be advised of the concerns raised. The Secretary would bring it to the attention of the secretaries of the Airworthiness Panel (AIRP) and the Flight Operations Panel (FLTOPSP).

2.8 **AMENDMENTS TO PART 8 OF THE TECHNICAL INSTRUCTIONS: PROVISIONS CONCERNING PASSENGERS AND CREW**

2.8.1 **Draft Amendments to the Technical Instructions agreed at DGP-WG/16 and DGP-WG/17 (DGP/26-WP/18)**

2.8.1.1 The meeting reviewed amendments to Part 8 of the Technical Instructions to reflect proposals agreed by DGP-WG/16 and DGP-WG/17. DGP-WG/17 recommended incorporating an amendment prohibiting spare batteries and power banks from being recharged or from being electrically connected or providing power to an external device in the 2017-2018 Edition of the Technical Instructions by way of an addendum, but that amendment was later withdrawn (see paragraph 6.3.4 of the report under Agenda Item 6). The other amendments were agreed, subject to them being reflected in the new structure agreed by the panel (see paragraph 2.8.2).

2.8.1.2 Provisions for active baggage tags had been recommended by DGP/25 (see paragraph 5.9 of the DGP/25 Report). The ANC did not support incorporating these provisions into the 2017-2018 Edition of the Technical Instructions without input from the Airworthiness Panel (AIRP) on the potential effects from electromagnetic interference. AIRP was subsequently tasked via job card AIRP.012.01 to analyse the risks and to develop provisions where necessary. The Secretary of AIRP addressed DGP/26 and advised that work would commence at the fifth meeting of the Airworthiness Panel (AIRP/5) which would convene from 6 to 10 November 2017. The need to address the issue in a timely manner was emphasized by a DGP member, noting that manufacture and use of the devices was on the rise. It was agreed to include the proposed amendment in the DGP/26 Report pending the review by AIRP. The ANC would be asked to re-consider the amendment to Part 8 based on AIRP's conclusions.

2.8.2 **Revision to Part 8 (DGP/26-WP/35)**

2.8.2.1 DGP/25 had been invited to comment on revisions aimed at simplifying the passenger provisions in Table 8-1 for incorporation in the 2019-2020 Edition of the Technical Instructions (see paragraph 2.8.4 of the DGP/25 Report). The list was simplified by grouping entries according to their hazard and function. This allowed for the removal of redundant text that had been repeated in the existing provisions. Work on simplifying the list continued at DGP-WG/16 (see paragraph 3.2.8.3 of the DGP-WG/16 Report) and DGP-WG/17 (see paragraph 3.2.8.7 of the DGP-WG/17 Report). A revised proposal was presented to DGP/26 to address comments raised at these previous meetings.

2.8.2.2 Other amendments were proposed in addition to restructuring the table into generic groupings. These included:

a) Modifications to the provisions preceding the table were made for the purpose of simplification and making it clear that dangerous goods were forbidden for carriage by passengers and crew unless they were listed in Table 8-1 and intended for personal use only. Specifying that they must be for personal use only was an attempt to prevent salespersons and retailers from carrying large quantities of items in accordance with the provisions for passengers and crew, something which had been reported;

b) Introductory text forbidding specific types of articles containing dangerous goods was moved to a new note and additional items that might be commonly carried by passengers on other modes of transport but which were prohibited by air were added to this list;

c) The entries for lithium batteries were merged into one entry. Specific reference was made to portable electronic devices (PEDs) because of their prevalence;

d) The “on the person” column was removed as the requirement for passengers to carry dangerous goods “on the person” applied only to lighters and matches. The requirement was included with the other restrictions for those articles;

e) Entries for non-radioactive medicinal articles (including aerosols), toiletry articles (including aerosols) and aerosols of Division 2.2 with no subsidiary hazard, for sporting or home use, were merged into one entry because of their similar restrictions; and

f) A separate Table 8-2 was created for items not intended to be carried by the average passenger, such as instruments carried by the Organization for the Prohibition of Chemical Weapons or other government agencies.

2.8.2.3 The panel was strongly in favour of the new structure and expressed its appreciation for the work done. The amendment, subject to a number of revisions for the sake of clarity and consistency, was agreed.

2.8.3 **Battery Powered Mobility Aids (DGP/26-WP/36)**

2.8.3.1 DGP/25 considered a proposal to simplify the provisions for battery-powered mobility aids (see paragraph 2.8.3 of the DGP/25 Report) whereby the three entries included in Table 8-1 of the 2017-2018 Edition were merged into one. These were mobility aids powered by:

a) non-spillable wet batteries;

b) spillable batteries; and

c) lithium ion batteries.

Noting that the provisions in the 2017-2018 Edition had 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).

2.8.3.2 There had been strong support for the principles applied in developing the amendment at DGP/25. A number of suggestions for improvement were proposed at that time and work on the provisions continued at DGP-WG/16 (see paragraph 3.2.8.2 of the DGP-WG/16 Report contained in DGP/26-WP/2) and DGP-WG/17 (see paragraph 3.2.8.6 of the DGP-WG/17 Report contained in DGP/26-WP/3). A revised proposal was presented to DGP/26 which:

a) removed references to "collapsible" mobility aids in response to the conclusion reached at DGP-WG/16 that the ability of a mobility aid to be collapsible was irrelevant as long as the battery was protected; and

d) required the operator to secure battery-powered mobility aids with installed batteries by use of restraint devices in response to the conclusion reached at DGP-WG/17 that simply requiring the mobility aid to be secured to prevent movement was ambiguous.

2.8.3.3 Concerns with respect to the feasibility and criteria for setting Watt-hour limits for lithium batteries that powered mobility aids had been raised at previous meetings (see paragraph 3.5.3.9 of the DGP-WG/16 Report contained in DGP/26-WP2). Mobility aids powered by lithium batteries with a higher watt hour rating than what was permitted in accordance with the passenger provisions were on the market. It was recognized that advances in technology in both the types of mobility aids available and the size of the battery needed to power them would likely lead to a continuous upward trend in battery energy density. This created a conundrum between the rights of passengers with restricted mobility and the need to ensure safety on the aircraft. A holistic approach to acknowledging the rights of passengers without compromising safety would require efforts beyond the DGP. The Secretary was invited to raise these concerns to the ANC during its review of the DGP/26 Report.

2.8.3.4 The panel was strongly in favour of the revisions and expressed its appreciation for the work done. The amendment, subject to a number of revisions for the sake of clarity and consistency, was agreed.

2.8.4 Spare Non-Spillable Battery for Mobility Aid (DGP/26-WP/21)

2.8.4.1 An amendment allowing passengers with restricted mobility to carry a spare non-spillable battery for their mobility aid was proposed. It was noted that spare lithium batteries were permitted for passengers with collapsible lithium battery-powered mobility aids. Allowing spare lithium battery spares while not allowing non-spillable battery spares did not seem justified, particularly since non-spillable batteries were considered "not restricted" in accordance with Special Provision A67 if consigned as cargo.

2.8.4.2 It was agreed that a spare non-spillable battery should be permitted. This was reflected in the restructured Part 8 and in the new Part 7;2.13 (see paragraphs 2.8.2 and 2.8.3 of this report).

2.9 RECOMMENDATIONS

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 2019-2020 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 training provisions in Part 1, Chapter 4 of the Technical Instructions

That the training provisions of the Technical Instructions be amended as indicated in Appendix B to the report on this agenda item.

Recommendation 2/3 — Guidance material to support a competency-based approach to dangerous goods training and assessment

That the guidance material contained in Appendix C to the report on this agenda item be included in a new ICAO circular and that the material be made freely available on the ICAO public website.

Recommendation 2/4 — Accessibility requirements for dangerous goods permitted only on cargo aircraft

That the accessibility requirements for dangerous goods permitted only on cargo aircraft be reviewed by dangerous goods, airworthiness and operations experts with a view to determining whether their effectiveness as a mitigation measure against incidents during flight remains valid as described in the draft job card contained in Appendix D to the report on this agenda item.

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APPENDIX A

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Part 1

GENERAL

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Chapter 1

SCOPE AND APPLICABILITY

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UN Model Regulations, Chapter 1.1, Note 1 (see ST/SG/AC.10/44/Add.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.6 and Amend.1), the contents of which are:

. . .

1.1 GENERAL APPLICABILITY

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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:

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DGP-WG/17 (see paragraph 3.2.1.1 of DGP/26-WP/3):

c) for dropping in connection with agricultural, horticultural, forestry~~, avalanche control~~, ice jam control and landslide clearance or pollution control activities;

d) for dropping or triggering in connection with avalanche control activities;

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

~~e~~f) vehicles carried in aircraft designed or modified for vehicle ferry operations and all of the following requirements are met:

1) authorization has been given by the appropriate authorities of the States concerned, and such authorities have prescribed specific terms and conditions for the particular operator's operation;

. . .

~~f~~g) 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.

~~g~~h) contained within items of excess baggage being sent as cargo provided that:

. . .

Consequential/editorial amendments:

1.1.5.2 Provision must be made to stow and secure dangerous goods transported under 1.1.5.1 a), b), c) ~~and~~, d) and e) during take-off and landing and at all other times when deemed necessary by the pilot-in-command.

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1.1.5.4 Dangerous goods transported under 1.1.5.1 a), b), c) ~~and~~, d) and e) may be carried on a flight made by the same aircraft before or after a flight for the purposes identified above, when it is impracticable to load or unload the dangerous goods immediately before or after the flight, subject to the following conditions:

a) the dangerous goods must be capable of withstanding the normal conditions of air transport;

b) the dangerous goods must be appropriately identified (e.g. by marking or labelling);

c) the dangerous goods may only be carried with the approval of the operator;

d) the dangerous goods must be inspected for damage or leakage prior to loading;

e) loading must be supervised by the operator;

f) the dangerous goods must be stowed and secured in the aircraft in a manner that will prevent any movement in flight which would change their orientation;

g) the pilot-in-command must be notified of the dangerous goods loaded on board the aircraft and their loading location. In the event of a crew change, this information must be passed to the next crew;

h) all personnel must be trained commensurate with their responsibilities;

i) the provisions of 7;4.2 and 7;4.4 apply.

1.1.5.5 Dangerous goods transported under 1.1.5.1 a), b), c) ~~and~~, d) and e) 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).

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Chapter 2

LIMITATION OF DANGEROUS GOODS ON AIRCRAFT

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2.3 TRANSPORT OF DANGEROUS GOODS BY POST

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DGP-WG/16 (see paragraph 3.2.1.6 of DGP/26-WP/2):

. . .

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

. . .

DGP-WG/16 (see paragraph 3.2.1.3 of DGP/26-WP/2):

2.3.3 The procedures of designated postal operators (DPOs) for controlling the introduction of dangerous goods in mail into air transport are subject to review and approval by the civil aviation authority of the State where the mail is accepted.

2.3.4 ~~Before a~~The ~~designated postal operator~~DPO must have received specific approval from the civil aviation authority before the DPO can introduce the acceptance of lithium batteries as identified in 2.3.2 d) and e) ~~they must have received specific approval from the civil aviation authority~~.

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Chapter 3

GENERAL INFORMATION

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3.1 DEFINITIONS

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UN Model Regulations, Chapter 1.2.1 (see ST/SG/AC.10/44/Add.1)

Animal material. Animal carcasses, animal body parts ~~or animal~~, foodstuffs or feedstuffs derived from animals.

. . .

UN Model Regulations, Chapter 1.2.1 (see ST/SG/AC.10/44/Add.1)

GHS. The ~~sixth~~ seventh 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.6~~ Rev.7.

. . .

UN Model Regulations, Chapter 1.2.1 (see ST/SG/AC.10/44/Add.1)

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/~~225~~257 (Sales No. E.~~14~~16.VIII.1).

. . .

UN Model Regulations, Chapter 1.2.1 (see ST/SG/AC.10/44/Add.1)

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

. . .

Dangerous goods. Articles or substances which are capable of posing a ~~risk~~ hazard to health, safety, property or the environment and which are shown in the list of dangerous goods in these Instructions, or which are classified according to these Instructions.

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Chapter 4

TRAINING

Revisions to the dangerous goods training provisions to support a competency-based approach to training and assessment are provided in Appendix B and Appendix C to the report under Agenda Item 2. DGP/26 recommended allowing the provisions contained in the 2017-2018 Edition of the Instructions to be used in place of the new provisions until 31 December 2020 and proposed that they be included in Attachment 4 to the 2019-2020 Edition, as shown in Appendix B to the report under Agenda Item 2..

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Chapter 5

DANGEROUS GOODS SECURITY

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Note 1.— This Chapter addresses the security responsibilities of operators, shippers and others involved in the transport of dangerous goods aboard aircraft. It should be noted that Annex 17 — Security*, provides comprehensive requirements for implementation of security measures by States to prevent unlawful interference with civil aviation or when such interference has been committed. In addition, the* Aviation Security Manual *(Doc 8973 — Restricted) provides procedures and guidance on aspects of aviation security and is intended to assist States in the implementation of their respective national civil aviation security programmes. The requirements in the Chapter are intended to supplement the requirements of Annex 17 and to implement measures to be taken to minimize theft or misuse of dangerous goods that may endanger persons or property. The provisions of this Chapter do not supersede requirements of Annex 17 or the* Aviation Security Manual.

UN Model Regulations, Chapter 1.4.3.2.1 (see ST/SG/AC.10/44/Add.1) and ST/SG/AC.10/C.3/102/Add.1

Note 2.— In addition to the security provisions of these Instructions, appropriate national authorities may implement further security provisions for reasons other than safety of dangerous goods during transport. In order to not impede international and multimodal transport by different explosives security marks, it is recommended that such marks be formatted consistent with an internationally harmonized standard (e.g. European Union Commission Directive 2008/43/EC).

5.3 PROVISIONS FOR HIGH CONSEQUENCE DANGEROUS GOODS

5.3.1 Definition of high consequence dangerous goods

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UN Model Regulations, Chapter 1.4.3.1.5 (see ST/SG/AC.10/44/Add.1)

5.3.1.5 When radioactive material possess subsidiary ~~risks~~ hazards of other classes or divisions, the criteria of Table 1-7 should also be taken into account (see also 1;6.5).

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Chapter 6

GENERAL PROVISIONS CONCERNING RADIOACTIVE MATERIAL

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6.1 SCOPE AND APPLICATION

Corrigendum 1 to UN Model Regulations, Chapter 1.5.1.1 (see ST/SG/AC.10/1/Rev.19/Corr.1)

6.1.1 These Instructions establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment that are associated with the transport of radioactive material. These Instructions are based on the IAEA *Regulations for the Safe Transport of Radioactive Material*, (2012 Edition), IAEA Safety Standards Series No. SSR-6, IAEA, Vienna (2012). Explanatory material can be found in *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (2012 Edition)*, Safety Standard Series No. ~~TS-G-1.1 (Rev. 1)~~SSG-26, IAEA, Vienna (~~2008~~2014). The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risk.

6.1.2 The objective of these Instructions is to establish requirements that must be satisfied to ensure safety and to protect persons, property and the environment from the effects of radiation in the transport of radioactive material. This protection is achieved by requiring:

a) containment of the radioactive contents;

b) control of external radiation levels;

c) prevention of criticality; and

d) prevention of damage caused by heat.

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

UN Model Regulations, Chapter 1.5.5.1 (see ST/SG/AC.10/44/Add.1)

6.5 RADIOACTIVE MATERIAL POSSESSING OTHER DANGEROUS PROPERTIES

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

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Part 2

CLASSIFICATION OF DANGEROUS GOODS

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INTRODUCTORY CHAPTER

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

1. RESPONSIBILITIES

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

UN Model Regulations, 2.0.0.2 (see ST/SG/AC.10/44/Add.1)

b) under the same UN number and name but with additional hazard communication information as appropriate to reflect the additional subsidiary ~~risk~~ hazard(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.

. . .

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 1: Explosives

Division 1.1: Substances and articles which have a mass explosion hazard
Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard
Division 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
Division 1.4: Substances and articles which present no significant hazard
Division 1.5: Very insensitive substances which have a mass explosion hazard
Division 1.6: Extremely insensitive articles which do not have a mass explosion hazard

Class 2: Gases

Division 2.1: Flammable gases
Division 2.2: Non-flammable, non-toxic gases
Division 2.3: Toxic gases

Class 3: Flammable liquids

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

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

Class 5: Oxidizing substances and organic peroxides

Division 5.1: Oxidizing substances
Division 5.2: Organic peroxides

Class 6: Toxic and infectious substances

Division 6.1: Toxic substances
Division 6.2: Infectious substances

Class 7: Radioactive material

Class 8: Corrosive substances

Class 9: Miscellaneous dangerous substances and articles, including environmentally hazardous substances

The numerical order of the classes and divisions is not that of the degree of danger.

. . .

2.5 Dangerous goods are determined to present one or more of the dangers represented by Classes 1 to 9 and divisions and, if applicable, the degree of danger on the basis of the requirements in Part 2, Chapters 1 to 9.

UN Model Regulations, 2.0.1.5 (see ST/SG/AC.10/44/Add.1)

2.6 Dangerous goods presenting a danger of a single class and division are assigned to that class and division and the degree of danger (packing group), if applicable, determined. When an article or substance is specifically listed by name in the Dangerous Goods List (Table 3-1), its class or division, its subsidiary ~~risk~~ hazard(s) and, when applicable, its packing group are taken from this list.

UN Model Regulations, 2.0.1.6 (see ST/SG/AC.10/44/Add.1)

2.7 ~~Where a substance or article is not specifically listed by name in Table 3-1 and there are two or more hazards of Class 3, 4 or 8 or Division 5.1 or 6.1 associated with its air transport in that it meets the definition for two of those classes or divisions as shown in Part 2, Chapters 1 to 9, it must be classified in accordance with the precedence of hazards table (Table 2-1).~~Dangerous goods meeting the defining criteria of more than one hazard class or division and which are not listed by name in Table 3-1, are assigned to a class and division and subsidiary hazard(s) on the basis of the precedence of hazards in 4.

. . .

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.

UN Model Regulations, 2.0.2.2 (see ST/SG/AC.10/44/Add.1)

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~~ hazard(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:

. . .

3.5 A mixture or solution meeting the classification criteria of these Instructions and composed of a single predominant substance identified by name in Table 3-1 and one or more substances not subject to these Instructions and/or traces of one or more substances identified by name in Table 3-1 must be assigned the UN number and proper shipping name of the predominant substance named in Table 3-1, unless:

a) the mixture or solution is identified by name in Table 3-1 in which case this name must be applied; or

b) the name and description of the substance named in Table 3-1 specifically indicates that it applies only to the pure substance; or

UN Model Regulations, (2.0.2.5 c) (see ST/SG/AC.10/44/Add.1)

c) the hazard class or division, subsidiary ~~risk~~ hazard(s), physical state or packing group of the solution or mixture is different from that of the substance named in Table 3-1; or

d) the hazard characteristics and properties of the mixture or solution necessitate emergency response measures that are different from those required for the substance identified by name in Table 3-1.

If b), c) or d) is applicable, the mixture or solution must be treated as a dangerous substance not specifically listed by name in Table 3-1.

Note.— Although traces of substances may not need to be taken into account for classification purposes, those traces may affect the properties of the substance and do need to be taken into account when considering the compatibility requirements of 4;1.1.3.

3.6 For a solution or mixture when the hazard class, the physical state or the packing group is changed in comparison with the listed substance, the appropriate n.o.s. entry must be used including its packaging and labelling provisions.

3.7 A mixture or solution containing one or more substances identified by name in Table 3-1 or classified under an n.o.s. entry and one or more substances not subject to these Instructions is not subject to these Instructions if the hazard characteristics of the mixture or solution are such that they do not meet the criteria (including human experience criteria) for any class.

3.8 Substances or articles which are not specifically listed by name in Table 3-1 must be classified under a “generic” or “n.o.s.” entry. The substance or article must be classified according to the class definitions and test criteria in this Part, and is then assigned the “generic” or “n.o.s.” entry in Table 3-1 which most appropriately describes the article or substance.[1] This means that a substance is to be assigned to an entry of type c), as defined in 3.2, only if it cannot be assigned to an entry of type b), and to an entry of type d) only if it cannot be assigned to an entry of type b) or c)[1].

UN Model Regulations, 2.0.2.9 (see ST/SG/AC.10/44/Add.1)

3.9 A mixture or solution meeting the classification criteria of these Instructions that is not identified by name in Table 3-1 and that is composed of two or more dangerous goods must be assigned to an entry that has the proper shipping name, description, hazard class or division, subsidiary ~~risk~~ hazard(s) and packing group that most precisely describe the mixture or solution.

4. PRECEDENCE OF HAZARD CHARACTERISTICS

UN Model Regulations, 2.0.3.1 (see ST/SG/AC.10/44/Add.1)

4.1 The precedence of hazards table (Table 2-1) must be used to determine the class of a substance, mixture or solution having more than one ~~risk~~ hazard, when it is not named in Table 3-1 or to assign the appropriate entry for articles containing dangerous goods n.o.s (UN Nos. 3537 to 3548, see 6). For goods having multiple ~~risks~~ hazards, which are not specifically listed by name in Table 3-1, the most stringent packing group denoted to the respective hazards of the goods takes precedence over other packing groups, irrespective of Table 2-1. The correct class or division to be used is shown at the point at which the column and row intersect in Table 2-1. The correct packing group to be used is also shown at the point at which the column and row intersect. The precedence of hazard characteristics of the following have not been dealt with in Table 2-1, as the primary characteristics always take precedence:

a) substances and articles of Class 1;

b) gases of Class 2;

c) liquid desensitized explosives of Class 3;

1. See also the “List of n.o.s. and generic proper shipping names” in Attachment 1, Chapter 2.

d) self-reactive substances and solid desensitized explosives of Division 4.1;

e) pyrophoric substances of Division 4.2;

f) substances of Division 5.2;

g) substances of Division 6.1 with a Packing Group I inhalation toxicity. Except for substances or preparations meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC_{50}) in the range of Packing Group I, but toxicity through oral ingestion or dermal contact only in the range of Packing Group III or less, which must be allocated to Class 8;

h) substances of Division 6.2; and

i) material of Class 7.

UN Model Regulations, 2.0.3.2 (see ST/SG/AC.10/44/Add.1)

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

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

5. TRANSPORT OF SAMPLES

. . .

UN Model Regulations, 2.0.4.3 (see ST/SG/AC.10/44/Add.1) and DGP/26 (see paragraph 2.2.1.2 a) of this report)

5.4 Samples of energetic materials for testing purposes

5.4.1 Samples of organic substances carrying functional groups listed in tables A6.1 and/or A6.3 in Appendix 6 (Screening Procedures) of the UN *Manual of Tests and Criteria* may be transported under UN 3224 (self-reactive solid type C) or UN 3223 (self-reactive liquid type C), as applicable, of Division 4.1 provided that:

a) the samples do not contain any:

i) known explosives;

ii) substances showing explosive effects in testing;

iii) compounds designed with the view of producing a practical explosive or pyrotechnic effect; or

iv) components consisting of synthetic precursors of intentional explosives;

b) for mixtures, complexes or salts of inorganic oxidizing substances of Division 5.1 with organic material(s), the concentration of the inorganic oxidizing substance is:

i) less than 15 per cent, by mass, if assigned to Packing Group I (high hazard) or II (medium hazard); or

ii) less than 30 per cent, by mass, if assigned to Packing Group III (low hazard);

c) available data do not allow a more precise classification;

d) the sample is not packed together with other goods;

e) the sample is packed in accordance with Packing Instruction 459; and

f) the proper shipping name is supplemented with the word “sample”.

UN Model Regulations, 2.0.5 (see ST/SG/AC.10/44/Add.1) and DGP-WG/17 (see paragraph 3.2.2.1 of DGP/26-WP/3) and ST/SG/AC.10/C.3/102/Add.2

6. CLASSIFICATION OF ARTICLES AS ARTICLES CONTAINING DANGEROUS GOODS N.O.S.

6.0 Articles which do not have an existing proper shipping name and which contain only dangerous goods as a residue or as an integral element of the machinery or apparatus must be classified as follows:

a) where the dangerous goods meet the provisions of Packing Instruction 962: UN 3363 — **Dangerous goods in apparatus** or **Dangerous goods in machinery**; or

b) where the net quantity of dangerous goods in the machinery or apparatus exceeds the limits of Packing Instruction 962 but contains dangerous goods permitted as limited quantities within the quantity limits specified in column 7(a) of the UN Model Regulations, see Special Provision A107; or

c) in accordance with paragraphs 6.1 to 6.6 of this section, as applicable.

6.1 Articles containing dangerous goods may be classified as otherwise provided by these Instructions under the proper shipping name for the dangerous goods they contain or in accordance with this section. For the purposes of this section "article" means machinery, apparatus or other devices containing one or more dangerous goods (or residues thereof) that are an integral element of the article, necessary for its functioning and that cannot be removed for the purpose of transport. An inner packaging is not an article.

6.2 Such articles may in addition contain batteries. Lithium batteries that are integral to the article must be of a type proven to meet the testing requirements of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, except when otherwise specified by these Instructions (e.g. for pre-production prototype articles containing lithium batteries or for a small production run, consisting of not more than 100 such articles).

6.3 This section does not apply to articles for which a more specific proper shipping name already exists in Table 3-1.

6.4 This section does not apply to dangerous goods of Class 1, Division 6.2, Class 7 or radioactive material contained in articles.

6.5 Articles containing dangerous goods must be assigned to the appropriate class or division determined by the hazards present using, where applicable, Table 2-1 for each of the dangerous goods contained in the article. If dangerous goods classified as Class 9 are contained within the article, all other dangerous goods present in the article must be considered to present a higher hazard.

6.6 Subsidiary hazards must be representative of the primary hazard posed by the other dangerous goods contained within the article. When only one item of dangerous goods is present in the article, the subsidiary hazard(s), if any, is the subsidiary hazard(s) identified in column 4 of Table 3-1. If the article contains more than one item of dangerous goods and these could react dangerously with one another during transport, each of the dangerous goods must be enclosed separately (see 4;1.1.8).

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Table 2-1. Precedence of hazards and packing groups for Classes 3, 4 and 8 and for Divisions 5.1 and 6.1

. . .

* Substances of Division 4.1 other than self-reactive substances, and solid desensitized explosives and substances of Class 3 other than liquid desensitized explosives.

** For pesticides only, the primary ~~risk~~ hazard must be Division 6.1.

— Denotes an impossible combination.

Note.— For hazards not shown in this table, see 4.

Chapter 1

CLASS 1 — EXPLOSIVES

. . .

Note 4.— Class 1 is unique in that the type of packaging frequently has a decisive effect on the hazard and therefore on the assignment to a particular division. The correct division is determined by use of the procedures provided in this Chapter.

. . .

1.1 DEFINITIONS AND GENERAL PROVISIONS

Class 1 comprises:

a) explosive substances (a substance that is not itself an explosive but which can form an explosive atmosphere of gas, vapour or dust is not included in Class 1), except those that are too dangerous to transport or those where the predominant hazard is appropriate to another class;

b) explosive articles, except devices containing explosive substances in such quantity or of such a character that their inadvertent or accidental ignition or initiation during transport will not cause any effect external to the device either by projection, fire, smoke, heat or loud noise (see 1.5.2); and

UN Model Regulations, 2.1.1.1 c) (see ST/SG/AC.10/44/Add.1)

c) substances and articles not mentioned under 1.1 a) and b), which are manufactured with a view to producing a practical~~,~~ explosive or pyrotechnic effect.

. . .

1.3 DIVISIONS

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).

b) Division 1.2 — Substances and articles which have a projection hazard but not a mass explosion hazard.

c) Division 1.3 — Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

This division comprises substances and articles which:

i) give rise to considerable radiant heat, or

ii) burn one after another, producing minor blast or projection effects or both.

d) Division 1.4 — Substances and articles which present no significant hazard.

This division comprises substances and articles which present only a small hazard in the event of ignition or initiation during transport. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Note.— Substances and articles of this division are in Compatibility Group S if they are so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package, unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder fire fighting or other emergency response efforts in the immediate vicinity of the package.

e) Division 1.5 — Very insensitive substances which have a mass explosion hazard.

This division comprises substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

Note.— For the normal conditions of transport, see Notes 2 to 4 of the Introductory Notes to Part 4.

UN Model Regulations, 2.1.1.4 f) (see ST/SG/AC.10/44/Add.1)

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

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

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

. . .

1.4 COMPATIBILITY GROUPS

1.4.1 Goods of Class 1 are assigned to one of six divisions, depending on the type of hazard they present (see 1.3.1), and to one of thirteen compatibility groups which identify the kinds of explosive substances and articles that are deemed to be compatible. Tables 2-2 and 2-3 show the scheme of classification into compatibility groups, the possible hazard divisions associated with each group, and the consequential classification codes.

UN Model Regulations (Part 1;4.2.1 provisions aren't included in the UN Model Regulations. Amendment is proposed for the sake of alignment with current reference.

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.10/11/Rev.6 and Amend.1) to demonstrate that any hazardous effects arising from functioning are confined within the package. Evidence of a hazardous effect outside the package includes:

a) denting or perforation of the witness plate beneath the package;

b) a flash or flame capable of igniting such as a sheet of 80 ± 3 g/m² paper at a distance of 25 cm from the package;

c) disruption of the package causing projection of the explosives contents; or

d) a projection which passes completely through the packaging (a projection or fragment retained or stuck in the wall of the packaging is considered as non-hazardous).

Editorial amendment.— Move paragraph 1.5 after Tables 2-2 and 2-3:

~~**1.5 CLASSIFICATION OF EXPLOSIVES**~~

~~*Note.— For additional information regarding classification of explosives, see UN Recommendations, 2.1.3.1.4, 2.1.3.1.5 and 2.1.3.4.*~~

. . .

UN Model Regulations, 2.1.2.1.1 (see ST/SG/AC.10/44/Add.1)

Table 2-2. Classification codes

Description of substance or article to be classified	*Compatibility group*	*Classification code*
. . .		
Explosive substance or article containing an explosive substance and presenting a special ~~risk~~ hazard (e.g. due to water activation or presence of hypergolic liquids, phosphides or a pyrophoric substance) and needing isolation of each type	L	1.1L 1.2L 1.3L
. . .		

. . .

Table 2-3. Scheme of classification of explosives, combination of hazard division with compatibility group

	Compatibility Group													
Hazard	A	B	C	D	E	F	G	H	J	K	L	N	S	A-S Σ
1.1	1.1A	1.1B	1.1C	1.1D	1.1E	1.1F	1.1G		1.1J		1.1L			9
1.2		1.2B	1.2C	1.2D	1.2E	1.2F	1.2G	1.2H	1.2J	1.2K	1.2L			10
1.3			1.3C			1.3F	1.3G	1.3H	1.3J	1.3K	1.3L			7
1.4		1.4B	1.4C	1.4D	1.4E	1.4F	1.4G						1.4S	7
1.5				1.5D										1
1.6												1.6N		1
1.1-1.6 Σ		3	4	4	3	4	4	2	3	2	3	1	1	35

. . .

Editorial amendment.— Paragraph 1.5 has been moved from before Table 2-2:

1.5 CLASSIFICATION OF EXPLOSIVES

Note.— For additional information regarding classification of explosives, see UN Recommendations, 2.1.3.1.4, 2.1.3.1.5 and 2.1.3.4.

. . .

UN Model Regulations, 2.1.3.1.2 c) (see ST/SG/AC.10/44/Add.1)

1.5.1.3 Except for substances that are listed by their proper shipping name in the Dangerous Goods List (Table 3-1), goods must not be offered for transport as Class 1 until they have been subjected to the classification procedure prescribed

in this Chapter. In addition, the classification procedure must be undertaken before a new product is offered for transport. In this context, a new product is one which, in the opinion of the appropriate national authority, involves any of the following:

a) a new explosive substance or a combination or a mixture of explosive substances which is considered to be significantly different from other combinations or mixtures already classified;

b) a new design of article or an article containing a new explosive substance or a new combination or mixture of explosive substances;

c) a new design of package for an explosive substance or article including a new type of inner packaging.

Note.— The importance of this can be overlooked unless it is realized that a relatively minor change in an inner or outer packaging can be critical and can convert a lesser ~~risk~~ hazard into a mass explosion ~~risk~~ hazard.

. . .

1.5.2 Exclusion from Class 1

1.5.2.1 The appropriate national authority may exclude an article or substance from Class 1 by virtue of test results and the Class 1 definition.

1.5.2.2 Where a substance provisionally accepted into Class 1 is excluded from Class 1 by performing Test Series 6 on a specific type and size of package, this substance, when meeting the classification criteria or definition for another class or division, should be listed in the Dangerous Goods List in that class or division with a special provision restricting it to the type and size of package tested.

UN Model Regulations, 2.1.3.6.3 (see ST/SG/AC.10/44/Add.1)

1.5.2.3 Where a substance is assigned to Class 1 but is diluted to be excluded from Class 1 by Test Series 6, this diluted substance (hereafter referred to as desensitized explosive) should be listed in the Dangerous Goods List with an indication of the highest concentration which excluded it from Class 1 (see 2;3.1.4 and 2;4.2.4) and if applicable, the concentration below which it is no longer deemed subject to these Instructions. New solid desensitized explosives subject to these Instructions should be listed in Division 4.1, and new liquid desensitized explosives should be listed in Class 3. When the desensitized explosive meets the criteria or definition for another class or division, the corresponding subsidiary ~~risk~~ hazard(s) should be assigned to it.

1.5.2.4 An article may be excluded from Class 1 when three unpackaged articles, each individually activated by its own means of initiation or ignition or external means to function in the designed mode, meet the following test criteria:

a) no external surface has a temperature of more than 65ºC. A momentary spike in temperature up to 200ºC is acceptable;

b) no rupture or fragmentation of the external casing or movement of the article or detached parts thereof of more than one metre in any direction;

Note.— Where the integrity of the article may be affected in the event of an external fire, these criteria must be examined by a fire test, such as described in ISO 12097-3.

c) no audible report exceeding 135 dB(C) peak at a distance of one metre;

d) no flash or flame capable of igniting a material such as a sheet of 80 ± 10 g/m² paper in contact with the article; and

e) no production of smoke, fumes or dust in such quantities that the visibility in a one cubic metre chamber equipped with appropriately sized blow out panels is reduced more than 50 per cent as measured by a calibrated light (lux) meter or radiometer located one metre from a constant light source located at the midpoint on opposite walls. The general guidance on optical density testing in ISO 5659-1 and the general guidance on the photometric system described in Section 7.5 in ISO 5659-2 may be used or similar optical density measurement methods designed to accomplish the same purpose may also be employed. A suitable hood cover surrounding the back and sides of the light meter must be used to minimize effects of scattered or leaking light not emitted directly from the source.

Note 1.— If during the tests addressing criteria a), b), c) and d), no smoke, or very little smoke is observed, the test described in e) may be waived.

UN Model Regulations, 2.1.3.6.4 (see ST/SG/AC.10/44/Add.1)

Note 2.— The appropriate national authority may require testing in packaged form if it is determined that, as packaged for transport, the article may pose a greater ~~risk~~ hazard.

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1.5.3 Classification documentation

. . .

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

. . .

f) the proper shipping name, UN number, class, hazard division and corresponding compatibility group of the explosives;

. . .

Chapter 2

CLASS 2 — GASES

. . .

2.2 DIVISIONS

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

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

a) Division 2.1 — Flammable gases.

Gases which at 20°C and a standard pressure of 101.3 kPa:

i) are ignitable when in a mixture of 13 per cent or less by volume with air; or

ii) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit. Flammability must be determined by tests or by calculation in accordance with methods adopted by ISO (see ISO 10156:2010). Where insufficient data are available to use these methods, tests by a comparable method recognized by the appropriate national authority must be used.

DGP-WG/16 (see paragraph 3.2.2.1 of DGP/26-WP/2):

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

. . .

c) Division 2.3 — Toxic gases.

Gases which:

i) are known to be so toxic or corrosive to humans as to pose a hazard to health; or

ii) are presumed to be toxic or corrosive to humans because they have an LC_{50} value equal to or less than 5 000 mL/m^3 (ppm) when tested in accordance with 6.2.1.3.

UN Model Regulations, 2.2.2.1 (see ST/SG/AC.10/44/Add.1)

Note.— Gases meeting the above criteria owing to their corrosivity are to be classified as toxic with a subsidiary corrosive ~~risk~~ hazard.

2.3 HAZARD PRECEDENCE

Gases and gas mixtures with hazards associated with more than one division take the following precedence:

a) Division 2.3 takes precedence over all other divisions;

b) Division 2.1 takes precedence over Division 2.2.

UN Model Regulations, 2.2.3 (c) (see ST/SG/AC.10/44/Add.1)

2.4 MIXTURES OF GASES

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

. . .

c) A gas mixture has a subsidiary ~~risk~~ hazard of corrosivity when the mixture is known by human experience to be destructive to the skin, eyes or mucous membranes or when the LC_{50} value of the mixture's corrosive components is equal to or less than 5 000 mL/m^3 (ppm) when the LC_{50} value is calculated by the formula:

$$LC_{50}\text{Corrosive (mixture)} = \frac{1}{\sum_{i=1}^{n} \frac{f_{ci}}{T_{ci}}}$$

. . .

2.5 AEROSOLS

2.5.1 For aerosols, the division of Class 2 and the subsidiary ~~risks~~ hazards depend on the nature of the contents of the aerosol dispenser. The following provisions must apply:

a) Division 2.1 applies if the contents include 85 per cent by mass or more flammable components and the chemical heat of combustion is 30 kJ/g or more;

b) Division 2.2 applies if the content contains 1 per cent by mass or less flammable components and the heat of combustion is less than 20 kJ/g;

c) otherwise the product must be classified as tested by the tests described in the UN *Manual of Tests and Criteria*, Part III, section 31. Extremely flammable and flammable aerosols must be classified in Division 2.1; non-flammable in Division 2.2;

d) gases of Division 2.3 must not be used as a propellant in an aerosol dispenser;

e) where the contents other than the propellant of aerosol dispensers to be ejected are classified as Division 6.1, Packing Groups II or III or Class 8, Packing Groups II or III, the aerosol must have a subsidiary ~~risk~~ hazard of Division 6.1 or Class 8;

f) aerosols with contents meeting the criteria of Packing Group I for toxicity or corrosivity are forbidden from transport.

2.5.2 Flammable components are flammable liquids, flammable solids or flammable gases and gas mixtures as defined in Notes 1 to 3 of subsections 31.1.3 of Part III of the UN *Manual of Tests and Criteria*. This designation does not cover pyrophoric, self-heating or water-reactive substances. The chemical heat of combustion must be determined by one of the following methods: ASTM D 240, ISO/FDIS 13943: 1999 (E/F) 86.1 to 86.3 or NFPA 30B.

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Chapter 3

CLASS 3 — FLAMMABLE LIQUIDS

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3.2 ASSIGNMENT OF PACKING GROUPS

UN Model Regulations, 2.3.2.1, 2.3.2.1.1 and 2.3.2.1.2 (see ST/SG/AC.10/44/Add.1) and DGP-WG/16 (see paragraph 3.2.1.6 of DGP/26-WP/2)

3.2.1 Table 2-4 should be used for the determination of the packing group of a liquid that presents a ~~risk~~ hazard due to flammability. For liquids whose only hazard is flammability, the packing group for the ~~material~~ liquid 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:

a) the viscosity[2] 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.

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

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Chapter 4

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

INTRODUCTORY NOTES

Note 1.— Where the term "water-reactive" is used in these Instructions, it refers to a substance which, in contact with water, emits flammable gas.

Note 2.— Because of the different properties exhibited by the dangerous goods within Divisions 4.1 and 4.2, it is impracticable to establish a single criterion for classification in either of these divisions. Tests and criteria for assignment to the three divisions of Class 4 are addressed in this chapter and in the UN Manual of Tests and Criteria, *Part III, section 33.*

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

UN Model Regulations, 2.4, Introductory notes (see ST/SG/AC.10/44/Add.1)

Note 3.— Since organometallic substances can be classified in Divisions 4.2 or 4.3 with additional subsidiary ~~risks~~ hazards, depending on their properties, a specific classification flowchart for these substances is given in 2.4.5 of the UN Recommendations on the Transport of Dangerous Goods.

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4.2.3 Division 4.1 — Self-reactive substances

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UN Model Regulations, 2.4.2.3.2.2 (see ST/SG/AC.10/44/Add.1)

4.2.3.2.3 Self-reactive substances permitted for transport are listed in 4.2.3.2.4. For each permitted substance listed, the appropriate generic entry of the Dangerous Goods List (UN 3221 to 3240) is assigned, and appropriate subsidiary ~~risks~~ hazard(s) and remarks providing relevant information are given. The generic entries specify:

— the self-reactive substance type (B to F);

— the physical state (i.e. liquid/solid); and

— when temperature control is required.

. . .

UN Model Regulations, 2.4.2.3.2.3 (see ST/SG/AC.10/44/Add.1)

Table 2-6. List of currently assigned self-reactive substances in packages

Self-reactive substance	*Concentration (%)*	*Control temperature (°C)*	*Emergency temperature (°C)*	*UN generic entry*	*Notes*
. . .					
4-Nitrosophenol	100	+35	+40	3236	
Phosphorothioic acid, O-[(cyanophenyl methylene) azanyl] O,O-diethyl ester	82-91 (Z isomer)			3227	8
Self-reactive liquid, sample				3223	6
. . .					

UN Model Regulations, 2.4.2.3.2.3 Remarks 2 and 10 (see ST/SG/AC.10/44/Add.1)

NOTES:

1. Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (b) of the UN Recommendations.
2. "EXPLOSIVE" subsidiary ~~risk~~ hazard label required and consequently forbidden for transport by air under any circumstance.
3. Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (c) of the UN Recommendations.
4. Azodicarbonamide formulations which fulfil the criteria of 2.4.2.3.3.2 (d) of the UN Recommendations.
5. With a compatible diluent having a boiling point of not less than 150°C.
6. See 4.2.3.2.6.
7. This entry applies to mixtures of esters of 2-diazo-1-naphthol-4-sulphonic acid and 2-diazo-1-naphthol-5-sulphonic acid meeting the criteria of 2.4.2.3.3.2 d) of the UN Recommendations.
8. This entry applies to the technical mixture in n-butanol within the specified concentration limits of the (Z) isomer.

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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.

UN Model Regulations, 2.4.2.5.2 (see ST/SG/AC.10/44/Add.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.

Note.—Substances meeting the criteria of a polymerizing substance and also for inclusion in Classes 1 to 8 are subject to the requirements of Special Provision A209.

4.3 SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION (DIVISION 4.2)

4.3.1 Definitions and properties

4.3.1.1 Division 4.2 includes:

a) pyrophoric substances: substances, including mixtures and solutions (liquid or solid), which even in small quantities ignite within 5 minutes of coming into contact with air. These substances are the most liable to spontaneous combustion and are called pyrophoric substances; and

b) self-heating substances: other substances which in contact with air without energy supply are liable to self-heating. These substances will ignite only when in large amounts (kilograms) and after long periods of time (hours or days) and are called self-heating substances.

. . .

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

4.4.1 Definitions and properties

DGP-WG/16 (see paragraph 3.2.2.3 of DGP/26-WP/2):

~~4.4.1.1 Division 4.3 — Substances which, in contact with water, emit flammable gases.~~

~~4.4.1.2~~ Certain substances in contact with water emit flammable gases which can form explosive mixtures with air. Such mixtures are easily ignited by all ordinary sources of ignition, for example, naked lights, sparking handtools or unprotected lamps. The resulting blast wave and flames may endanger people and the environment. The test method referred to in 4.4.2 must be used to determine whether the reaction of a substance with water leads to the development of a dangerous amount of gases which may be flammable. It must not be applied to pyrophoric substances.

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Chapter 5

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

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5.2 OXIDIZING SUBSTANCES (DIVISION 5.1)

5.2.1 Classification in Division 5.1

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

UN Model Regulations, 2.5.2.1.2 (see ST/SG/AC.10/44/Add.1)

5.2.1.2 By exception, solid ammonium nitrate based fertilizers must be classified in accordance with the procedure as set out in the UN *Manual of Tests and Criteria*, Part III, section 39.

5.2.1.3 For substances having other hazards, e.g. toxicity or corrosivity, the requirements of Part 2, Introductory Chapter must be met.

. . .

5.3.2.3 Organic peroxides permitted for transport are listed in 5.3.2.4. For each permitted substance, Table 2-7 assigns the appropriate generic entry in the Dangerous Goods List (UN 3103 to 3120) and provides relevant information. The generic entries specify:

a) organic peroxide type (B to F);

b) physical state (liquid or solid); and

c) temperature control, when required (see 5.3.3).

. . .

5.3.2.4 *List of currently assigned organic peroxides in packagings*

~~The following table (Table 2-7) is reproduced from 2.5.3.2.4 of the UN *Recommendations on the Transport of Dangerous Goods* (Eighteenth revised edition), with irrelevant material removed.~~

5.3.2.5 Table 2-7 provides a list of currently assigned organic peroxides in packagings. Classification of organic peroxides not listed in ~~5.3.2.4~~ Table 2-7 and assignment to a generic entry must be made by the appropriate authority of the State in wh ich 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.

5.3.2.6 Samples of new formulations of organic peroxides not listed in 5.3.2.4 for which complete test data are not available and which are to be transported for further testing or evaluation may be assigned to one of the appropriate entries for **Organic peroxide Type C** provided that the following conditions are met:

a) the available data indicate that the sample would be no more dangerous than organic peroxide type B;

b) it is packed in a combination packaging consisting of a plastic IP.2 inner packaging with a capacity not exceeding 0.5 L or 0.5 kg which is placed in a wooden box (4C1), plywood box (4D) or fibreboard box (4G) with the maximum net quantity per package not exceeding 1 L or 1 kg; and

c) the available data indicate that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation.

. . .

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

UN Model Regulations 2.5.3.2.4 (see ST/SG/AC.10/44/Add.1)

Organic peroxide	*Concentration (per cent)*	*Diluent type A (per cent)*	*Diluent type B (per cent) (Note 1)*	*Inert solid (per cent)*	*Water (per cent)*	*Control tempera-ture (°C)*	*Emergency tempera-ture (°C)*	*UN generic entry*	*~~Notes~~ Sub-sidiary hazards and notes*
. . .									
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	≤100					+30	+35	3114	
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	≤42 as a paste					+35	+40	3116	
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	≤42 as a stable dispersion in water					+30	+35	3119	
. . .									
Diisobutyryl peroxide	>32-52		≥48			–20	–10	FORBIDDEN	3
Diisobutyryl peroxide	≤42 as a stable dispersion in water					-20	-10	3119	
Diisobutyryl peroxide	≤32		≥68			–20	–10	3115	
nn . . .									
Peroxylauric acid	≤100					+35	+40	3118	
1-Phenylethyl hydroperoxide	≤38		≥ 62					3109	
Pinanyl hydroperoxide	>56-100							3105	13
. . .									

UN Model Regulations, 2.5.3.2.4 (see ST/SG/AC.10/44/Add.1)

Notes:

1. Diluent type B may always be replaced by diluent type A. Boiling point diluent type B should be at least 60°C higher than the SADT of the organic peroxide.
2. Available oxygen ≤4.7 per cent.
3. "EXPLOSIVE" subsidiary ~~risk~~ hazard label required and consequently forbidden for transport by air under any circumstance.
4. Diluent may be replaced by Di-tert-butyl peroxide.
5. Available oxygen ≤9 per cent.
6. With ≤9 per cent hydrogen peroxide; available oxygen ≤10 per cent.
7. Only non-metallic packagings allowed.
8. Available oxygen >10 per cent and ≤10.7 per cent, with or without water.
9. Available oxygen ≤10 per cent, with or without water.
10. Available oxygen ≤8.2 per cent, with or without water.

11. See 5.3.2.6.
12. Not used.
13. "CORROSIVE" subsidiary ~~risk~~ hazard label required (see Figure 5-24).
14. Peroxyacetic acid formulations which fulfil the criteria of 5.3.2.5.
15. Peroxyacetic acid formulations which fulfil the criteria of 5.3.2.5.
16. Peroxyacetic acid formulations which fulfil the criteria of 5.3.2.5.
17. Addition of water to this organic peroxide will decrease its thermal stability.
18. No "CORROSIVE" subsidiary ~~risk~~ hazard label required for concentrations below 80 per cent.
19. Mixtures with hydrogen peroxide, water and acid(s).
20. With diluent type A, with or without water.
21. With ≥25 per cent diluent type A by mass, and in addition ethylbenzene.
22. With ≥19 per cent diluent type A by mass, and in addition methyl isobutyl ketone.
23. With <6 per cent di-tert-butyl peroxide.
24. With ≤8 per cent 1-isopropylhydroperoxy-4-isopropylhydroxybenzene.
25. Diluent type B with boiling point >110°C.
26. With <0.5 per cent hydroperoxides content.
27. For concentrations more than 56 per cent, "CORROSIVE" subsidiary ~~risk~~ hazard label required (see Figure 5-24).
28. Available active oxygen ≤7.6 per cent in diluent type A having a 95 per cent boil-off point in the range of 200-260°C.
29. Not subject to the requirements of these Instructions for Division 5.2.
30. Diluent type B with boiling point >130°C.
31. Active oxygen ≤6.7 per cent.

Chapter 6

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

. . .

UN Model Regulations, 2.6.2.2.1 (a) (b) and (c) (see ST/SG/AC.10/44/Add.1)

6.2.2 Assignment of packing groups

6.2.2.1 Substances of Division 6.1, including pesticides, are allocated among the three packing groups, according to the degree of their toxic hazards in transport as follows:

a) Packing Group I — Substances and preparations presenting a very severe toxicity ~~risk~~ hazard;

b) Packing Group II — Substances and preparations presenting a serious toxicity ~~risk~~ hazard;

c) Packing Group III — Substances and preparations presenting a relatively low toxicity ~~risk~~ hazard.

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Editorial amendment:

6.2.2.4.1 The grouping criteria for the oral and dermal routes as well as for inhalation of dusts and mists are as shown in Table 2-8.

Note. — Substances meeting the criteria of Class 8 and with an inhalation toxicity of dusts and mists (LC_{50}) leading to Packing Group I are only accepted for an allocation to Division 6.1 if the toxicity through oral ingestion or dermal contact is at least in the range of Packing Group I or II. Otherwise, an allocation to Class 8 is made when appropriate (see ~~8.2.3~~ 8.2.4).

. . .

6.2.4 Classification of pesticides

UN Model Regulations, 2.6.4.1 (see ST/SG/AC.10/44/Add.1)

6.2.4.1 All active pesticide substances and their preparations for which the LC_{50} and/or LD_{50} values are known and which are classified in Division 6.1 must be classified under appropriate packing groups in accordance with the criteria given in 6.2.2. Substances and preparations which are characterized by subsidiary ~~risks~~ hazards must be classified according to the precedence of hazards table (Table 2-1) with the assignment of appropriate packing groups.

6.2.4.2 If the oral or dermal LD_{50} value for a pesticide preparation is not known, but the LD_{50} value of its active substance(s) is known, the LD_{50} value for the preparation may be obtained by applying the procedures in 6.2.3.

Note.— LD_{50} toxicity data for a number of common pesticides may be obtained from the most current edition of the document The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification *available from the International Programme on Chemical Safety, World Health Organization (WHO), 1211 Geneva 27, Switzerland. While that document may be used as a source of LD_{50} data for pesticides, its classification system should not be used for purposes of transport classification of, or assignment of packing groups to, pesticides which must be in accordance with these Instructions.*

UN Model Regulations, 2.6.4.3 (see ST/SG/AC.10/44/Add.1)

6.2.4.3 The proper shipping name used in the transport of the pesticide must be selected on the basis of the active ingredient, of the physical state of the pesticide and any subsidiary ~~risks~~ hazards it may exhibit.

. . .

6.3 DIVISION 6.2 — INFECTIOUS SUBSTANCES

. . .

6.3.6 Infected animals

6.3.6.1 *Infected live animals*

Live animals must not be used to consign infectious substances unless such a substance cannot be consigned by any other means. 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 authorities of the States of Origin, Transit, Destination and Operator in accordance with the Supplement to these Instructions (Part S-1;2).

UN Model Regulations, 2.6.3.6.2 (see ST/SG/AC.10/44/Add.1)

6.3.6.2 ~~*Infected animal material*~~*Deleted*

~~Animal material from animals intentionally infected for the purpose of propagating 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.~~

. . .

UN Model Regulations, Chapter 2.8 (see ST/SG/AC.10/44/Add.1)

Chapter 8

CLASS 8 — CORROSIVE SUBSTANCES

8.1 DEFINITION ~~OF CLASS 8~~ AND GENERAL PROVISIONS

8.1.1 ~~Class 8 substances (c~~Corrosive substances~~)~~ are substances which, by chemical action, will cause ~~severe~~ irreversible damage ~~when in contact with living tissue~~ to the skin or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport.

8.1.2 For substances and mixtures that are corrosive to skin, general classification provisions are provided in 8.2. Skin corrosion refers to the production of irreversible damage to the skin, namely, visible necrosis through the epidermis and into the dermis occurring after exposure to a substance or mixture.

8.1.3 Liquids and solids which may become liquid during transport, which are judged not to be skin corrosive, must still be considered for their potential to cause corrosion to certain metal surfaces in accordance with the criteria in 8.3.3 c) ii).

8.2 ~~ASSIGNMENT OF PACKING GROUPS~~GENERAL CLASSIFICATION PROVISIONS

8.2.1 Substances and ~~preparations~~ mixtures of Class 8 are divided among the three packing groups according to their degree of ~~hazard~~ danger in transport as follows:

a) Packing Group I: Very dangerous substances and ~~preparations~~ mixtures;

b) Packing Group II : Substances and ~~preparations~~ mixtures presenting medium danger;

c) Packing Group III: Substances and ~~preparations~~ mixtures presenting minor danger.

8.2.2 Allocation of substances ~~in Class 8~~ listed in Table 3-1 to the packing groups ~~referred to in the Introductory Chapter to Part 2~~ in Class 8 has been made on the basis of experience, taking into account such additional factors as inhalation risk (see 8.2.4.) and reactivity with water, including the formation of hazardous decomposition products.

8.2.3 New substances~~, including~~ and mixtures~~,~~ can be assigned to packing groups on the basis of the length of time of contact necessary to produce ~~full thickness destruction of human skin~~ irreversible damage of intact skin tissue in accordance with the criteria in 8.3~~. Liquids, and solids which may become liquid during transport, which are judged not to cause full thickness destruction of human skin must still be considered for their potential to cause corrosion to certain metal surfaces in accordance with the criteria in 8.2.5 c) ii)~~. Alternatively, for mixtures, the criteria in 8.4 can be used.

~~8.2.3~~8.2.4 A substance or ~~preparation~~ mixture meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC_{50}) in the range of Packing Group I, but toxicity through oral ingestion or dermal contact only in the range of Packing Group III or less, must be allocated to Class 8 (see Note under 6.2.2.4.1).

8.3 PACKING GROUP ASSIGNMENT FOR SUBSTANCES AND MIXTURES

8.3.1 Existing human and animal data, including information from single or repeated exposure, must be the first line of evaluation, as they give information directly relevant to effects on the skin.

~~8.2.4~~8.3.2 In assigning the packing group ~~to a substance~~ in accordance with ~~8.2.2~~ 8.2.3, account must be taken of human experience in instances of accidental exposure. In the absence of human experience, the ~~packing~~ grouping must be based on data obtained from experiments in accordance with OECD Guideline for the Testing of Chemicals No. 404, *Acute Dermal Irritation/Corrosion*, ~~2002~~ 2015 or No. 435, *In Vitro Membrane Barrier Test Method for Skin Corrosion*, ~~2006~~ 2015. A substance or mixture which is determined not to be corrosive in accordance with OECD Guideline for the Testing of Chemicals No. 430, *In Vitro Skin Corrosion: Transcutaneous Electrical Resistance Test (TER)*, ~~2004~~ 2015 or No. 431, *In Vitro Skin Corrosion: Human Skin Model Test,* ~~2004~~ 2015 may be considered not to be corrosive to skin for the purposes of these Instructions without further testing.

~~8.2.5~~8.3.3 Packing groups are assigned to corrosive substances in accordance with the following criteria (see Table 2-15):

a) *Packing Group I* is assigned to substances that cause ~~full thickness destruction~~ irreversible damage of intact skin tissue within an observation period of up to 60 minutes starting after ~~an~~ the exposure time of 3 minutes or less.

b) *Packing Group II* is assigned to substances that cause ~~full thickness destruction~~ irreversible damage of intact skin tissue within an observation period of up to 14 days starting after ~~an~~ the exposure time of more than 3 minutes but not more than 60 minutes.

c) *Packing Group III* is assigned to substances that:

i) cause ~~full thickness destruction~~ irreversible damage of intact skin tissue within an observation period of up to 14 days starting after ~~an~~ the exposure time of more than 60 minutes but not more than 4 hours; or

ii) are judged not to cause ~~full thickness destruction~~ irreversible damage of intact skin tissue but which exhibit a corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm a year at a test temperature of 55°C when tested on both materials. For the purposes of testing steel, type S235JR+CR (1.0037 resp. St 37-2), S275J2G3+CR (1.0144 resp. St 44-3), ISO 3574~~,~~ or Unified Numbering System (UNS) G10200 or a similar type or SAE 1020, and for testing aluminium, non-clad types 7075-T6 or AZ5GU-T6, must be used. An acceptable test is prescribed in the UN *Manual of Tests and Criteria*, Part III, Section 37.

Note.— Where an initial test on either steel or aluminium indicates the substance being tested is corrosive, the follow up test on the other metal is not required.

Paragraph 8.3 of the 2017-2018 Edition is moved to 8.5

~~**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.~~

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

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

8.4 Alternative packing group assignment methods for mixtures: Step-wise approach

8.4.1 General provisions

8.4.1.1 For mixtures, it is necessary to obtain or derive information that allows the criteria to be applied to the mixture for the purpose of classification and assignment of packing groups. The approach to classification and assignment of packing groups is tiered, and is dependent upon the amount of information available for the mixture itself, for similar mixtures and/or for its ingredients. The flow chart of Figure 2-2 outlines the process to be followed.

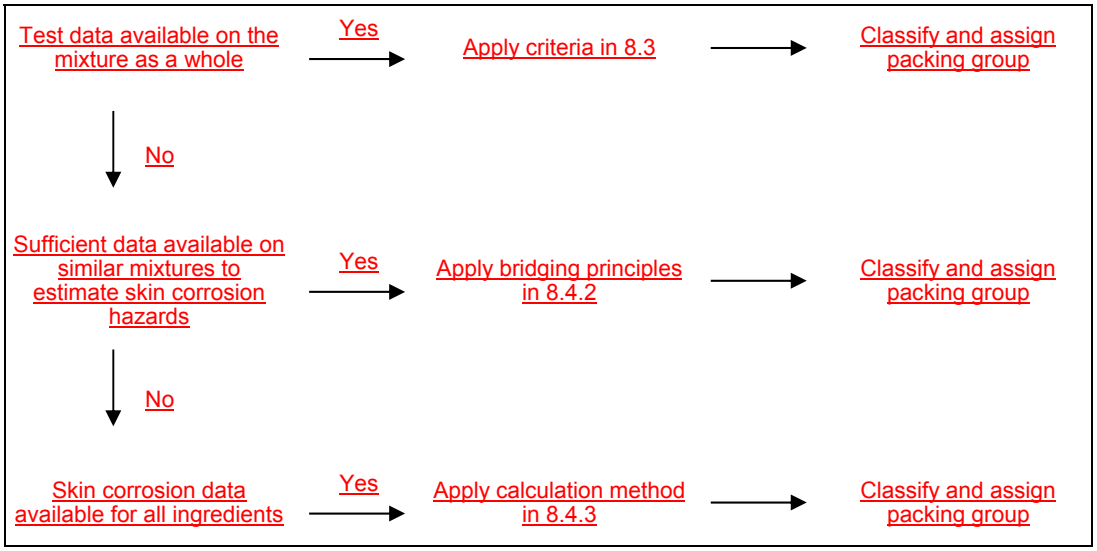

Figure 2-2 Step-wise approach to classify and assign packing group of corrosive mixtures

8.4.2 Bridging principles

8.4.2.1 Where a mixture has not been tested to determine its skin corrosion potential, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately classify and assign a packing group for the mixture, these data will be used in accordance with the following bridging principles. This ensures that the classification process uses the available data to the greatest extent possible in characterizing the hazards of the mixture.

a) *Dilution.* If a tested mixture is diluted with a diluent which does not meet the criteria for Class 8 and does not affect the packing group of other ingredients, then the new diluted mixture may be assigned to the same packing group as the original tested mixture.

Note.— In certain cases, diluting a mixture or substance may lead to an increase in the corrosive properties. If this is the case, this bridging principle cannot be used.

b) *Batching.* The skin corrosion potential of a tested production batch of a mixture can be assumed to be substantially equivalent to that of another untested production batch of the same commercial product when produced by or under the control of the same manufacturer, unless there is reason to believe there is significant variation such that the skin corrosion potential of the untested batch has changed. If the latter occurs, a new classification is necessary.

c) *Concentration of mixtures of Packing Group I.* If a tested mixture meeting the criteria for inclusion in Packing Group I is concentrated, the more concentrated untested mixture may be assigned to Packing Group I without additional testing.

d) *Interpolation within one packing group.* For three mixtures (A, B and C) with identical ingredients, where mixtures A and B have been tested and are in the same skin corrosion packing group, and where untested mixture C has the same Class 8 ingredients as mixtures A and B but has concentrations of Class 8 ingredients intermediate to the concentrations in mixtures A and B, then mixture C is assumed to be in the same skin corrosion packing group as A and B.

e) *Substantially similar mixtures.* Given the following:

i) two mixtures: (A+B) and (C+B);

ii) the concentration of ingredient B is the same in both mixtures;

iii) the concentration of ingredient A in mixture (A+B) equals the concentration of ingredient C in mixture (C+B);

iv) data on skin corrosion for ingredients A and C are available and substantially equivalent, i.e. they are the same skin corrosion packing group and do not affect the skin corrosion potential of B;

if mixture (A+B) or (C+B) is already classified based on test data, then the other mixture may be assigned to the same packing group.

8.4.3 Calculation method based on the classification of the substances

8.4.3.1 Where a mixture has not been tested to determine its skin corrosion potential, nor is sufficient data available on similar mixtures, the corrosive properties of the substances in the mixture must be considered to classify and assign a packing group. Applying the calculation method is only allowed if there are no synergistic effects that make the mixture more corrosive than the sum of its substances. This restriction applies only if Packing Group II or III would be assigned to the mixture.

8.4.3.2 When using the calculation method, all Class 8 ingredients present at a concentration of ≥1 per cent must be taken into account, or <1 per cent if these ingredients are still relevant for classifying the mixture to be corrosive to skin.

8.4.3.3 To determine whether a mixture containing corrosive substances must be considered a corrosive mixture and to assign a packing group, the calculation method in the flow chart in Figure 2-3 must be applied.

8.4.3.4 When a specific concentration limit (SCL) is assigned to a substance following its entry in Table 3-1 or in a special provision, this limit must be used instead of the generic concentration limits (GCL). This appears where 1 per cent is used in the first step for the assessment of the Packing Group I substances, and where 5 per cent is used for the other steps respectively in Figure 2-3.

8.4.3.5 For this purpose, the summation formula for each step of the calculation method must be adapted. This means that, where applicable, the generic concentration limit must be substituted by the specific concentration limit assigned to the substance(s) (SCL_i), and the adapted formula is a weighted average of the different concentration limits assigned to the different substances in the mixture:

$$\frac{PGx_1}{GCL} + \frac{PGx_2}{SCL_2} + \cdots + \frac{PGx_i}{SCL_i} \geq 1$$

Where:

PGx_i = concentration of substance 1, 2 … i in the mixture, assigned to Packing Group x (I, II or III)

GCL = generic concentration limit

SCL_i = specific concentration limit assigned to substance i

The criterion for a packing group is fulfilled when the result of the calculation is ≥1. The generic concentration limits to be used for the evaluation in each step of the calculation method are those found in Figure 2-3.

Note.— Examples for the application of the above formula:

Example 1

A mixture contains one corrosive substance in a concentration of 5 per cent assigned to Packing Group I without a specific concentration limit:

Calculation for packing group I:

$\frac{5}{5\ (GCL)} = 1$ ➔ assign to Class 8, Packing Group I:

Example 2

A mixture contains three substances corrosive to skin; two of them (A and B) have specific concentration limits; for the third one (C) the generic concentration limits apply. The rest of the mixture needs not to be taken into consideration:

Substance X in the mixture and its packing group assignment within Class 8	Concentration (conc) in the mixture	Specific concentration limit (SCL)for Packing Group I	Specific concentration limit (SCL) for Packing Group II	Specific concentration limit (SCL) for Packing Group III
A — assigned to Packing Group I	3%	30%	none	none
B — assigned to Packing Group I	2%	20%	10%	none
C — assigned to Packing Group III	10%	none	none	none

Calculation for Packing Group I:

$$\frac{3\ (conc\ A)}{30\ (SCL\ PGI)} + \frac{2\ (conc\ B)}{20\ (SCL\ PGI)} = 0.2 < 1$$

The criterion for Packing Group I is not fulfilled.

Calculation for Packing Group II:

$$\frac{3\ (conc\ A)}{5\ (GCL\ PG\ II)} + \frac{2\ (conc\ B)}{10\ (SCL\ PG\ II)} = 0.8 < 1$$

The criterion for Packing Group II is not fulfilled.

Calculation for Packing Group III:

$$\frac{3\ (conc\ A)}{5\ (GCL\ PGIII)} + \frac{2\ (conc\ B)}{5\ (GCL\ PG\ III)} + \frac{10\ (conc\ C)}{5\ GCL\ PG\ III)} = 3\ \geq\ 1$$

The criterion for Packing Group III is fulfilled, the mixture must be assigned to Class 8, Packing Group III.

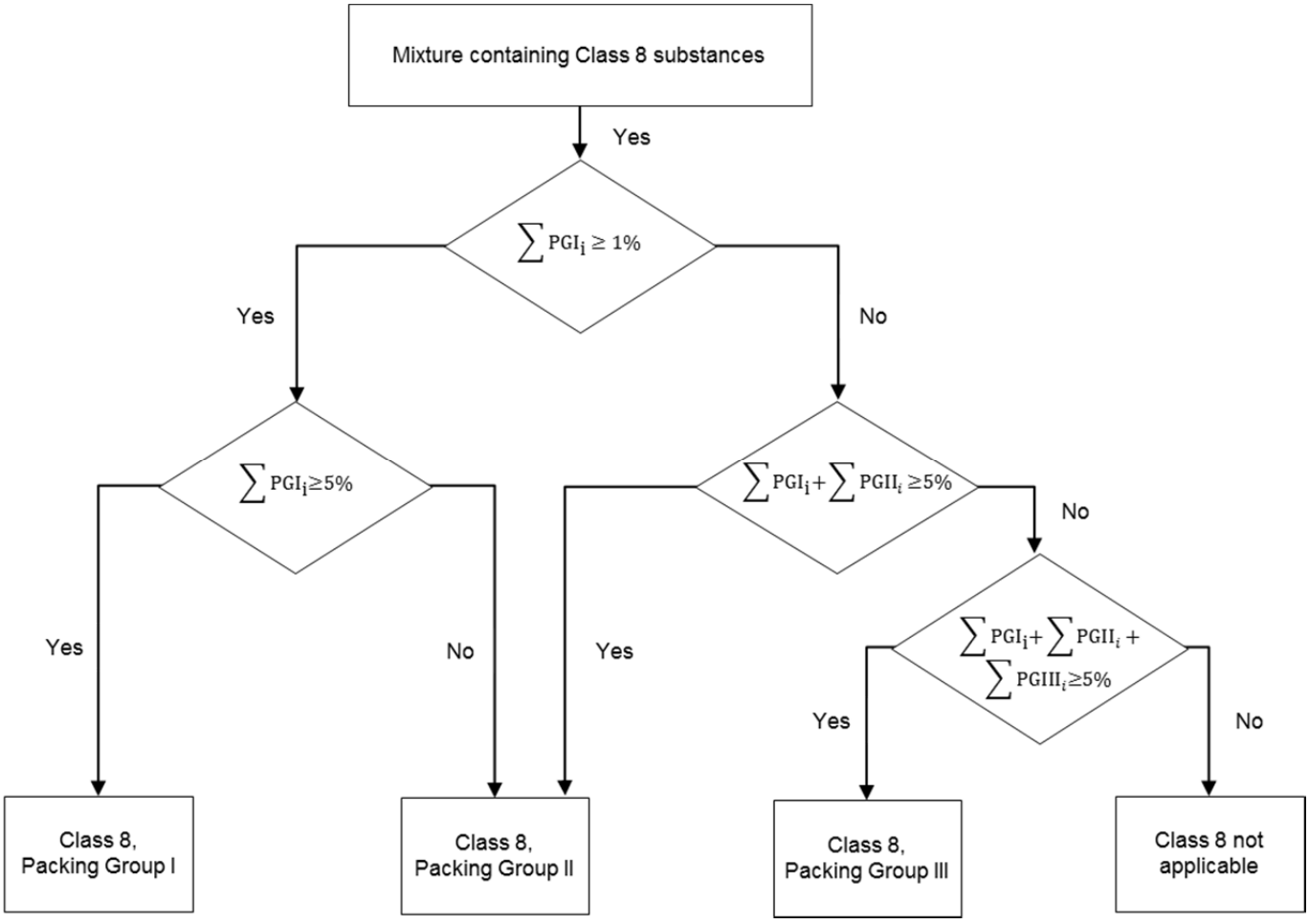

Figure 2-3. Calculation method

Paragraph 8.5 was moved from 8.3 of the 2017-2018 Edition (no changes).

8.5 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.

Chapter 9

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

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9.3 LITHIUM BATTERIES

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

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

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

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

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

b) each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally incident to transport;

c) each cell and battery is equipped with an effective means of preventing external short circuits;

d) each battery containing cells or a series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g. diodes, fuses, etc.);

e) cells and batteries must be manufactured under a quality management programme that includes:

1) a description of the organizational structure and responsibilities of personnel with regard to design and product quality;

2) the relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;

3) process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;

4) quality records, such as inspection reports, test data, calibration data and certificates. Test data must be kept and made available to the appropriate national authority upon request;

5) management reviews to ensure the effective operation of the quality management programme;

6) a process for control of documents and their revision;

7) a means for control of cells or batteries that are not conforming to the type tested in accordance with Part III, subsection 38.3 of the UN *Manual of Tests and Criteria*;

8) training programmes and qualification procedures for relevant personnel; ~~and~~

9) procedures to ensure that there is no damage to the final product~~.~~;

Note.— In-house quality management programmes may be accepted. Third-party certification is not required, but the procedures listed in 1) to 9) above must be properly recorded and traceable. A copy of the quality management programme must be made available to the appropriate national authority upon request.

UN Model Regulations, 2.9.4 (see ST/SG/AC.10/44/Add.1) and DGP/26 (see paragraph 2.2.1.2 c) of this report)

f) lithium batteries, containing both primary lithium metal cells and rechargeable lithium ion cells, that are not designed to be externally charged (see Special Provision A213) must meet the following conditions:

(i) the rechargeable lithium ion cells can only be charged from the primary lithium metal cells;

ii) overcharge of the rechargeable lithium ion cells is precluded by design;

iii) the battery has been tested as a lithium primary battery;

iv) component cells of the battery must be of a type proved to meet the respective testing requirements of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3~~.~~; and

g) manufacturers and subsequent distributors of cells or batteries manufactured after 30 June 2003 must make available the test summary as specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, paragraph 38.3.5. This test summary must be made available from 1 January 2020.

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Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

Chapter 1

GENERAL

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1.2.7 Generic or "not otherwise specified" (n.o.s.) names

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1.2.7.1.1 The technical name must be a recognized chemical or biological name or other name currently used in scientific and technical handbooks, journals and texts. Trade names must not be used for this purpose. In the case of pesticides, only ISO common name(s), other name(s) in the World Health Organization (WHO) *Recommended Classification of Pesticides by Hazard and Guidelines to Classification,* or the name(s) of the active substance(s) may be used.

UN Model Regulations, 3.1.2.8.1.2 (see ST/SG/AC.10/44/Add.1)

1.2.7.1.2 When a mixture of dangerous goods ~~is~~ or articles containing dangerous goods are described by one of the "n.o.s." or "generic" entries where an asterisk is indicated in column 1 of the Dangerous Goods List, not more than the two constituents which most predominantly contribute to the hazard or hazards of ~~a~~ the mixture or of the articles need to be shown, excluding controlled substances when their disclosure is prohibited by national law or international convention. If a package containing a mixture is labelled with any subsidiary ~~risk~~ hazard label, one of the two technical names as shown in parentheses must be the name of the constituent which compels the use of the subsidiary ~~risk~~ hazard label.

UN Model Regulations, 3.1.2.8.1.3 (see ST/SG/AC.10/44/Add.1)

1.2.7.1.3 Examples illustrating the selection of the proper shipping name supplemented with the technical name of the dangerous goods for such n.o.s. entries are:

UN 3540 **Articles containing flammable liquids n.o.s.** (pyrrolidine)
UN 3394 **Organometallic substance, liquid, pyrophoric, water-reactive** (Trimethylgallium)
UN 2902 **Pesticide, liquid, toxic, n.o.s.** (Drazoxolon)**.**

Note. — As an aid to choosing the most appropriate n.o.s. or generic name, all the n.o.s. entries and the main generic entries of Table 3-1 are listed in Attachment 1, Chapter 2.

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1.3 MIXTURES OR SOLUTIONS

. . .

1.3.2 A mixture or solution meeting the classification criteria of these Instructions composed of a single predominant substance identified by name in Table 3-1 and one or more substances not subject to these Instructions and/or traces of one or more substances identified by name in Table 3-1 must be assigned the UN number and proper shipping name of the predominant substance named in Table 3-1, unless:

a) the mixture or solution is specifically identified by name in Table 3-1 in which case this name must be applied; or

b) the name and description of the substance named in Table 3-1 specifically indicates that it applies only to the pure substance; or

UN Model Regulations, 3.1.3.2 (c) (see ST/SG/AC.10/44/Add.1)

c) the hazard class or division, subsidiary ~~risk~~ hazard(s), physical state or packing group of the solution or mixture is different from that of the substance named in Table 3-1; or

d) the hazard characteristics and properties of the mixture or solution necessitate emergency response measures that are different from those required for the substance identified by name in Table 3-1.

If b), c) or d) is applicable, the mixture or solution must be treated as a substance not specifically listed by name in Table 3-1.

Note.— Although traces of substances may not need to be taken into account for classification purposes, those traces may affect the properties of the substance and do need to be taken into account when considering the compatibility requirements of 4;1.1.3.

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UN Model Regulations, 3.1.3.3 (see ST/SG/AC.10/44/Add.1)

1.3.4 A mixture or solution meeting the classification criteria of these Instructions that is not identified by name in Table 3-1 and that is composed of two or more dangerous goods must be assigned to an entry that has the proper shipping name, description, hazard class or division, subsidiary ~~risk~~ hazard(s) and packing group that most precisely describe the solution or mixture.

Chapter 2

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

. . .

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

UN Model Regulations, 3.2.1, description of Column 4 (see ST/SG/AC.10/44/Add.1)

Column 4 "Subsidiary ~~risk~~ hazard" — this column contains the class or division number of any important subsidiary ~~risks~~ hazards which have been identified by applying the classification found in Part 2; Chapters 1 to 9. Requirements for the labelling of dangerous goods which have subsidiary ~~risks~~ hazards are given in 5;3.2.

Column 5 "Labels" — this column specifies the class hazard label followed by the subsidiary ~~risk~~ hazard label(s) (after the symbol "&") to be applied to each outside packaging and overpack. Subsidiary ~~risk~~ hazard labels are not shown for all n.o.s. or generic articles and substances which possess more than one hazard. When such an article or substance has more than one hazard and no subsidiary ~~risk~~ hazard label is indicated in column 5 of Table 3-1, subsidiary ~~risk~~ hazard labels must be applied in accordance with 5;3.2.2 and 5;3.2.3. For magnetized material the required handling label is also shown. In the instances where no label is required the word "None" will appear.

. . .

Table 3-1. Dangerous Goods List

UN Model Regulations, Dangerous goods list (see ST/SG/AC.10/44/Add.1)

Name	*UN No.*	*Class or division*	*Subsidiary ~~risk~~ hazard*	*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*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*

See Appendices A (alphabetical order) and B (UN number order) for proposed amendments to Table 3-1.

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Chapter 3

SPECIAL PROVISIONS

. . .

Table 3-2. Special provisions

TIs	*UN*

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UN Model Regulations, Special Provision 240 (see ST/SG/AC.10/44/Add.1)

A21 ~~(=240)~~ Not used.~~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 vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, 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.~~

TIs *UN*

. . .

UN Model Regulations, Special Provision 251 (see ST/SG/AC.10/44/Add.1)

A44 (≈251) The entry chemical kit or first-aid kit is intended to apply to boxes, cases, etc., containing small quantities of various dangerous goods which are used, for example, for medical, analytical or testing or repair purposes. Components must not react dangerously (see 4;1.1.8). The packing group assigned to the kit as a whole must be the most stringent packing group assigned to any individual substance in the kit. The assigned packing group must be shown on the dangerous goods transport document. Where the kit contains only dangerous goods to which no packing group is assigned, a packing group must not be indicated on the dangerous goods transport document.

~~The only dangerous goods which are permitted in the kits are substances which may be transported as~~ Such kits must only contain dangerous goods that are permitted as:

a) excepted quantities not exceeding the quantity indicated by the code ~~as specified~~ in column 9 of Table 3-1, provided ~~the inner packagings and quantities~~ that the quantity per inner packaging and quantity per package are as prescribed in 5.1.2 and 5.1.3 and the inner packagings are as prescribed in 5.2.~~1~~ a); or

b) limited quantities as prescribed under 3;4.1.2.

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DGP-WG/16 (see paragraph 3.2.3.2 of DGP/26-WP/2):

A59 A tire assembly unserviceable or damaged is not subject to these Instructions if the tire is ~~completely~~ deflated to a gauge pressure of less than 200 kPa at 20ºC. A tire assembly with a serviceable tire is not subject to these Instructions provided the tire is not inflated to a gauge pressure exceeding the maximum rated pressure for that tire. However, such tires (including valve assemblies) must be protected from damage during transport, which may require the use of a protective cover.

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DGP/26 (see paragraph 2.3.3 of this report):

A67 (≈238) Batteries can be considered as non-spillable provided that they are capable of withstanding the vibration and pressure differential tests given below, without leakage of battery fluid.

Vibration test: The battery is rigidly clamped to the platform of a vibration machine and a simple harmonic motion having an amplitude of 0.8 mm (1.6 mm maximum total excursion) is applied. The frequency is varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return is traversed in 95 ± 5 minutes for each mounting position (direction of vibration) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

Pressure differential test: Following the vibration test, the battery is stored for six hours at 24°C ±4°C while subjected to a pressure differential of at least 88 kPa. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

Note.— Non-spillable type batteries which are an integral part of, and necessary for the operation of, mechanical or electronic equipment must be securely fastened in the battery holder on the equipment and protected in such a manner so as to prevent damage and short circuits.

Non-spillable batteries ~~meeting the requirements of Packing Instruction 872~~ are not subject to these Instructions when carried as cargo if, at a temperature of 55°C, the electrolyte will not flow from a ruptured or cracked case. The battery must not contain any free or unabsorbed liquid. Any electrical battery or battery powered device, equipment or vehicle having the potential of dangerous evolution of heat must be prepared for transport so as to prevent:

a) a short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or, in the case of equipment, by disconnection of the battery and protection of exposed terminals); and

b) unintentional activation.

TIs *UN*

The words “not restricted” and the special provision number A67 must be provided on the air waybill when an air waybill is issued.

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DGP-WG/16 (see paragraph 3.2.1.6 of DGP/26-WP/2):

A72 (163) A substance specifically listed by name in Table 3-1 must not be transported under this entry. ~~Materials~~ Substances transported under this entry may contain 20 per cent or less nitrocellulose provided the nitrocellulose contains not more than 12.6 per cent nitrogen.

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UN Model Regulations, Special Provision 172 (see ST/SG/AC.10/44/Add.1)

A78 (≈172) Where a radioactive material has a subsidiary ~~risk~~ hazard(s):

a) The substance must be allocated to Packing Group I, II or III, if appropriate, by application of the packing group criteria provided in Part 2 corresponding to the nature of the predominant subsidiary ~~risk~~ hazard.

b) Packages must be labelled with subsidiary ~~risk~~ hazard labels corresponding to each subsidiary ~~risk~~ hazard exhibited by the material in accordance with the relevant provisions of 5;3.2; corresponding placards must be affixed to cargo transport units in accordance with the relevant provisions of 5;3.6.

DGP/26 (see paragraph 2.3.2 of this report):

c) For the purposes of documentation and package marking, the proper shipping name must be supplemented with the name of the constituents which most predominantly contribute to this subsidiary ~~risk~~ hazard(s) and which must be enclosed in parenthesis. However, where the constituent is listed by name in Table 3-1 and:

i) “forbidden” is shown in columns 10 and 11, the dangerous goods transport document must indicate Cargo Aircraft Only and the package must bear cargo aircraft only labels, except that the substance may be shipped on a passenger aircraft with the prior approval of the appropriate authority of the State of Origin and the State of the Operator under the conditions established by those authorities. A copy of the document of approval, showing the quantity limitations and the packaging requirements, must accompany the consignment; and

ii) “forbidden” is shown in columns 12 and 13, the substance is forbidden for transport by air except that the substance may be shipped on a cargo aircraft with the prior approval of the appropriate authority of the State of Origin and the State of the Operator under the conditions established by those authorities. A copy of the document of approval, showing the quantity limitations and the packaging requirements, must accompany the consignment.

Radioactive material with a subsidiary hazard of Division 4.2 in Packing Group I must be transported in Type B packages. These may be transported on passenger or cargo aircraft.

d) The dangerous goods transport document must indicate the subsidiary class or division and, where assigned, the packing group as required by 5;4.1.4.1 d) and e).

For packing, see also 4;9.1.5.

TIs *UN*

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

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UN Model Regulations, Special Provision 307 (see ST/SG/AC.10/44/Add.1)

A79 (307) This entry may only be used for ~~uniform mixtures containing~~ ammonium nitrate fertilizers. They must be classified in accordance with the procedure as set out in the *Manual of Tests and Criteria*, Part III, Section 39. ~~as the main ingredient within the following composition limits:~~

~~a) not less than 90 per cent ammonium nitrate with not more than 0.2 per cent total combustible/organic material calculated as carbon and with added matter, if any, which is inorganic and inert towards ammonium nitrate; or~~

~~b) less than 90 per cent but more than 70 per cent ammonium nitrate with other inorganic materials or more than 80 per cent but less than 90 per cent ammonium nitrate mixed with calcium carbonate and/or dolomite and/or mineral calcium sulphate and not more than 0.4 per cent total combustible/organic material calculated as carbon; or~~

~~c) nitrogen type ammonium nitrate based fertilizers containing mixtures of ammonium nitrate and ammonium sulphate with more than 45 per cent but less than 70 per cent ammonium nitrate and not more than 0.4 per cent total combustible/organic material calculated as carbon such that the sum of the percentage composition of ammonium nitrate and ammonium sulphate exceeds 70 per cent.~~

. . .

UN Model Regulations, Special Provision 310 (see ST/SG/AC.10/44/Add.1)

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 ~~and~~ 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 requirements in Packing Instruction 910 of the Supplement are met.

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UN Model Regulations, Special Provision 186 (see ST/SG/AC.10/44/Add.1)

A89 (186) ~~In determining the ammonium nitrate content, all nitrate ions for which a molecular equivalent of ammonium ions is present in the mixture must be calculated as ammonium nitrate.~~Not used.

UN Model Regulations, Special Provision 193 (see ST/SG/AC.10/44/Add.1)

A90 (193) This entry may only be used for ~~uniform~~ ammonium nitrate based compound fertilizers ~~mixtures of the nitrogen, phosphate or potash type, containing not more than 70 per cent ammonium nitrate and not more than 0.4 per cent total combustible/organic material calculated as carbon or with not more than 45 per cent ammonium nitrate and unrestricted combustible material. Fertilizers within these composition limits are not subject to these Instructions if shown by a Trough Test (see UN *Manual of Tests and Criteria*, Part III, subsection 38.2) not to be liable to self sustaining decomposition~~. They must be classified in accordance with the procedure as set out in the UN *Manual of Tests and Criteria*, Part III, Section 39.

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A92	(199)	Lead compounds which, when mixed in a ratio of 1:1000 with 0.07 M hydrochloric acid and stirred for 1 hour at a temperature of 23°C ±2°C, exhibit a solubility of 5 per cent or less (see ISO 3711:1990 "*Lead chromate pigments and lead chromate-molybdate pigments — Specifications and methods of test*") are considered insoluble and are not subject to these Instructions unless they meet the criteria for inclusion in another hazard class or division.

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A106		This entry may only be used for samples of chemicals taken for analysis in connection with the implementation of the Chemical Weapons Convention. They may be transported on a passenger or cargo aircraft providing prior approval has been granted by the appropriate authority of the State of Origin or the Director General of the Organization for the Prohibition of Chemical Weapons and providing the samples comply with the requirements shown against the entry for chemical samples in Table S-3-1 of the Supplement. The substance is assumed to meet the criteria of Packing Group I for Division 6.1. Subsidiary ~~risk~~ hazard labelling is not required. A copy of the document of approval showing the quantity limitations and the packing requirements must accompany the consignment. *Note.— The transport of substances under this description must be in accordance with chain of custody and security procedures specified by the Organization for the Prohibition of Chemical Weapons.*

DGP/26 (See paragraph 2.2.1.2 b) of this report):

A107	(≈301)	This entry only applies to machinery or apparatus containing dangerous goods as a residue or as an integral element of the machinery or apparatus. It must not be used for machinery or apparatus for which a proper shipping name already exists in Table 3-1. Where the quantity of dangerous goods contained as an integral element in machinery or apparatus exceeds the limits permitted by Packing Instruction 962, and the dangerous goods meet the provisions of Special Provision 301 of the UN Model Regulations, the machinery or apparatus may be transported 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.

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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, UN 3175, UN 3334 and UN 3335 provided such substances do not have a subsidiary ~~risk~~ hazard. Dangerous goods that are forbidden for transport aboard passenger aircraft must not be transported as consumer commodities.

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A115	(280)	This entry applies to safety devices for vehicles, vessels or aircraft, e.g. air bag inflators, air bag modules, seat belt pretensioners, and pyromechanical devices and which contain dangerous goods of Class 1 or dangerous goods of other classes and when transported as component parts and if these articles as presented for transport have been tested in accordance with test series 6 (c) of Part I of the UN *Manual of Tests and Criteria*, with no explosion of the device, no fragmentation of the device casing or pressure receptacle, and no projection hazard or thermal effect which would significantly hinder firefighting or other emergency response efforts in the immediate vicinity. This entry does not apply to life saving appliances described in Packing Instruction 955 (UN Nos. 2990 and 3072).

TIs *UN*

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UN Model Regulations, Chapter 3.3, Special Provision 293 (see ST/SG/AC.10/44/Add.1)

A125 (293) The following definitions apply to matches:

a) Fusee matches are matches the heads of which are prepared with a friction-sensitive igniter composition and a pyrotechnic composition which burns with little or no flame, but with intense heat;

b) Safety matches are matches combined with or attached to the box, book or card ~~that~~ which can be ignited by friction only on a prepared surface;

c) Strike anywhere matches are matches that can be ignited by friction on a solid surface;

d) Wax Vesta matches are matches that can be ignited by friction either on a prepared surface or on a solid surface.

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UN Model Regulations, Chapter 3.3, Special Provision 290 (see ST/SG/AC.10/44/Add.1)

A130 (290) When this radioactive material meets the definitions and criteria of other classes or divisions as defined in Part 2, it must be classified in accordance with the following:

a) Where the substance meets the criteria for dangerous goods in excepted quantities as set out in 3;5, the packagings must be in accordance with 3;5.2 and meet the testing requirements of 3;5.3. All other requirements applicable to radioactive material, excepted packages as set out in 1;6.1.5 apply without reference to the other class or division;

b) Where the quantity exceeds the limits specified in 3;5.1.2, the substance must be classified in accordance with the predominant subsidiary ~~risk~~ hazard. The dangerous goods transport document must describe the substance with the proper shipping name and UN number applicable to the other class supplemented with the name applicable to the radioactive excepted package according to column 1 of the Dangerous Goods List, and must be transported in accordance with the provisions applicable to that UN number. An example of the information shown on the dangerous goods transport document is:

UN 1993 Flammable liquid, n.o.s. (ethanol and toluene mixture), Radioactive material, excepted package — limited quantity of material, Class 3, PG II

The radioactive material, excepted package label (Figure 5-33) is not required on packages meeting the conditions set out in this sub-paragraph. To aid acceptance, it is recommended that “A130” be indicated on the dangerous goods transport document. In addition, the requirements of 2;7.2.4.1.1 apply;

c) The provisions of 3;4 for the transport of dangerous goods packed in limited quantities do not apply to substances classified in accordance with sub-paragraph b);

d) When the substance meets a special provision that excepts this substance from all dangerous goods provisions of the other classes, it must be classified in accordance with the applicable UN number of Class 7 and all requirements specified in 1;6.1.5 apply.

TIs *UN*

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UN Model Regulations, Special Provision 204 (see ST/SG/AC.10/44/Add.1)

A132 (204) Articles containing smoke-producing substance(s) corrosive according to the criteria for Class 8 must be labelled with a "Corrosive" subsidiary ~~risk~~ hazard 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~~ hazard label (Figure 5-18), 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, Special Provision 312 (see ST/SG/AC.10/44/Add.1)

A134 ~~(312) Vehicles 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**, 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.~~Not used.

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A150 An additional subsidiary ~~risk~~ hazard label may be required by a Note found adjacent to the technical name entry in Table 2-7.

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DGP/26 (see paragraph 6.3.9 under Agenda Item 6 of this report)

A154 Lithium batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons or cells or batteries that cannot be diagnosed as damaged or defective prior to transport).

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A162 (339) Fuel cell cartridges containing hydrogen in a metal hydride transported under this entry must have a water capacity less than or equal to 120 mL.

The pressure in the fuel cell cartridge must not exceed 5 MPa at 55°C. The design type must withstand, without leaking or bursting, a pressure of two (2) times the design pressure of the cartridge at 55°C or 200 kPa more than the design pressure of the cartridge at 55°C, whichever is greater. The pressure at which this test is conducted is referred to in the drop test and the hydrogen cycling test as the "minimum shell burst pressure".

Fuel cell cartridges must be filled in accordance with procedures provided by the manufacturer. The manufacturer must provide the following information with each fuel cell cartridge:

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b) safety precautions and potential hazards to be aware of;

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TIs	*UN*	
A186	(361)	This entry applies to electric double layer capacitors with an energy storage capacity greater than 0.3 Wh. Capacitors with an energy storage capacity of 0.3 Wh or less are not subject to these Instructions. Energy storage capacity means the energy held by a capacitor, as calculated using the nominal voltage and capacitance. All capacitors to which this entry applies, including capacitors containing an electrolyte that does not meet the classification criteria of any class or division of dangerous goods, must meet the following conditions: a) capacitors not installed in equipment must be transported in an uncharged state. Capacitors installed in equipment must be transported either in an uncharged state or protected against a short circuit; b) each capacitor must be protected against a potential short circuit hazard in transport as follows: . . .

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UN Model Regulations, Special Provision 362 (see ST/SG/AC.10/44/Add.1)

A187	(362)	This entry applies to liquids, pastes or powders, pressurized with a propellant which meets the definition of a gas in 2;2.1.1 and 2;2.1.2 a) or b). *Note.— A chemical under pressure in an aerosol dispenser must be transported under UN 1950.* The following provisions must apply: a) The chemical under pressure must be classified based on the hazard characteristics of the components in the different states: i) the propellant; ii) the liquid; or iii) the solid. If one of these components, which can be a pure substance or a mixture, needs to be classified as flammable, the chemical under pressure must be classified as flammable in Division 2.1. Flammable components are flammable liquids and liquid mixtures, flammable solids and solid mixtures or flammable gases and gas mixtures meeting the following criteria: i) a flammable liquid is a liquid having a flashpoint of not more than 93°C; ii) a flammable solid is a solid which meets the criteria in 2;4.2.2 of these Instructions; iii) a flammable gas is a gas which meets the criteria in 2;2.2.1 of these Instructions; b) gases of Division 2.3 and gases with a subsidiary ~~risk~~ hazard of 5.1 must not be used as a propellant in a chemical under pressure; c) where the liquid or solid components are classified as dangerous goods of Division 6.1, Packing Groups II or III, or Class 8, Packing Groups II or III, the chemical under pressure must be assigned a subsidiary ~~risk~~ hazard of Division 6.1 or Class 8 and the appropriate UN number must be assigned. Components classified in Division 6.1, Packing Group I, or Class 8, Packing Group I, must not be used for transport under this proper shipping name; d) in addition, chemicals under pressure with components meeting the properties of: Class 1, explosives; Class 3, liquid desensitized explosives; Division 4.1, self-reactive substances and solid desensitized explosives; Division 4.2, substances liable to spontaneous combustion; Division 4.3, substances which, in contact with water, emit flammable gases; Division 5.1, oxidizing substances; Division 5.2, organic peroxides; Division 6.2, infectious substances; or Class 7, radioactive material, must not be used for transport under this proper shipping name; e) Chemicals under pressure containing components forbidden for transport on both passenger and cargo aircraft (columns 10 to 13 of Table 3-1) must not be transported by air.

TIs *UN*

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A191 Notwithstanding the Division 6.1 subsidiary ~~risk~~ hazard shown in column 4 of Table 3-1, the toxic subsidiary ~~risk~~ hazard label and an indication of this subsidiary ~~risk~~ hazard on the dangerous goods transport document are not required when the manufactured articles contain not more than 5 kg of mercury. Transport in accordance with this special provision must be noted on the dangerous goods transport document.

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UN Model Regulations, Special Provision 369 (see ST/SG/AC.10/44/Add.1) and Corrigendum 1 to UN Model Regulations, Chapter 3.3, special provision 369 (see ST/SG/AC.10/1/Rev.19/Corr.1)

(*Note.— DGP/26 decided not to align with the UN Model Regulations with respect to "radioactivity and corrosivity subsidiary hazards" (see paragraph 2.3.1.2 c) of this report*).

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

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 Division 6.1 substances with a corrosive subsidiary ~~risk~~ hazard, 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.

TIs UN

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DGP/26 (see paragraph 6.3.8 under Agenda Item 6 of this report)

A201 ~~States concerned may grant an exemption from the prohibition to transport lithium metal or lithium ion batteries on passenger aircraft in accordance with Part 1;1.1.3.~~In instances where other forms of transport (including cargo aircraft) is impracticable, lithium cells or batteries may be transported as Class 9 (UN 3480 or UN 3090) on passenger aircraft with the prior approval of the authority of the State of Origin, the State of the Operator and the State of Destination under the written conditions established by those authorities, provided that the following types and quantities are met:

a) quantities of lithium metal cells or batteries (UN 3090) are limited to the allowance permitted in Table 968-II of Packing Instruction 968; and

b) quantities of lithium ion cells or batteries (UN 3480) are limited to the allowance permitted in Table 965-II of Packing Instruction 965.

When States, other than the State of Origin, the State of the Operator or State of Destination have notified ICAO that they require prior approval of shipments made under this special provision, approval must also be obtained from these States, as appropriate.

The requirements of Part 5 for Class 9 (UN 3090 or UN 3480) lithium metal and lithium ion batteries apply. A copy of the document of approval including the quantity limitations must accompany the consignment. Transport in accordance with this special provision must be noted on the dangerous goods transport document.

If transport in accordance with this special provision is not possible, States concerned may grant an exemption from the prohibition to transport lithium metal or lithium ion batteries on passenger aircraft in accordance with Part 1;1.1.3.

Authorities issuing exemptions or approvals in accordance with this special provision must provide a copy to the Chief of the Cargo Safety Section within three months via email at CSS@icao.int, via facsimile at +1 514-954-6077 or via post to the following address:

Chief, Cargo Safety Section
International Civil Aviation Organization
999 Robert-Bourassa Boulevard
Montréal, Quebec
CANADA H3C 5H7

Note.— Guidance for the processing of exemptions or approvals from the prohibition to transport lithium batteries may be found in Part S-1;4 and Table S-3-1, Special Provision A334 of the Supplement to the Technical Instructions.

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UN Model Regulations, Special Provision 380 (see ST/SG/AC.10/44/Add.1)

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.**~~Not used.

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UN Model Regulations, Special Provision 385 (see ST/SG/AC.10/44/Add.1)

A207 ~~(≈385)~~ Not used.~~This entry applies to vehicles powered by flammable liquid or gas internal combustion engines or fuel cells.~~

TIs	*UN*	
		~~Hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed must be consigned under this entry. Vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed, must be consigned under the entry UN 3171 — **Battery-powered vehicle** (see Special Provision A21).~~ ~~For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are cars, motorcycles, trucks, locomotives, scooters, three- and four-wheeled vehicles or motorcycles, lawn tractors, self-propelled farming and construction equipment, boats and aircraft.~~

. . .

UN Model Regulations, Special Provision 363 (see ST/SG/AC.10/44/Add.1)

A208 (≈363) a) This entry applies to engines or machinery, powered by fuels classified as dangerous goods via internal combustion systems or fuel cells (e.g. combustion engines, generators, compressors, turbines, heating units).

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.

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.

~~*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.*~~

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UN Model Regulations, Special Provision 387 (see ST/SG/AC.10/44/Add.1) (see paragraph 2.3.1.2 c) of this report).

A213 (387) Lithium batteries in conformity with 2;9.3.1 f) containing both primary lithium metal cells and rechargeable lithium ion cells must be assigned to UN Nos. 3090 or 3091 as appropriate. When such batteries are transported in accordance with Section II of Packing Instruction 968, 969 or 970, the total lithium content of all lithium metal cells contained in the battery must not exceed 1.5 g and the total capacity of all lithium ion cells contained in the battery must not exceed 10 Wh.

TIs *UN*

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UN Model Regulations, Special Provision 388 (see ST/SG/AC.10/44/Add.1)

A214 (388) UN No. 3166 entries apply to vehicles powered by flammable liquid or flammable gas internal combustion engines or fuel cells.

Vehicles powered by a fuel cell engine must be assigned to UN 3166 **Vehicle, fuel cell, flammable gas powered** or UN 3166 **Vehicle, 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.

Other vehicles which contain an internal combustion engine must be assigned to UN 3166 **Vehicle, flammable gas powered** or UN 3166 **Vehicle, flammable liquid powered**, as appropriate. These entries include hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the battery(ies) installed.

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**.

Entry UN 3171 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 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 cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, bicycles (pedal cycles with a motor) and other vehicles of this type (e.g. self-balancing vehicles or vehicles not equipped with at least one seating position), wheelchairs, lawn tractors, self-propelled farming and construction equipment, boats and aircraft. This includes vehicles transported in a packaging. In this case some parts of the vehicle may be detached from its frame to fit into the packaging.

Examples of equipment are lawnmowers, cleaning machines or model boats and model aircraft. Equipment powered by lithium metal batteries or lithium ion batteries must be assigned to 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.

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Chapter 4

DANGEROUS GOODS IN LIMITED QUANTITIES

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4.1 APPLICABILITY

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

Class 2	Only UN 1950 in Divisions 2.1 and 2.2, UN 2037 in Divisions 2.1 and 2.2 without a subsidiary ~~risk~~ hazard, UN 3478 (**Fuel cell cartridges**, containing liquefied flammable gas) and UN 3479 (**Fuel cell cartridges**, containing hydrogen in metal hydride)

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

a) those permitted only on cargo aircraft;

b) those in Packing Group I;

c) those in Class 1 or 7 or Divisions 2.1 (except as permitted above), 2.3 or 6.2;

d) those in Division 4.2 or with a subsidiary ~~risk~~ hazard of 4.2.

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Chapter 5

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

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DGP-WG/16 (see paragraph 3.2.4.2 of DGP/26-WP/2):

5.1 EXCEPTED QUANTITIES

5.1.2.1 For gases, the volume indicated for inner packagings refers to the water capacity of the inner receptacle and the volume indicated for outer packagings refers to the combined water capacity of all inner packagings within a single outer ~~package~~ packaging.

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5.3 TESTS FOR PACKAGES

5.3.1 The complete package as prepared for transport, with inner packagings filled to not less than 95 per cent of their capacity for solids or 98 per cent for liquids, must be capable of withstanding, as demonstrated by testing which is appropriately documented, without breakage or leakage of any inner packaging and without significant reduction in effectiveness:

. . .

DGP-WG/16 (see paragraph 3.2.3.3 of DGP/26-WP/2):

b) a force applied to the top surface for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3 m (including the ~~drop~~ sample).

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5.4 MARKING OF PACKAGES

5.4.1 Packages containing excepted quantities of dangerous goods prepared in accordance with this chapter must be durably and legibly marked with the mark shown in Figure 3-2. The primary hazard class or, when assigned, the division of each of the dangerous goods contained in the package must be shown in the mark. Where the name of the shipper or consignee is not shown elsewhere on the package, this information must be included within the mark.

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5.6 DE MINIMIS QUANTITIES

Dangerous goods assigned to codes E1, E2, E4 or E5 are not subject to these Instructions when carried as cargo provided that:

DGP-WG/16 (see paragraph 3.2.1.6 of DGP/26-WP/2):

a) the maximum net quantity ~~of material~~ per inner packaging is limited to 1 mL for liquids and gases and 1 g for solids;

b) the provisions of 5.2 are met, except that an intermediate packaging is not required if the inner packagings are securely packed in an outer packaging with cushioning material in such a way that, under normal conditions of transport, they cannot break, be punctured, or leak their contents; and for liquid dangerous goods, the outer packaging contains sufficient absorbent material to absorb the entire contents of the inner packagings;

c) the provisions of 5.3 are complied with; and

d) the maximum net quantity of dangerous goods per outer packaging does not exceed 100 g for solids or 100 mL for liquids and gases.

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Part 4

PACKING INSTRUCTIONS

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Chapter 3

CLASS 1 — EXPLOSIVES

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Packing Instruction 101

Inner packagings *Intermediate packagings* *Outer packagings*

As specified by the appropriate national authority.

UN Model Regulations, Chapter 4.1, packing instruction P101 (see ST/SG/AC.10/44/Add.1)

The ~~State's~~ distinguishing sign ~~for motor~~ used on vehicles in international road traffic of the country for which the authority acts must be marked on the dangerous goods transport document as follows: "Packaging approved by the competent authority of ..."

Note 1.— In this instance the term "competent authority" is used for intermodal compatibility; it refers to the appropriate national authority.

Note 2.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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Chapter 4

CLASS 2 — GASES

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4.1 SPECIAL PACKING PROVISIONS FOR DANGEROUS GOODS OF CLASS 2

4.1.1 General requirements

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UN Model Regulations, 4.1.6.1.4 (see ST/SG/AC.10/44/Add.1)

4.1.1.4 Refillable cylinders must not be filled with a gas or gas mixture different from that previously contained unless the necessary operations for change of gas service have been performed. The change of service for compressed and liquefied gases must be in accordance with ISO 11621:1997, as applicable. In addition, a cylinder that previously contained a Class 8 corrosive substance or a substance of another class with a corrosive subsidiary ~~risk~~ hazard must not be authorized for the transport of a Class 2 substance unless the necessary inspection and testing as specified in 6;5.1.6 have been performed.

UN Model Regulations, 4.1.4.1, packing instruction P200 (see ST/SG/AC.10/44/Add.1)

Packing Instruction 200

. . .

3) In no case must cylinders be filled in excess of the limit permitted in the following requirements:

. . .

e) For liquefied gases charged with compressed gases, both components — the ~~liquid phase~~ liquefied gas 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~~ liquefied gas 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~~ liquefied gas at 65°C;

v) Calculation of the total pressure, which is the sum of the vapour pressure of the ~~liquid component~~ liquefied gas 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~~ liquefied phase is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (vi)) into account.

. . .

Table 1. COMPRESSED GASES

UN No.	Name and description	Class or Division	Subsidiary ~~risk~~ hazard	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar*	Maximum working pressure, bar*	Special packing provisions*
. . .									

Table 2. LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class Or Division	Subsidiary ~~risk~~ hazard	LC_{50} ml/m^3	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
. . .									

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Packing Instruction 202

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UN Model Regulations, 4.1.4.1, packing instruction P203 (see ST/SG/AC.10/44/Add.1)

7) Compatibility

Materials used to ensure the leakproofness of the joints or for the maintenance of the closures must be compatible with the contents. In the case of receptacles intended for the transport of oxidizing gases (i.e. with a subsidiary ~~risk~~ hazard of 5.1), these materials must not react with these gases in a dangerous manner.

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Packing Instruction 211 1.

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

Refrigerating machines or components containing non-toxic liquefied gases or Ammonia solutions (UN 2672) must meet the following requirements:

a) each cylinder must not contain more than 450 kg of a Division 2.2 gas without subsidiary ~~risk~~ hazard or 25 kg of Ammonia solutions (UN 2672);

b) machines or components having two or more charged cylinders may not contain an aggregate of more than 910 kg of a Division 2.2 gas without subsidiary ~~risk~~ hazard or more than 45 kg of Ammonia solutions (UN 2672);

c) each cylinder must be equipped with a safety device meeting the requirements of a recognized national standard;

d) each cylinder must be equipped with a shut-off valve at each opening except openings used for safety devices and with no other connection. These valves must be closed prior to and during transport;

e) cylinders must be manufactured, inspected and tested in accordance with a recognized UN or national standard;

f) all parts subject to refrigerant pressure during shipment must be tested in accordance with a recognized UN or national standard;

g) the liquid portion of the refrigerant, if any, must not completely fill any pressure vessel at 55°C;

h) the amount of refrigerant, if liquefied, must not exceed the filling density prescribed by applicable State regulations.

Packing Instruction 218

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UN Model Regulations, 4.1.4.1, packing instruction P206 (see ST/SG/AC.10/44/Add.1) and DGP/26 (see paragraph 2.4.1.2 a) of the report)

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:

   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) Calculation of the total pressure, which 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 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~~ phase is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph vi)) into account.

OUTER PACKAGINGS

Boxes	*Drums*	*Jerricans*
	Strong outer packagings	

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UN Model Regulations, 4.1.4.1, Packing Instruction P006 (see ST/SG/AC.10/44/Add.1) and DGP-WG/17 (see paragraph paragraphs 3.2.2.1.2 and 3.2.2.1.3 of DGP/26-WP/3)

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Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

Replace all references to "subsidiary risk" with "subsidiary hazard"

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DGP/26 (see paragraph 2.4.3 of this report):

Packing Instructions 360 – 366

Cargo aircraft only

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ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

For UN 1308

For Packing Groups I and II, only combination packagings are permitted. The completed package must not have a gross mass exceeding 75 kg.

Packing Group III

— Packagings must meet the Packing Group II performance requirements if the substance has a Class 8 subsidiary risk.

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Chapter 6

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

Replace all references to "subsidiary risk" with "subsidiary hazard"

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Replace all references to "subsidiary risk" with "subsidiary hazard"

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Packing Instruction 459

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

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ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

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

UN Model Regulations, 4.1.4.1, P520, new PP94 (see ST/SG/AC.10/44/Add.1) and DGP/26 (see paragraph 2.4.1.2 c)

UN 3223 or UN 3224

Energetic samples classified in accordance with Part 2, Introductory Chapter, paragraph 5.4 may be carried under UN 3223 or UN 3224, as appropriate, provided that:

1. The quantity per individual inner cavity does not exceed 0.01 g for solids or 0.01 mL for liquids and the maximum net quantity per outer packaging does not exceed 20 g for solids or 20 mL for liquids, or in the case of mixed packing the sum of grams and millilitres does not exceed 20:

   a) the samples are carried in microtiter plates or multi-titer plates made of plastics, glass, porcelain or stoneware as an inner packaging;

   b) only combination packaging with outer packaging comprising boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1 and 4H2) are permitted; or

2. The maximum content of each inner packaging does not exceed 1 g for solids or 1 mL for liquids and the maximum net quantity per outer packaging does not exceed 56 g for solids or 56 mL for liquids, or in the case of mixed packing the sum of grams and millilitres does not exceed 56:

   a) The individual substance is contained in an inner packaging of glass or plastics of maximum capacity of 30 mL placed in an expandable polyethylene foam matrix of at least 130 mm thickness having a density of 18 ±1 g/L;

   b) Within the foam carrier, inner packagings are segregated from each other by a minimum distance of 40 mm and from the wall of the outer packaging by a minimum distance of 70 mm. The package may contain up to two layers of such foam matrices, each carrying up to twenty-eight inner packagings;

   c) The outer packaging consists only of corrugated fibreboard boxes (4G) having minimum dimensions of 60 cm (length) by 40.5 cm (width) by 30 cm (height) and minimum wall thickness of 1.3 cm.

When dry ice or liquid nitrogen is optionally used as a coolant for quality control measures, all applicable requirements of these Instructions must be met. Interior supports must be provided to secure the inner 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 inner and outer packagings 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.

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Chapter 7

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

Replace all references to “subsidiary risk” with “subsidiary hazard”

. . .

Chapter 8

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

Replace all references to “subsidiary risk” with “subsidiary hazard”

. . .

Packing Instruction 620

This packing instruction applies to UN 2814 and UN 2900.

The following packagings are authorized provided the special packing provisions are met.

Packagings meeting the requirements of 6;6 and approved accordingly consisting of:

. . .

e) Whatever the intended temperature of the consignment, the primary receptacle or the secondary packaging must be capable of withstanding, without leakage, an internal pressure producing a pressure differential of not less than 95 kPa ~~and temperatures in the range –40°C to +55°C~~. This primary receptacle or secondary packaging must also be capable of withstanding temperatures in the range –40°C to +55°C.

. . .

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.

. . .

DGP-WG/16 (see paragraph 3.2.4.2 of DGP/26-WP/2):

Packing Instruction 650

. . .

7) For liquid substances:

. . .

e) The primary receptacle or the secondary packaging must be capable of withstanding, without leakage, an internal pressure of 95 kPa (0.95 bar);

f) The outer ~~package~~ packaging must not contain more than 4 litres. This quantity excludes ice, dry ice or liquid nitrogen when used to keep specimens cold.

. . .

8) For solid substances:

. . .

d) Except for packages containing body parts, organs or whole bodies, the outer ~~package~~ packaging must not contain more than 4 kg. This quantity excludes ice, dry ice or liquid nitrogen when used to keep specimens cold;

e) If there is any doubt as to whether or not residual liquid may be present in the primary receptacle during transport, then a packaging suitable for liquids, including absorbent materials, must be used.

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Chapter 9

CLASS 7 — RADIOACTIVE MATERIAL

Replace all references to “subsidiary risk” with “subsidiary hazard”

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Chapter 10

CLASS 8 — CORROSIVE SUBSTANCES

Replace all references to “subsidiary risk” with “subsidiary hazard”

. . .

DGP/26 (see paragraph 2.3.3 of this report):

Packing Instruction 872

Passenger and cargo aircraft for UN 2800

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.

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS				**SINGLE PACKAGINGS**
UN number and proper shipping name	*Packing conditions*	*Total quantity per package — passenger*	*Total quantity per package — cargo*	
UN 2800 **Batteries, wet, non-spillable**	Batteries must be protected against short circuits and must be securely packed in strong outer packagings.	No limit	No limit	No

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes *Drums* *Jerricans*

Strong outer packagings

~~**TESTING**~~

~~Batteries can be considered as non-spillable provided that they are capable of withstanding the vibration and pressure differential tests given below, without leakage of battery fluid.~~

~~*Vibration test:* The battery is rigidly clamped to the platform of a vibration machine and a simple harmonic motion having an amplitude of 0.8 mm (1.6 mm maximum total excursion) is applied. The frequency is varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return is traversed in 95 ± 5 minutes for each mounting position (direction of vibration) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.~~

~~*Pressure differential test:* Following the vibration test, the battery is stored for six hours at 24°C ±4°C while subjected to a pressure differential of at least 88 kPa. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.~~

~~*Note.— Non-spillable type batteries which are an integral part of, and necessary for the operation of, mechanical or electronic equipment must be securely fastened in the battery holder on the equipment and protected in such a manner so as to prevent damage and short circuits.*~~

. . .

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

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Replace all references to “subsidiary risk” with “subsidiary hazard”

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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, Packing Instruction 952 for battery-powered equipment and vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

. . .

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;

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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.

. . .

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, Packing Instruction 952 for battery-powered equipment and vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

. . .

ADDITIONAL PACKING REQUIREMENTS

Flammable gas vessels

1) for flammable gas-powered vehicles, 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 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 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.

DGP/26 (see paragraph 2.4.2 of this report):

Flammable liquid fuel tanks

If a vehicle is powered by a flammable liquid and a flammable gas internal combustion engine, the requirements set out in Packing Instruction 950 for flammable liquid fuel tanks must also be met.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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.

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, Packing Instruction 951 for flammable gas-powered vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

. . .

ADDITIONAL PACKING REQUIREMENTS

. . .

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:

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;

DGP-WG/17 (see paragraph 3.2.4.1 of DGP/26-WP/3) and DGP/26 (see paragraph 2.4.1.2 d) of this report):

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~~Where the lithium battery is removed from the vehicle and is packed separate from the vehicle in the same outer packaging, the package must be consigned as UN 3481— **Lithium ion batteries packed with equipment** or UN 3091 — **Lithium metal batteries packed with equipment** and packed according to Packing Instruction 966 or 969 as applicable; and

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

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. . .

Packing Instruction 955

Passenger and cargo aircraft for UN 2990 and UN 3072 only

The term “life-saving appliances” applies to articles such as life rafts, life vests, aircraft survival kits or aircraft evacuation slides.

The description “Life-saving appliances, self-inflating” (UN 2990) is intended to apply to life-saving appliances that present a hazard if the self-inflating device is activated accidentally.

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.

UN number and proper shipping name	*Quantity — passenger*	*Quantity — cargo*
UN 2990 **Life-saving appliances, self-inflating** UN 3072 **Life-saving appliances, not self-inflating** containing dangerous goods as equipment	No limit	No limit

ADDITIONAL PACKING REQUIREMENTS

Life-saving appliances may only contain the dangerous goods listed below:

a) Division 2.2 gases, must be contained in cylinders which conform to the requirements of the appropriate national authority of the country in which they are approved and filled. Such cylinders may be connected to the life-saving appliance. These cylinders may include installed actuating cartridges (cartridges, power device of Division 1.4C and 1.4S) provided the aggregate quantity of deflagrating (propellant) explosives does not exceed 3.2 grams per unit. When the cylinders are shipped separately, they must be classified as appropriate for the Division 2.2 gas contained and need not be marked, labelled or described as explosive articles;

b) signal devices (Class 1), which may include smoke and illumination signal flares; signal devices must be packed in plastic or fibreboard inner packagings;

c) small quantities of flammable substances, corrosive solids and organic peroxides (Class 3, Class 8, Division 4.1 and 5.2), which may include a repair kit and not more than 30 strike-anywhere matches. The organic peroxide may only be a component of a repair kit and the kit must be packed in strong inner packaging. The strike-anywhere matches must be packed in a cylindrical metal or composition packaging with a screw-type closure and be cushioned to prevent movement;

d) electric storage batteries (Class 8), which must be disconnected or electrically isolated and protected against short circuits;

e) lithium batteries:

1) must meet the applicable requirements of 2;9.3;

2) must be disconnected or electrically isolated and protected against short circuits; and

3) must be secured against movement within the appliance.

f) first aid kits which may include flammable, corrosive and toxic articles or substances.

The appliances must be packed, so that they cannot be accidentally activated, in strong outer packagings and, except for life vests, the dangerous goods must be in inner packagings packed so as to prevent movement. The dangerous goods must be an integral part of the appliance without which it would not be operational and in quantities which do not exceed those appropriate for the actual appliance when in use.

Packing Instruction 955

UN Model Regulations, Chapter 3.3, Special Provision 296 (see ST/SG/AC.10/44/Add.1)

Life-saving appliances packed in strong rigid outer packagings with a total maximum gross mass of 40 kg, containing no dangerous goods other than Division 2.2 compressed or liquefied gases with no subsidiary ~~risk~~ hazard in receptacles with a capacity not exceeding 120 mL, installed solely for the purpose of the activation of the appliance, are not subject to these Instructions when carried as cargo.

Life-saving appliances may also include articles and substances not subject to these Instructions which are an integral part of the appliance.

. . .

DGP/26 (see paragraph 2.4.4 of this report):

Packing Instruction 958

Passenger and cargo aircraft for UN 2071 and UN 2590 only

General requirements

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

1) **Compatibility requirements**

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

2) **Closure requirements**

— Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS				SINGLE PACKAGINGS
UN number and proper shipping name	*Inner packaging (see 6;3.2)*	*Inner packaging quantity (per receptacle) ~~Quantity — passenger~~*	*Total ~~Q~~quantity ~~— cargo~~ per package*	
UN 2071 **Ammonium nitrate fertilizers** UN 2590 **Asbestos, chrysotile**	Glass	~~200~~ 10 kg	200 kg	~~Yes~~200 kg
	Fibre	50 kg		
	Metal	50 kg		
	Paper bag	50 kg		
	Plastics	50 kg		
	Plastic bag	50 kg		

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

~~*For UN 2071 and 2590*~~

— ~~All rigid packagings must be sift proof.~~Plastic, paper and fibre inner packagings must be siftproof.

~~*For UN 2590*~~

— ~~Bags must be palletized and unitized by methods such as shrink wrapping in plastic film or wrapping in fibreboard secured by strapping.~~

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

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

ADDITIONAL PACKING REQUIREMENTS FOR SINGLE PACKAGINGS

— ~~Plastic, paper and fibre inner packagings must be siftproof~~Fibre, fibreboard, wood and plywood single packagings must be fitted with a suitable liner.
— For UN 2590, bags must be placed in closed rigid overpacks.

SINGLE PACKAGINGS

Bags	*Boxes*	*Drums*	*Jerricans*
Paper (5M2)	Aluminium (4B)	Aluminium (1B1, 1B2)	Aluminium (3B1, 3B2)
Plastics (5H4)	Fibreboard (4G)	Fibre (1G)	Plastics (3H1, 3H2)
Textile(5L3)	Natural wood (4C1, 4C2)	Other metal (1N1, 1N2)	Steel (3A1, 3A2)
Woven plastics (5H3)	Other metal (4N)	Plastics (1H1, 1H2)	
	Plastics (~~4H1, 4~~H2)	Plywood (1D)	
	Plywood (4D)	Steel (1A2)	
	Reconstituted wood (4F)		
	Steel (4A)		

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Packing Instruction 961

Passenger and cargo aircraft for UN 3268 only

UN Model Regulations, Chapter 4.1.4.1, packing instruction P902 (see ST/SG/AC.10/44/Add.1)

. . .

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

— Packagings must meet the Packing Group III performance requirements.
— The packagings must be designed and constructed to prevent movement of the articles and inadvertent operation during normal conditions of transport.
— Any pressure receptacle must be in accordance with the requirements of the appropriate national authority for the substance(s) contained therein.

Cargo aircraft only

Air bag inflators, air bag modules and seat-belt pretensioners may also be transported unpackaged on cargo aircraft in dedicated handling devices when transported ~~from where they are manufactured to vehicle assembly plants~~ to, from, or between where they are manufactured and an assembly plant including intermediate handling locations. When transported in handling devices, the following conditions must be met:

. . .

Packing Instruction 962

Passenger and cargo aircraft for UN 3363 only

. . .

ADDITIONAL PACKING REQUIREMENTS

UN Model Regulations, Chapter 3.3, Special Provision 301 (see ST/SG/AC.10/44/Add.1)

— If the machinery or apparatus contains more than one item of dangerous goods, the individual dangerous goods must be enclosed to prevent them reacting dangerously with one another during transport (see 4;1.1.3).
— Receptacles containing dangerous goods must be so secured or cushioned so as to prevent their breakage or leakage and so as to control their movement within the machinery or apparatus during normal conditions of transport. Cushioning material must not react dangerously with the contents of the receptacles. Any leakage of the contents must not substantially impair the protective properties of the cushioning material.
— "Package orientation" labels (Figure 5-29), or preprinted orientation labels meeting the same specification as either Figure 5-29 or ISO Standard 780-1997 must be affixed on at least two opposite vertical sides with the arrows pointing in the correct direction only when required to ensure liquid dangerous goods remain in their intended orientation.
— Irrespective of 5;3.2.10, machinery or apparatus containing magnetized material meeting the requirements of Packing Instruction 953 must also bear the "Magnetized material" label (Figure 5-27).
— For Division 2.2 gases, cylinders for gases, their contents and filling ratios must conform to the requirements of Packing Instruction 200.
— Dangerous goods in apparatus or machinery must be packed in strong outer packagings unless the receptacles containing the dangerous goods are afforded adequate protection by the construction of the apparatus or machinery.

Fuel system components

— Fuel system components must be emptied of fuel as far as practicable and all openings must be sealed securely. They must be packed:

1) in sufficient absorbent material to absorb the maximum amount of liquid which may possibly remain after emptying. Where the outer packaging is not liquid tight, a means of containing the liquid in the event of leakage must be provided in the form of a leakproof liner, plastic bag or other equally efficient means of containment; and

2) in strong outer packagings.

Packing Instruction Y963

DGP-WG/17 (see paragraph 3.2.4.3 of DGP/26-WP/3):

Limited quantities
Passenger and cargo aircraft for ID 8000 only

Consumer commodities are materials that are packaged and distributed in a form intended or suitable for retail sale for the purposes of personal care or household use. These include items administered or sold to patients by doctors or medical administrations. Except as otherwise provided below, dangerous goods packed in accordance with this packing instruction do not need to comply with 4;1 or Part 6 of these Instructions; they must, however, comply with all other applicable requirements.

a) Each packaging must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during air transport.

. . .

DGP-WG/16 (see paragraph 3.2.4.1 of DGP/26-WP/2):

f) Inner packagings containing liquids~~, excluding flammable liquids in inner packagings of 120 mL or less,~~ must be packed with their closures upward and the upright position of the package must be indicated by "Package orientation" labels (Figure 5-29). These labels, or pre-printed package orientation labels meeting the same specification as either Figure 5-29 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 requirements of this sub-paragraph do not apply to:

1) dangerous goods in inner packagings each containing not more than 120 mL with sufficient absorbent material between the inner and outer packagings to completely absorb the liquid contents; or

2) dangerous goods in gas tight inner packagings such as tubes, bags or vials which are opened by breaking or puncturing.

. . .

Packing Instruction 965

Cargo aircraft only for UN 3480

1. **Introduction**

This entry applies to lithium ion or lithium polymer batteries. This packing instruction is structured as follows:

— Section IA applies to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
— Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and
— Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.

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.

IA.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**	Forbidden	35 kg

Packing Instruction 965

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.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Lithium ion cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
— 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	*Drums*	*Jerricans*
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)		

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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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 965

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	Forbidden	10 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.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically 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 marked with the appropriate lithium battery mark (Figure 5-3) in addition to the appropriate Class 9 hazard label (Figure 5-26) and the cargo aircraft only label (Figure 5-28).

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

IB.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 965

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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	*Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh*	*Lithium ion cells with a Watt-hour rating more than 2.7 Wh, but not more than 20 Wh*	*Lithium ion batteries with a Watt-hour rating more than 2.7 Wh, but not more than 100 Wh*
1	*2*	*3*	*4*
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

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

Packing Instruction 965

II.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with other dangerous goods.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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 marked with the appropriate lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 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 mark, if the package dimensions are adequate.

~~Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.~~

— 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” — cargo aircraft only” or “lithium ion batteries, in compliance with Section II of PI965 — CAO” 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.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 965

II.4 **Overpacks**

Not more than one package prepared in accordance with this section may be placed into an overpack.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

Packages prepared in accordance with this section must not be placed into an overpack with packages containing substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When the package is placed in an overpack, the lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 5-28) required by this packing instruction must either be clearly visible or the mark and label must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

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

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.

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.

Packing Instruction 966

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

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.

DGP/26 (see paragraph 6.3.1 under Agenda Item 6 of report):

— The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.

— 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*
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other metal (1N2)	Steel (3A2)
Other metal (4N)	Plastics (1H2)	
Plastics (4H1, 4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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;

Packing Instruction 966

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 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).

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

II.2 **Additional requirements**

— Lithium ion cells and batteries must:
   — be placed in inner packagings that completely enclose the cell or battery, then placed in a strong 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.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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.

DGP/26 (see paragraph 6.3.1 under Agenda Item 6 of report):

— The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.
— 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 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.

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

— 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.
— 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

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

Packing Instruction 967

Passenger and cargo aircraft for UN 3481 (contained in equipment) only

1. **Introduction**

This entry applies to lithium ion or lithium polymer batteries contained in equipment.

Section I of this packing instruction applies to lithium ion and lithium polymer cells and batteries that are assigned to Class 9. Certain lithium ion and lithium polymer cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

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.

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**

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).

Packing Instruction 967

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**

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

— 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 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.
— Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

I.3 **Outer packagings**

DGP-WG/16 (see paragraph 3.5.3.1.3 of DGP/26-WP/2) (incorporated in the 2017-2018 Edition of the Technical Instructions through Addendum/Corrigendum No. 1) (Steel, although not included in of DGP/26-WP/2, was also added under "boxes"):

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

~~Strong outer packagings~~

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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

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 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.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~
- Where a consignment includes packages bearing the lithium battery 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.

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

Packing Instruction 968

Cargo aircraft only for UN 3090

1. **Introduction**

This entry applies to lithium metal or lithium alloy batteries. This packing instruction is structured as follows:

— Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
— Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
— Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

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

2. **Lithium batteries forbidden from transport**

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. **SECTION IA**

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

IA.1 **General requirements**

Part 4;1 requirements must be met.

Table 968-IA

UN number and proper shipping name	*Net quantity per package*	
	Passenger	*Cargo*
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.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Lithium metal cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
— 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	*Drums*	*Jerricans*
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)		

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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) and the following:

1) for lithium metal cells, the lithium content is not more than 1 g;
2) for lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g.

IB.1 **General requirements**

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

Table 968-IB

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

IB.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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 marked with the appropriate lithium battery mark (Figure 5-3) in addition to the appropriate Class 9 hazard label (Figure 5-26) and the cargo aircraft only label (Figure 5-28).

~~*Note. The provisions for a lithium battery handling label as contained in the 2015 2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015 2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

IB.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) and the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g.

II.1 **General requirements**

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

Table 968-II

Contents	*Lithium metal cells and/or batteries with a lithium content not more than 0.3 g*	*Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g*	*Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g*
1	*2*	*3*	*4*
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

II.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong rigid outer packaging.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with other dangerous goods.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically 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 marked with the appropriate lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 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 mark, if the package dimensions are adequate.

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

- 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.
- Packages and overpacks of lithium metal 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.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

Not more than one package prepared in accordance with this section may be placed into an overpack.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

Packages prepared in accordance with this section must not be placed into an overpack with packages containing substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When the package is placed in an overpack, the lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 5-28) required by this packing instruction must either be clearly visible or the mark and label must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word “Overpack” in lettering of at least 12 mm high.

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

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.

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**

Part 4;1 requirements must be met.

UN number and proper shipping name		*Package quantity (Section I)*	
		Passenger	*Cargo*
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.

DGP/26 (see paragraph 6.3.1 under Agenda Item 6 of report):

- The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.
- 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.

Packing Instruction 969

I.3 **Outer packagings**

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

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) ~~-~~ 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).

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

II.2 **Additional requirements**

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

— Lithium metal cells ~~or~~ 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.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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.

Packing Instruction 969

DGP/26 (see paragraph 6.3.1 under Agenda Item 6 of this report):

- The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.
- 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 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.

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

- 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.
- 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.

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

Packing Instruction 970

Passenger and cargo aircraft for UN 3091 (contained in equipment) only

1. **Introduction**

This entry applies to lithium metal or lithium alloy batteries contained in equipment.

Section I of this packing instruction applies to lithium metal and lithium alloy cells and batteries that are assigned to Class 9. Certain lithium metal and lithium alloy cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

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.

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.

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

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.

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

— 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.
— The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

Packing Instruction 970

I.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II. **SECTION II**

Error discovered and corrected through Addendum/Corrigendum No. 1 to 2017-2018 Edition):

Lithium metal or lithium alloy cells and batteries contained ~~with~~ 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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) 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**

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2)

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).

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

Packing Instruction 970

II.2 **Additional requirements**

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- The equipment must be packed in strong 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 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.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

- Where a consignment includes packages bearing the lithium battery mark, the words "lithium metal batteries, in compliance with Section II of PI970" must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

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Part 5

SHIPPER'S RESPONSIBILITIES

Chapter 1

GENERAL

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1.1 GENERAL REQUIREMENTS

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

. . .

Note 1.— Packages and overpacks containing dangerous goods may be included on the same air waybill as cargo which is not subject to these Instructions.

Note 2.— The requirement in 1.1 j) also applies to consolidated shipments offered to the operator.

Note 3.— For cooling purposes, an overpack may contain dry ice, provided that the overpack meets the requirements of Packing Instruction 954.

UN Model Regulations, 5.1.1 (see ST/SG/AC.10/44/Add.1)

Note 4.— In accordance with the GHS, a GHS pictogram not required by these Instructions should only appear in transport as part of a complete GHS label and not independently (see GHS 1.4.10.4.4).

1.6 EMPTY PACKAGINGS

. . .

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

. . .

1.7 MIXED PACKING

UN Model Regulations, 5.1.4 (see ST/SG/AC.10/44/Add.1)

When two or more dangerous goods are packed within the same outer packaging, the package must be labelled and marked as required for each substance. Labels need not be applied for a subsidiary ~~risk~~ hazard if the hazard is already represented by a primary ~~risk~~ hazard label.

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Chapter 3

LABELLING

. . .

UN Model Regulations, 5.2 (see ST/SG/AC.10/44/Add.1)

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~~ hazard label must also be affixed for any ~~risk~~ hazard 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~~ hazard label where no subsidiary ~~risk~~ hazard is indicated in column 4 or may exempt from the requirement for a subsidiary ~~risk~~ hazard label where such a ~~risk~~ hazard is indicated in the Dangerous Goods List.

3.1.2 Labels identifying the primary and subsidiary ~~risk~~hazards 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~~ hazard 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~~ hazard 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~~ hazard label.

Note.— Many liquid organic peroxide formulations are flammable; however, no subsidiary ~~risk~~ hazard flammable label is required because the organic peroxide label itself is considered to imply that the product may be flammable.

. . .

3.2.8 Except as provided in 3.5.1.1 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 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 mark;

d) when primary and subsidiary ~~risk~~ hazard 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.

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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 5-4 to 5-26.

Note.— Where appropriate, labels in Figures 5-4 to 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:

DGP/26 (see paragraph 2.5.1.2 of this report):

a) Labels must be configured as described below (see Figure 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~~. There must be a line inside the edge forming the diamond ~~must be 2 mm. The line inside the edge~~ which must be parallel and approximately 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).

. . .

UN Model Regulations, 5.2.2.2.1.2 (see ST/SG/AC.10/44/Add.1)

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 "Gas cylinders — Precautionary labels", 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.

Corrigendum 1 to UN Model Regulations, Chapter 5.2, 5.2.2.2.1.3, see ST/SG/AC.10/1/Rev.19/Corr.1)

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 batteries (Figure 5-26).~~ However for the Class 9 label for lithium batteries (Figure 5-26), the upper half of the label must only contain the seven vertical stripes of the symbol and the lower half must contain the group of batteries of the symbol and the class number. Except for the Class 9 label for lithium batteries (Figure 5-26), ~~T~~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.

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UN Model Regulations, 5.2 (see ST/SG/AC.10/44/Add.1)

e) 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~~ hazard and precautions to be taken in handling. In the case of the Class 9 label for lithium batteries (Figure 5-26), no text other than the class number must be included in the bottom part of the label.

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3.5.1.2 Illustrations of the class hazard labels, showing the approved symbols and colours, are given in Figures 5-5 to 5-26. 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~~ hazard. See Figures 5-5 to 5-8 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 labels may extend to the edge of the label or there may be some white space at the edge, etc.

UN Model Regulations, 5.2.2.2.2 (see ST/SG/AC.10/44/Add.1) and DGP/-WG/17 (see paragraph 3.2.5.1.3 of DGP/26-WP/3).

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Chapter 4

DOCUMENTATION

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;

UN Model Regulations, 5.4.1.4.1 (d) (see ST/SG/AC.10/44/Add.1)

d) subsidiary hazard class or division number(s) corresponding to the subsidiary ~~risk~~ hazard 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.*~~

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UN Model Regulations, 5.4.1.5.5 (see ST/SG/AC.10/44/Add.1)

4.1.5.4 *Self-reactive substances and organic peroxides*

4.1.5.4.1 When organic peroxides and self-reactive substances are transported under conditions where approval is required (for organic peroxides, see 2;5.3.2.5 for self-reactive substances, see 2;4.2.3.2.5), a statement to this effect must be included in the dangerous goods transport document. A copy of the classification approval and conditions of transport for non-listed organic peroxides and self-reactive substances must be attached to the dangerous goods transport document.

4.1.5.4.2 When a sample of an organic peroxide (see 2;5.3.2.6) or a self-reactive substance (see 2;4.2.3.2.6) is transported, a statement to this effect must be included in the dangerous goods transport document.

4.1.5.6 *Firework classification reference*

4.1.5.6.1 When fireworks of UN 0336 or UN 0337 are transported, the dangerous goods transport document must include a classification reference(s) issued by the appropriate national authority.

UN Model Regulations, 5.4.1.5.10 (see ST/SG/AC.10/44/Add.1)

4.1.5.6.2 The classification reference(s) must consist of the appropriate national authority's State, indicated by the distinguishing sign ~~for motor~~ used on vehicles in international traffic, the appropriate national authority identification and a unique serial reference. Examples of such classification references are:

GB/HSE123456
D/BAM1234
USA EX20091234.

Note.— The distinguishing sign used on vehicles in international traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

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Chapter 2

MARKING OF PACKAGINGS OTHER THAN INNER PACKAGINGS

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UN Model Regulations, 6.1.3.1 f) (see ST/SG/AC.10/44/Add.1)

f) the State authorizing the allocation of the mark, indicated by the distinguishing sign ~~for motor~~ used on vehicles in international road traffic;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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UN Model Regulations, 6.1.3.8 (h) (see ST/SG/AC.10/44/Add.1)

2.1.8 After reconditioning a packaging, the reconditioner must apply to it, in sequence, durable marks showing:

h) the State in which the reconditioning was carried out, indicated by the distinguishing sign ~~for motor~~ used on vehicles in international road traffic;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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Chapter 4

PACKAGING PERFORMANCE TESTS

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4.7 TEST REPORT

4.7.1 A test report containing at least the following particulars must be drawn up and must be available to the users of the packaging:

a) name and address of the test facility;

b) name and address of the applicant (where appropriate);

c) a unique test report identification;

d) date of the test report;

e) manufacturer of the packaging;

f) description of the packaging type (e.g. dimensions, materials, closures, thickness, etc.), including method of manufacture (e.g. blow moulding); drawings and/or photographs may be included;

g) maximum capacity;

UN Model Regulations, 6.1.5.7.1 (see ST/SG/AC.10/44/Add.1)

h) characteristics of the test contents (e.g. the viscosity and relative density for liquids and the particle size for solids) (for plastics packagings subject to the internal pressure test in 4.5, the temperature of the water used);

i) test descriptions and results;

j) a signature and name and status of the signatory.

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Chapter 5

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES, AEROSOL DISPENSERS AND SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

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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 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;

UN Model Regulations, 6.2.1.6.1 d) (see ST/SG/AC.10/44/Add.1)

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.~~ For seamless steel cylinders the check of 5.1.6.1 b) and hydraulic pressure test of 5.1.6.1 d) may be replaced by a procedure conforming to ISO 16148:2016 "Gas cylinders — Refillable seamless steel gas cylinders and tubes — Acoustic emission examination (AT) and follow-up ultrasonic examination (UT) for periodic inspection and testing".

Note 3.— The check of 5.1.6.1 b) and ~~T~~the hydraulic pressure test of 5.1.6.1 d) 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.

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5.2 REQUIREMENTS FOR UN CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES

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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~~ ISO 7866: 2012+ Cor 1:2014	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing *Note.— Aluminium alloy 6351A or equivalent must not be used.*	Until further notice
. . .		

UN Model Regulations, 6.2.2.1.1 (see ST/SG/AC.10/44/Add.1)

ISO 11118:1999	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	~~Until further notice~~Until 31 December 2020
ISO 11118:2015	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods	Until further notice

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UN Model Regulations, 6.2.2.1.8 (see ST/SG/AC.10/44/Add.1)

5.2.1.8 Not used.

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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 31 December 2020
ISO 10297:2014	Gas cylinders — Cylinder valves — Specification and type testing	Until further notice

UN Model Regulations, 6.2.2.3 (see ST/SG/AC.10/44/Add.1)

ISO 13340:2001	Transportable gas cylinders — Cylinder valves for non-refillable cylinders — Specification and prototype testing.	~~Until further notice~~Until 31 December 2020

ISO 14246:2014	Gas cylinders — Cylinder valves — Manufacturing tests and examination	Until further notice
ISO 17871:2015	Gas cylinders — Quick-release cylinders valves- Specification and type testing	Until further notice

. . .

5.2.4 Periodic inspection and test

UN Model Regulations, 6.2.2.4 (see ST/SG/AC.10/44/Add.1)

5.2.4.1 The following standards apply to the periodic inspection and testing of UN cylinders ~~and UN metal hydride storage systems~~ and their closures:

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. *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.*	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 31 December 2018
ISO 10462:2013	Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance.	Until further notice
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~~ Until 31 December 2020
ISO 11623:2015	Gas cylinders — Composite construction — Periodic inspection and testing	Until further notice
ISO 22434:2006	Transportable gas cylinders — Inspection and maintenance of cylinder valves *Note.— These requirements may be met at times other than at the periodic inspection and test of UN cylinders.*	Until further notice

5.2.4.2 The following standard applies to the periodic inspection and testing of UN metal hydride storage systems:

ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	Until further notice

Editorial amendment (redundant text, it appears under 5.2.4.1, ISO 10460:2005):

~~*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.*~~

. . .

Consequential/editorial amendments:

5.2.6.5 *Periodic inspection and test and certification*

5.2.6.5.1 The application of the periodic inspection and test 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 marks, including its registered mark, to each approved cylinder and closed cryogenic receptacle (see ~~5.2.7.8~~ 5.2.7.7).

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5.2.7 Marking of UN refillable cylinders and closed cryogenic receptacles

. . .

UN Model Regulations, 6.2.2.7.2 (c) (see ST/SG/AC.10/44/Add.1)

c) The character(s) identifying the country of approval, as indicated by the distinguishing sign~~s of motor~~ used on vehicles in international road traffic;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

. . .

UN Model Regulations, 6.2.2.7.4 (see ST/SG/AC.10/44/Add.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;

Note.— Information on marks that may be used for identifying threads for cylinders is given in ISO/TR 11364, Gas cylinders — Compilation of national and international valve stem/gas cylinder neck threads and their identification and marking system.

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 sign~~s of motor~~ used on vehicles in international road traffic. The country mark and the manufacturer's mark must be separated by a space or slash;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

. . .

Consequential/editorial amendments:

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~~ 5.2.7.7;

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 marking a cylinder:

m) 25E	n) D MF	o) 765432	p) H	
i) PW200PH	f) 300BAR	g) 62.1KG	j) 50L	h) 5.8MM
(un) 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.

Deleted because requirements for composite cylinders are included in 5.2.7.4 q) and r):

~~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).~~

5.2.7.~~8~~.7 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:

UN Model Regulations, 6.2.2.7.7 (a) (see ST/SG/AC.10/44/Add.1)

a) the character(s) identifying the country authorizing the body performing the periodic inspection and test as indicated by the distinguishing sign used on vehicles in international road traffic. This mark is not required if this body is approved by the appropriate national authority of the country approving manufacture;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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~~.8 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.

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5.2.9 Marking of UN metal hydride storage systems

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5.2.9.2 The following marks must be applied:

a) The UN packaging symbol (un)

This symbol must not be used for any purpose other than for certifying that a packaging complies with the relevant requirements in Chapters 1 to 6;

b) "ISO 16111" (the technical standard used for design, manufacture and testing);

UN Model Regulations, 6.2.2.9.2 (c) (see ST/SG/AC.10/44/Add.1)

c) The character(s) identifying the country of approval, as indicated by the distinguishing sign~~s of motor~~ used on vehicles in international road traffic;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

. . .

UN Model Regulations, 6.2.2.9.2 (h) (see ST/SG/AC.10/44/Add.1)

h) 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 sign~~s of motor~~ used on vehicles in international road traffic. The country mark and the manufacturer's mark must be separated by a space or slash;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

. . .

UN Model Regulations, 6.2.2.9.4 (a) (see ST/SG/AC.10/44/Add.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~~ used for vehicles in international road traffic. This mark is not required if this body is approved by the appropriate national authority of the country approving manufacture;

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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Chapter 6

PACKAGINGS FOR INFECTIOUS SUBSTANCES OF CATEGORY A

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6.4 MARKING

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6.4.2 A packaging that meets the requirements of this section and of 6.5 shall be marked with:

. . .

UN Model Regulations, 6.3.4.2 (e) (see ST/SG/AC.10/44/Add.1)

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

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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 mark required in b) above.

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Chapter 8

REQUIREMENTS FOR INTERMEDIATE BULK CONTAINERS

8.1 MARKING OF PACKAGING FOR INTERMEDIATE BULK CONTAINERS

. . .

8.1.2 The packaging mark consists of:

UN Model Regulations, 6.5.2.1 (e) (see ST/SG/AC.10/44/Add.1)

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

Note.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

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.

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Part 7

OPERATOR'S RESPONSIBILITIES

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Chapter 2

STORAGE AND LOADING

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2.2 INCOMPATIBLE DANGEROUS GOODS

2.2.1 Segregation

UN Model Regulations, 7.1.2.3 c) (see ST/SG/AC.10/44/Add.1) and DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3)

2.2.1.1 Packages containing dangerous goods which might react dangerously one with another must 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. As a minimum, the segregation scheme shown in Table 7-1 must be followed in order to maintain acceptable segregation between packages containing dangerous goods having different hazards. The scheme applies irrespective of whether the hazard is the primary or subsidiary ~~risk~~ hazard.

DGP/26 (see paragraph 2.7.1.2 a) of this report:

2.2.1.2 Packages and overpacks containing lithium ion batteries prepared in accordance with Section IA or Section IB of Packing Instruction 965 and packages and overpacks containing lithium metal batteries prepared in accordance with Section IA or Section IB of Packing Instruction 968 must not be stowed on an aircraft next to, or in a position that would allow interaction with packages or overpacks containing dangerous goods which bear a Class 1, other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1 hazard label. To maintain acceptable segregation between packages and overpacks, the segregation requirements shown in Table 7-1 must be followed. The segregation requirements apply based on all hazard labels applied on the package or overpack, irrespective of whether the hazard is the primary or subsidiary hazard.

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2.2.2 Separation of explosive substances and articles

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DGP-WG/16 (see paragraph 3.2.7.7 of DGP/26-WP/2):

~~2.2.2.4 Except as provided for in 2.2.2.5, explosives of different compatibility groups may be stowed together whether or not they belong to the same division.~~

DGP-WG/16 (see paragraph 3.2.7.6 of DGP/26-WP/2) (para numbering changed consequential to deletion of 2.2.2.4 above:

~~2.2.2.5~~2.2.2.4 For explosives of different division numbers and compatibility groups, the ~~segregation~~ separation scheme shown in Table 7-2 must be followed in order to maintain acceptable distances between such packages.

. . .

DGP-WG/17 (see paragraphs 3.2.7.1 and 3.5.3.1 of DGP/26-WP/3):

Table 7-1. Segregation between packages

Hazard label	*Class or division*										
	1	*2.1*	*2.2, 2.3*	*3*	*4.1*	*4.2*	*4.3*	*5.1*	*5.2*	*8*	*9 see 2.2.1.2*
1	Note 1	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
2.1	Note 2	—	—	—	—	—	—	—	—	—	x
2.2, 2.3	Note 2	—	—	—	—	—	—	—	—	—	—
3	Note 2	—	—	—	—	—	—	x	—	—	x
4.1	Note 2	—	—	—	—	—	—	—	—	—	x
4.2	Note 2	—	—	—	—	—	—	x	—	—	—
4.3	Note 2	—	—	—	—	—	—	—	—	x	—
5.1	Note 2	—	—	x	—	x	—	—	—	—	x
5.2	Note 2	—	—	—	—	—	—	—	—	—	—
8	Note 2	—	—	—	—	—	x	—	—	—	—
9 see 2.2.1.2	Note 2	x	—	x	x	—	—	x	—	—	—

An "x" at the intersection of a row and column indicates that packages containing these classes of dangerous goods may not be stowed next to or in contact with each other, or in a position which would allow interaction in the event of leakage of the contents. Thus, a package containing Class 3 dangerous goods may not be stowed next to or in contact with a package containing Division 5.1 dangerous goods.

Note 1.— See 2.2.2.2 through ~~2.2.2.5~~2.2.2.4.

Note 2.— This class or division must not be stowed together with explosives other than those in Division 1.4, Compatibility Group S.

Note 3. — Packages containing dangerous goods with multiple hazards in the class or divisions which require segregation in accordance with Table 7-1 need not be segregated from other packages bearing the same UN number.

*Note 4. — UN 3528, **Engines, internal combustion, flammable liquid powered**, **Engines, fuel cell, flammable liquid powered**, **Machinery internal combustion, flammable liquid powered** and **Machinery, fuel cell, flammable liquid powered** need not be segregated from packages containing dangerous goods in Division 5.1.*

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2.4 LOADING AND SECURING OF DANGEROUS GOODS

2.4.1 Loading of cargo aircraft

. . .

DGP-WG/16 (see paragraph 3.2.7.4 of DGP/26-WP/2):

2.4.1.2 The requirements of 2.4.1.1 a), b or c) do not apply to:

Alignment with the UN agreement that the word "risk" was inappropriately used in many paragraphs of the Model Regulations and should be replaced by the word "hazard" (see ST/SG/AC.10/C.3/98).

a) flammable liquids (Class 3), Packing Group III, other than those with a subsidiary ~~risk~~ hazard of Class 8;

b) toxic substances (Division 6.1) with no subsidiary ~~risk~~ hazard other than Class 3;

c) infectious substances (Division 6.2);

d) radioactive material (Class 7);

DGP/26 (see paragraph 2.7.2 of this report):

e) miscellaneous dangerous goods (Class 9)~~.~~;

f) UN 3528 — **Engine, internal combustion, flammable liquid powered** or **Engine, fuel cell, flammable liquid powered** or **Machinery, internal combustion, flammable liquid powered** or **Machinery, fuel cell, flammable liquid powered**; and

g) UN 3529 — **Engine, internal combustion, flammable gas powered** or **Engine, fuel cell, flammable gas powered** or **Machinery, internal combustion, flammable gas powered** or **Machinery, fuel cell, flammable gas powered.**

DGP-WG/17 (see paragraph 3.2.7.2 of DGP/26-WP/3):

Note — When transporting goods in a non-pressurized cargo ~~hold~~ compartment, there will be a large pressure differential up to 75 kPa at cruise altitudes. Packages that are filled at a normal atmospheric pressure may not be capable of withstanding this pressure differential. Confirmation of the suitability of the packagings from the shipper should be obtained.

. . .

2.9 SPECIAL PROVISIONS APPLICABLE TO THE CARRIAGE OF RADIOACTIVE MATERIAL

2.9.1 LIMITATION OF EXPOSURE OF PERSONS TO RADIATION

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2.9.3 STOWAGE DURING TRANSPORT AND STORAGE IN TRANSIT

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

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DGP-WG/16 (see paragraph 3.2.7.6 of DGP/26-WP/2):

b) Where a consignment is transported under exclusive use, there is no limit on the sum of the transport indexes aboard a single aircraft, but the requirement on minimum ~~segregation~~ separation distances established in 2.9.6 applies;

. . .

DGP-WG/17 (see paragraph 3.2.7.2 of DGP/26-WP/3):

2.12 LOADING OF UN 2211, POLYMERIC BEADS, EXPANDABLE OR UN 3314, PLASTICS MOULDING COMPOUND

A total of not more than 100 kg net mass of expandable polymeric beads (or granules), or plastic moulding materials, referenced to Packing Instruction 957, may be carried in any inaccessible ~~hold~~ cargo compartment on any aircraft.

DGP/26 (see paragraph 2.8.3 of this report):

2.13 LOADING OF BATTERY POWERED MOBILITY AIDS CARRIED UNDER THE PROVISIONS OF PART 8

2.13.1 Loading of non-spillable wet battery powered mobility aids

2.13.1.1 An operator must secure, by use of straps, tie-downs or other restraint devices, a battery powered mobility aid with installed batteries. The mobility aid, the batteries, electrical cabling and controls must be protected from damage including by the movement of baggage, mail or cargo.

2.13.1.2 An operator must verify that:

a) the passenger has confirmed that the battery is a non-spillable wet battery that complies with Special Provision A67;

b) the battery terminals are protected from short circuits (e.g. by being enclosed within a battery container);

c) the battery is either:

1) securely attached to the mobility aid and the electrical circuits are isolated following the manufacturer's instructions; or

2) removed by the user, if the mobility aid is specifically designed to allow it to be, following the manufacturer's instructions.

d) a maximum of one spare battery may be carried per passenger.

2.13.1.3 An operator must ensure that any battery(ies) removed from the mobility aid and any spare battery are carried in strong, rigid packagings, protected from short circuit and stowed in the cargo compartment.

2.13.1.4 The operator must inform the pilot-in-command of the location of any mobility aids with installed batteries, removed batteries and spare batteries.

2.13.2 Loading of spillable battery powered mobility aids

2.13.2.1 An operator must secure, by use of straps, tie-downs or other restraint devices, a battery powered mobility aid with installed batteries. The mobility aid, the batteries, electrical cabling and controls must be protected from damage including by the movement of baggage, mail or cargo.

2.13.2.2 An operator must verify that:

a) the battery terminals are protected from short circuits (e.g. by being enclosed within a battery container);

b) the battery is fitted, where feasible, with spill resistant-vent caps; and

c) the battery is either:

1) securely attached to the mobility aid and the electrical circuits are isolated following the manufacturer's instructions; or

2) removed from the mobility aid following the manufacturer's instructions when required by 2.13.2.3.

2.13.2.3 An operator must load, stow, secure, and unload a spillable battery-powered mobility aid in an upright position. If the mobility aid cannot be loaded, stowed, secured and unloaded always in an upright position or if the mobility aid does not adequately protect the battery, the operator must remove the batteries and carry them in strong, rigid packagings, as follows:

a) packagings must be leak-tight, impervious to battery fluid and be protected against being overturned by securing them to pallets or by securing them in cargo compartments using appropriate means of securement;

b) batteries must be protected against short circuits, secured upright in these packagings and surrounded by compatible absorbent material sufficient to absorb their total liquid contents; and

c) these packagings must be marked “Battery, wet, with wheelchair” or “Battery, wet, with mobility aid” and be labelled with a “Corrosive” label (Figure 5-24) and with package orientation labels (Figure 5-29) as required by 5;3.

2.13.2.4 The operator must inform the pilot-in-command of the location of any mobility aids with installed spillable batteries and removed batteries.

2.13.3 Loading of lithium ion battery powered mobility aids

2.13.3.1 An operator must secure, by use of straps, tie-downs or other restraint devices, a battery powered mobility aid with installed batteries. The mobility aid, the batteries, electrical cabling and controls must be protected from damage including by the movement of baggage, mail or cargo.

2.13.3.2 An operator must verify that:

a) the battery terminals are protected from short circuits (e.g. by being enclosed within a battery container);

b) the battery is either:

1) securely attached to the mobility aid and the electrical circuits are isolated following the manufacturer's instructions; or

2) removed by the user, if the mobility aid is specifically designed to allow it to be, following the manufacturer's instructions; and

c) the removed battery does not exceed 300 Wh and that its spare battery does not exceed 300 Wh or its two spare batteries do not exceed 160 Wh each.

2.13.3.3 An operator must ensure that any battery removed from the mobility aid and any spare batteries are carried in the cabin and protected from damage (e.g., by placing each battery in a protective pouch) and the battery terminals protected from short circuit (by insulating the terminals, e.g. by taping over exposed terminals).

2.13.3.4 The operator must inform the pilot-in-command of the location of any mobility aids with installed lithium ion batteries, removed batteries and spare batteries.

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Renumber subsequent paragraphs accordingly

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Chapter 4

PROVISION OF INFORMATION

. . .

4.1 INFORMATION TO THE PILOT-IN-COMMAND

. . .

DGP-WG/16 (see paragraph 3.2.7.2 of DGP/26-WP/2):

4.1.1.1 Except as otherwise provided, the information required by 4.1.1 must include the following:

a) the date of the flight;

~~a~~b) the air waybill number (when issued);

Alignment with the UN agreement that the word “risk” was inappropriately used in many paragraphs of the Model Regulations and should be replaced by the word “hazard” (see ST/SG/AC.10/C.3/98).

~~b~~c) the proper shipping name (the technical name(s) shown on the dangerous goods transport document is not required) and UN Number or ID number as listed in these Instructions. When chemical oxygen generators contained in protective breathing equipment (PBE) are being transported under Special Provision A144, the proper shipping name of “oxygen generator, chemical” must be supplemented with the statement “Aircrew protective breathing equipment (smoke hood) in accordance with Special Provision A144”.

~~c~~d) the class or division, and subsidiary ~~risk~~ hazard(s) corresponding to the subsidiary ~~risk~~ hazard label(s) applied, by numerals, and in the case of Class 1, the compatibility group;

~~d~~e) the packing group shown on the dangerous goods transport document;

~~e~~f) the number of packages and their exact loading location. For radioactive material see g) below;

≠ ~~f~~g) 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 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;

~~g~~h) for radioactive material the number of packages, overpacks or freight containers, their category, their transport index (if applicable) and their exact loading location;

~~h~~i) whether the package must be carried on cargo aircraft only;

~~i~~j) the aerodrome at which the package(s) is to be unloaded;

~~j~~k) where applicable, an indication that the dangerous goods are being carried under a State exemption; and

~~k~~l) the telephone number where a copy of the information provided to the pilot-in-command can be obtained during the flight if the operator allows the pilot-in-command to provide a telephone number instead of the details about the dangerous goods on board the aircraft, as specified in 4.3.

DGP-WG/17 (see paragraph 3.2.7.2 of DGP/26-WP/3):

4.1.2 For UN 1845 — **Carbon dioxide, solid** (dry ice), the information required by 4.1.1 may be replaced by the UN number, proper shipping name, class, total quantity in each ~~hold~~ cargo compartment on the aircraft and the aerodrome at which the package(s) is to be unloaded.

DGP/26 (see paragraph 6.3.2 under Agenda Item 6 of this report):

4.1.3 For UN 3480 (**Lithium ion batteries**) and UN 3090 (**Lithium metal batteries**), the information required by 4.1.1 may be replaced by the UN number, proper shipping name, class, total quantity at each specific loading location, the aerodrome at which the package(s) is to be unloaded and whether the package must be carried on cargo aircraft only. UN 3480 (**Lithium ion batteries**) and UN 3090 (**Lithium metal batteries**) carried under a State exemption must meet all of the requirements of 4.1.

. . .

DGP-WG/17 (see paragraph 3.2.7.5 of DGP/26-WP/3):

Table 7-9. Dangerous goods not required to appear in the information to the pilot-in-command

UN Number	*Item*	*Reference*
n/a	Dangerous goods packed in excepted quantities	3;5.1.1
UN 2807	**Magnetized material** with field strengths causing a compass deflection of not more than 2 degrees at a distance of 4.6 m	Packing Instruction 953
UN 2908	**Radioactive material, excepted package — empty packaging**	1;6.1.5.1 a)
UN 2909	**Radioactive material, excepted package — articles manufactured from natural uranium** or **depleted uranium** or **natural thorium**	1;6.1.5.1 a)
UN 2910	**Radioactive material, excepted package — limited quantity of material**	1;6.1.5.1 a)
UN 2911	**Radioactive material, excepted package — instruments** or **articles**	1;6.1.5.1 a)
UN 3090	**Lithium metal batteries** (including lithium alloy batteries) when meeting the requirements of Packing Instruction 968, Section II	Packing Instruction 968, Section II
UN 3091	**Lithium metal batteries contained in equipment** (including lithium alloy batteries) when meeting the requirements of Packing Instruction 970, Section II	Packing Instruction 970, Section II

UN Number	*Item*	*Reference*
UN 3091	**Lithium metal batteries packed with equipment** (including lithium alloy batteries) when meeting the requirements of Packing Instruction 969, Section II	Packing Instruction 969, Section II
UN 3245	**Genetically modified micro-organisms**	Packing Instruction 959
UN 3245	**Genetically modified organisms**	Packing Instruction 959
UN 3373	**Biological substance, Category B**	Packing Instruction 650, sub-paragraph 11
UN 3480	**Lithium ion batteries** (including lithium ion polymer batteries) when meeting the requirements of Packing Instruction 965, Section II	Packing Instruction 965, Section II
UN 3481	**Lithium ion batteries contained in equipment** (including lithium ion polymer batteries) when meeting the requirements of Packing Instruction 967, Section II	Packing Instruction 967, Section II
UN 3481	**Lithium ion batteries packed with equipment** (including lithium ion polymer batteries) when meeting the requirements of Packing Instruction 966, Section II	Packing Instruction 966, Section II

. . .

Alignment with the UN agreement that the word “risk” was inappropriately used in many paragraphs of the Model Regulations and should be replaced by the word “hazard” (see ST/SG/AC.10/C.3/98).

4.3 INFORMATION TO BE PROVIDED BY THE PILOT-IN-COMMAND IN CASE OF IN-FLIGHT EMERGENCY

If an in-flight emergency occurs, the pilot-in-command must, as soon as the situation permits, inform the appropriate air traffic services unit, for the information of aerodrome authorities, of any dangerous goods carried as cargo on board an aircraft. Wherever possible this information should include the proper shipping name and/or UN number, the class/division and, for Class 1, the compatibility group, any identified subsidiary ~~risk~~ hazard(s), the quantity and the location on board the aircraft, or a telephone number where a copy of the information provided to the pilot-in-command can be obtained. When it is not considered possible to include all the information, those parts thought most relevant in the circumstances or a summary of the quantities and class or division of dangerous goods in each cargo compartment should be given.

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Chapter 6

PROVISIONS TO AID RECOGNITION OF UNDECLARED DANGEROUS GOODS

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Consequential/editorial amendment:

unaccompanied passengers’ baggage/personal effects — may contain items meeting any of the criteria for dangerous goods not permitted under Table 8-1

Note.— Excess baggage carried as cargo may contain certain dangerous goods, as provided for by 1;1.1.5.1 ~~g)~~ h).

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Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

Chapter 1

PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

Parts of this Chapter are affected by State Variations US 15, VE 9, VE 10; see Table A-1

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

DGP/26 (see paragraph 2.8.2 of this report):

~~1.1.1 Except as otherwise provided in 1.1.2, dangerous goods, including excepted packages of radioactive material, must not be carried by passengers or crew members, either as or in carry-on baggage or checked baggage or on their person. Except as provided for in Table 8-1, 31), security type equipment such as attaché cases, cash boxes, cash bags, etc., incorporating dangerous goods, for example lithium batteries or pyrotechnic material, are totally forbidden; see entry in Table 3-1. Personal medical oxygen devices that utilize liquid oxygen are forbidden either as or in carry on baggage or checked baggage or on the person. Electroshock weapons (e.g. tasers) containing dangerous goods such as explosives, compressed gases, lithium batteries, etc., are forbidden in carry on baggage or checked baggage or on the person.~~

1.1.1 Passengers or crew are forbidden to carry dangerous goods either as or in carry-on baggage, checked baggage or on their person unless the dangerous goods are:

a) permitted by Table 8-1; and

b) for personal use only.

~~1.1.2 Notwithstanding any additional restrictions which may be implemented by States in the interests of aviation security, except for the incident reporting provisions of 7;4.4 or 7;4.5, as applicable, the provisions of these Instructions do not apply to the dangerous goods listed in Table 8-1 when carried by passengers or crew members or in baggage that has been separated from its owner during transit (e.g. lost baggage or improperly routed baggage) or in excess baggage carried as cargo as permitted by 1;1.1.5.1 g):~~

1.1.2 Except for the reporting provisions of 7;4.4 and 7;4.5, the provisions of these Instructions do not apply to the dangerous goods permitted by Table 8-1 when those dangerous goods are:

a) carried by passengers or crew for personal use only;

b) contained in baggage that has been separated from its owner during transit (e.g. lost baggage or improperly routed baggage); or

c) contained within items of excess baggage sent as cargo as permitted by 1;1.1.5.1 h).

1.1.3 The entry in Table 8-1 that most appropriately describes the item or article must be selected.

Note.— For instance, electronic cigarettes must meet the requirements of the entry for "Battery powered portable electronic smoking devices" not the entry for lithium batteries or non-spillable batteries.

1.1.4 An item or article that contains multiple dangerous goods must meet all applicable entries.

Note.— For instance, the restrictions and conditions for entries 1) and 14) of Table 8-1 apply to an avalanche backpack that contains lithium batteries and gas cartridges.

1.1.5 Baggage intended to be carried in the cabin that is placed in the cargo compartment must only contain dangerous goods permitted in checked baggage. When baggage intended as carry-on is taken by the operator and placed into the cargo compartment for carriage, the operator must confirm with the passenger that dangerous goods which are only permitted in carry-on baggage have been removed.

1.1.~~3~~6 Any organization or enterprise other than an operator (such as a travel agent), involved in the air transport of passengers, should provide passengers with information about the types of dangerous goods which they are forbidden to ~~transport~~ carry aboard an aircraft. This information should consist of, as a minimum, notices at those locations where there is an interface with the passengers.

1.1.~~4~~7 Where provision is made for the purchase of tickets via the Internet, information on the types of dangerous goods which a passenger is forbidden to ~~transport~~ carry aboard an aircraft should be provided in either text or pictorial form and should be such that ticket purchase cannot be completed until the passenger, or a person acting on their behalf, has indicated that they have understood the restrictions on dangerous goods in baggage.

1.1.8 The Organization for the Prohibition of Chemical Weapons (OPCW) and government agencies may carry instruments containing dangerous goods permitted by Table 8-2.

1.1.9 Except for the reporting provisions of 7;4.4 and 7;4.5, the provisions of these Instructions do not apply to the dangerous goods permitted by Table 8-2 when those dangerous goods are:

a) carried by staff members of the OPCW on official travel or government agencies;

b) contained in baggage that has been separated from its owner during transit (e.g. lost baggage or improperly routed baggage); or

c) contained within items of excess baggage sent as cargo as permitted by 1;1.1.5.1 h).

Note 1.— The following dangerous goods may be commonly carried by passengers on other modes of transport, however, they are prohibited either as or in carry-on baggage or checked baggage:

a) personal medical oxygen devices that utilize liquid oxygen;

b) electroshock weapons (e.g. tasers) containing dangerous goods such as explosives, compressed gases, lithium batteries, etc.;

c) "strike anywhere" matches;

d) lighter fuel and lighter refills;

e) premixing burner lighter (see the Glossary of Terms in Attachment 2) without a means of protection against unintentional activation; and

f) battery-powered lighters powered by a lithium ion or lithium metal battery (e.g. laser plasma lighters, tesla coil lighters, flux lighters, arc lighters and double arc lighters) without a safety cap or means of protection against unintentional activation.

Note 2.— Exceptions found in these Instructions are not reproduced in Table 8-1. The following dangerous goods are not subject to these Instructions:

— Radio-pharmaceuticals contained within the body of a person as the result of medical treatment; and

— Energy efficient lamps when in retail packaging and intended for personal or home use. (see 1;2.6).

Note 3.— States may implement additional restrictions in the interests of aviation security.

[1.1.10 Active devices must meet defined standards for electromagnetic radiation to ensure that the operation of the devices does not interfere with aircraft systems.]

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

DGP/26 (see paragraph 2.8.2 of this report):

Replace Table 8-1 with the following:

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
Batteries				
1) Lithium batteries (including portable electronic devices)	Yes (except for g)	Yes	(see c) and d))	a) each 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; b) each battery must not exceed the following: — for lithium metal batteries, a lithium content of 2 grams; or — for lithium ion batteries, a Watt-hour rating of 100 Wh; c) each battery may exceed 100 Wh but not exceed 160 Wh Watt-hour rating for lithium ion with the approval of the operator; d) each battery may exceed 2 grams but not exceed 8 grams lithium content for lithium metal for portable medical electronic devices with the approval of the operator; e) batteries contained in portable electronic devices should be carried as carry-on baggage; however, if carried as checked baggage: — measures must be taken to prevent unintentional activation and to protect the devices from damage; and — the devices must be completely switched off (not in sleep or hibernation mode); f) batteries and heating elements must be isolated in portable electronic devices capable of generating extreme heat, which could cause a fire if activated, by removal of the heating element, battery or other components; g) spare batteries, including power banks: — must be carried as carry-on baggage; and — 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); DGP/26 (see paragraph 6.3.5 under Agenda Item 6 of this report): h) baggage equipped with a lithium battery(ies) must be carried as carry-on baggage unless the battery(ies) is removed from the baggage, in which case the battery(ies) must be carried in accordance with g); i) no more than two spare batteries meeting the requirements of c) or d) may be carried per person.

Dangerous Goods	Location: Checked baggage	Location: Carry-on baggage	Approval of the operator(s) is required	Restrictions
2) Non-spillable batteries	Yes	Yes	No	a) must meet the requirements of Special Provision A67; b) each battery must not exceed a voltage of 12 volts and a Watt-hour rating of 100 Wh; c) each battery must be protected from short circuit by the effective insulation of exposed terminals; d) no more than two spare batteries per person may be carried; and e) if contained in equipment, the equipment must be either protected from unintentional activation, or each battery must be disconnected and its exposed terminals insulated.
3) Battery-powered portable electronic smoking devices (e.g. e-cigarettes, e-cigs, ecigars, e-pipes, personal vaporizers, electronic nicotine delivery systems)	No	Yes	No	a) if powered by lithium batteries, each battery must comply with restrictions of 1) a), b) and g); b) the devices and/or batteries must not be recharged on board the aircraft; and DGP/26 (see paragraph 6.3.7 under Agenda Item 6 of this report): c) measures must be taken to prevent unintentional activation of the heating element while on board the aircraft.

DGP/26 (see paragraphs 2.3.3, 2.8.3 and 2.8.4 of this report):

4) Battery-powered mobility aids (e.g. wheelchairs)	Yes	(see d))	Yes	a) for use by passengers whose mobility is restricted by either a disability, their health or age, or a temporary mobility problem (e.g. broken leg); b) the passenger should make advance arrangements with each operator and provide information on the type of battery installed and on the handling of the mobility aid (including instructions on how to isolate the battery); c) in the case of a non-spillable wet battery: i) each battery must comply with Special Provision A67; and ii) a maximum of one spare battery may be carried per passenger. d) in the case of a lithium ion battery: i) each battery must be of a type which meets the requirements of each test in the UN Manual of Test and Criteria, Part III, subsection 38.3; ii) when the mobility aid does not provide adequate protection to the battery: — the battery must be removed in accordance with the manufacturer's instructions; — the battery must not exceed 300 Wh; — the battery terminals must be protected from short circuit (by insulating the terminals, e.g. by taping over exposed terminals); — the battery must be protected from damage (e.g. by placing each

Dangerous Goods	Location: Checked baggage	Location: Carry-on baggage	Approval of the operator(s) is required	Restrictions
				battery in a protective pouch); and — the battery must be carried in the cabin; iii) a maximum of one spare battery not exceeding 300 Wh or two spare batteries not exceeding 160 Wh each may be carried.
Flame and fuel sources				
DGP-WG/17 (see paragraph 3.5.3.6 of DGP/26-W/3):				
5) Cigarette lighter Small packet of safety matches	No	(see b))	No	a) no more than one per person; b) must be carried on the person; c) must not contain unabsorbed liquid fuel (other than liquefied gas); and d) if cigarette lighter is powered by lithium batteries, each battery must comply with restrictions of 1) a), b) and g) and 3) b) and c).
DGP/26 (see paragraph 2.8.2 of DGP/26-W/3):				
6) Alcoholic beverages containing more than 24 per cent but not more than 70 per cent alcohol by volume	Yes	Yes	No	a) must be in retail packagings; and b) no more than 5 L total net quantity per person. *Note.— Alcoholic beverages containing not more than 24 per cent alcohol by volume are not subject to any restrictions.*
7) Internal combustion engines or fuel cell engines	Yes	No	No	Measures must be taken to nullify the hazard. Refer to Special Provision A70 for more information.
8) Fuel cells containing fuel	No	Yes	No	a) fuel cell cartridges may only contain flammable liquids, corrosive substances, liquefied flammable gas, water reactive substances or hydrogen in metal hydride;
Spare fuel cell cartridges	Yes	Yes	No	b) refuelling of fuel cells on board an aircraft is not permitted except that the installation of a spare cartridge is allowed;
				c) the maximum quantity of fuel in any fuel cell or fuel cell cartridge must not exceed: — for liquids 200 mL; — for solids 200 grams; — for liquefied gases, 120 mL for non-metallic fuel cell cartridges or 200 mL for metal fuel cell or fuel cell cartridges; and — for hydrogen in metal hydride, the fuel cell or fuel cell cartridges must have a water capacity of 120 mL or less; d) each fuel cell and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, including Amendment 1, and must be marked with a manufacturer's certification that it conforms to the specification. In addition, each fuel cell cartridge must be marked with the maximum quantity and type of fuel in the cartridge; e) fuel cell cartridges containing hydrogen in metal hydride must comply with the

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
				requirements in Special Provision A162; f) no more than two spare fuel cell cartridges may be carried by a passenger; g) fuel cells containing fuel are permitted in carry-on baggage only; h) interaction between fuel cells and integrated batteries in a device must conform to IEC 62282-6-100 Ed. 1, including Amendment 1. Fuel cells whose sole function is to charge a battery in the device are not permitted; i) fuel cells must be of a type that will not charge batteries when the portable electronic device is not in use and must be durably marked by the manufacturer: "APPROVED FOR CARRIAGE IN AIRCRAFT CABIN ONLY" to so indicate; and j) in addition to the languages which may be required by the State of Origin for the markings specified above, English should be used.
Gases in cylinders and cartridges				
9) Cylinders of oxygen or air required for medical use	Yes	Yes	Yes	a) no more than 5 kg gross mass per cylinder; b) cylinders, valves and regulators, where fitted, must be protected from damage which could cause inadvertent release of the contents; c) advance arrangements recommended; and d) the pilot-in-command must be informed of the number of oxygen or air cylinders loaded on board the aircraft and their loading location(s).
10) Cartridges of Division 2.2 worn for the operation of mechanical limbs	Yes	Yes	No	Spare cartridges of a similar size are also allowed, if required, to ensure an adequate supply for the duration of the journey.
11) Cartridge of hydrocarbon gas contained in hair styling equipment	Yes	Yes	No	a) no more than one per person; b) the safety cover must be securely fitted over the heating element; and c) spare cartridges must not be carried.
12) Cartridges of Division 2.2 with no subsidiary hazard fitted into a self-inflating personal safety device such as a life-jacket or vest	Yes	Yes	Yes	a) no more than one personal safety device per person; b) the personal safety device must be packed in such a manner that it cannot be accidentally activated; c) must be for inflation purposes; d) no more than two cartridges are fitted into the device; and e) no more than two spare cartridges.
13) Cartridges of Division 2.2 with no subsidiary hazard for other than self-inflating personal safety device	Yes	Yes	Yes	a) no more than four cartridges per person; and b) the water capacity of each cartridge must not exceed 50 mL. *Note.— For carbon dioxide, a gas cartridge with a water capacity of 50 mL is equivalent to a 28 g cartridge.*

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
14) Cartridges and cylinders of Division 2.2 with no subsidiary hazard contained in an avalanche rescue backpack	Yes	Yes	Yes	a) no more than one avalanche rescue backpack per person;; b) the backpack must be packed in such a manner that it cannot be accidentally activated; c) may contain a pyrotechnic trigger mechanism which must not contain more than 200 mg net of Division 1.4S; and d) the airbags within the backpack must be fitted with pressure relief valves.
Radioactive material				
15) Radioisotopic cardiac pacemakers or other medical devices	n/a	Yes	No	Must be implanted into a person or fitted externally as the result of medical treatment.
Mercury				
16) Small medical or clinical thermometer which contains mercury	Yes	No	No	a) no more than one per person; and b) must be in its protective case.
Other dangerous goods				
17) Non-radioactive medicinal articles (including aerosols), toiletry articles (including aerosols) and aerosols in Division 2.2 with no subsidiary hazard	Yes	Yes	No	a) no more than 0.5 kg or 0.5 L total net quantity per single article; b) no more than 2 kg or 2 L total net quantity of all articles (e.g. four aerosol cans of 0.5 L each) per person; c) release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents; and d) the release of gas must not cause extreme annoyance or discomfort to crew members so as to prevent the correct performance of assigned duties.
18) Dry ice	Yes	Yes	Yes	a) no more than 2.5 kg per person; b) used to pack perishables that are not subject to these Instructions; c) the package must permit the release of carbon dioxide gas; and d) when carried as checked baggage, each package must be marked: i) "DRY ICE" or "CARBON DIOXIDE, SOLID"; and ii) the net weight of dry ice or an indication that the net weight is 2.5 kg or less.
19) Cartridges in Division 1.4S (UN 0012 or UN 0014 only)	Yes	No	Yes	a) no more than 5 kg gross mass per person; b) must be securely packaged; c) must not include ammunition with explosive or incendiary projectiles; and d) allowances for more than one person must not be combined into one or more packages.
20) Permeation devices	Yes	No	No	Instructions on how to package permeation devices for calibrating air quality monitoring equipment are found in Special Provision A41.

	Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
		Checked baggage	*Carry-on baggage*		
21)	Non-infectious specimens in flammable solutions	Yes	Yes	No	Instructions on how to package and mark specimens are found in Special Provision A180.
22)	Refrigerated liquid nitrogen	Yes	Yes	No	Must be contained in insulated packagings (e.g. dry shippers) that would not allow the build-up of pressure and be fully absorbed in a porous material so that there is no free liquid that could be released from the packaging. Refer to Special Provision A152 for more information.
23)	Dangerous goods incorporated in security-type equipment, such as attaché cases, cash boxes, cash bags, etc.	Yes	No	Yes	The security-type equipment must be equipped with an effective means of preventing accidental activation and the dangerous goods incorporated in the equipment must meet the conditions of Special Provision A178.

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Insert new Table 8-2 as follows:

Table 8-2. Provisions for instruments carried by OPCW and government agencies

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
1) Instruments containing radioactive material (i.e. chemical agent monitor (CAM) and/or rapid alarm and identification device monitor (RAID-M))	Yes	Yes	Yes	a) the instruments must not exceed the activity limits specified in Table 2-14 of these Instructions; b) must be securely packed; and c) must be carried by staff members of the Organization for the Prohibition of Chemical Weapons (OPCW) on official travel.
2) A mercurial barometer or mercurial thermometer	No	Yes	Yes	a) must be carried by a representative of a government weather bureau or similar official agency; b) must be packed in a strong outer packaging, having a sealed inner liner or a bag of strong leakproof and puncture-resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position; and c) the pilot-in-command must be informed of the barometer or thermometer.

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ATTACHMENT A

PROPOSED AMENDMENTS TO TABLE 3-1 — UN NUMBER ORDER

The format for displaying the amendments to Table 3-1 is as follows:

Modified entries

- both the original and the modified entry are printed;
- both modified and non-modified fields are printed;
- the original entry is printed in a shaded box with an asterisk in the left margin;
- check boxes are printed above the field(s) which have been modified;
- the modified entry is shown without shading below the original entry; and
- the "≠" symbol is printed in the left margin.

Deleted entries

- deleted entries are displayed in a shaded box with an asterisk in the left margin;
- check boxes are shown above each field; and
- the ">" symbol is displayed in the left margin below the shaded box to indicate that the entry will be deleted.

New entries

New entries are shown without shading with the "+" symbol in the left margin

Table 3-1. Dangerous Goods List

	Name	UN No.	Class or division	Subsidiary hazard	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
*	**Articles, explosive, n.o.s.***	0349	1.4S		Explosive 1.4		☑ A62		E0	101	25 kg	101	100 kg
≠	**Articles, explosive, n.o.s.***	0349	1.4S		Explosive 1.4		A62 A165		E0	101	25 kg	101	100 kg
*	**Fuzes, detonating †**	0367	1.4S		Explosive 1.4		☑		E0	141	25 kg	141	100 kg
≠	**Fuzes, detonating †**	0367	1.4S		Explosive 1.4		A165		E0	141	25 kg	141	100 kg
*	**Components, explosive train, n.o.s.* †**	0384	1.4S		Explosive 1.4		☑ A62		E0	101	25 kg	101	100 kg
≠	**Components, explosive train, n.o.s.* †**	0384	1.4S		Explosive 1.4		A62 A165		E0	101	25 kg	101	100 kg
*	**Substances, explosive, n.o.s.***	0481	1.4S		Explosive 1.4		☑ A62		E0	101	25 kg	101	100 kg
≠	**Substances, explosive, n.o.s.***	0481	1.4S		Explosive 1.4		A62 A165		E0	101	25 kg	101	100 kg
*	**Ammonium nitrate based fertilizer**	2067	5.1		Oxidizer		☑ A64 A79 A89	III	E1	559 Y546	25 kg 10 kg	563	100 kg
≠	**Ammonium nitrate based fertilizer**	2067	5.1		Oxidizer		A64 A79	III	E1	559 Y546	25 kg 10 kg	563	100 kg
*	**Ammonium nitrate based fertilizer**	2071	9		Miscellaneous		☑ A89 A90	III	E1	958 Y958	200 kg 30 kg G	958	200 kg
≠	**Ammonium nitrate based fertilizer**	2071	9		Miscellaneous		A90	III	E1	958 Y958	200 kg 30 kg G	958	200 kg
*	**Asbestos, amphibole*** (amosite, tremolite, actinolite, anthophyllite, crocidolite)†	2212	9				☑ A61			FORBIDDEN		FORBIDDEN	
≠	**Asbestos, amphibole*** (amosite, tremolite, actinolite, anthophyllite, crocidolite) †	2212	9				A2 A61			FORBIDDEN		FORBIDDEN	

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: 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 — Lithium batteries	US 2 US 3	☑ A88 A99 A154 A164 A183 A201 A206		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 A213		E0	FORBIDDEN		See	968
*	**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 contained in equipment** (including lithium alloy batteries) †	3091	9		Miscellaneous — Lithium batteries	US 2 US 3	A48 A88 A99 A154 A164 A181 A185 A206 A213		E0	970	5 kg	970	35 kg

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**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
≠	**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 A213		E0	969	5 kg	969	35 kg
*	**Vehicle, flammable gas powered**	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A203 A207		E0	FORBIDDEN		951	No limit
≠	**Vehicle, flammable gas powered**	3166	9		Miscellaneous		A70 A87 A118 A120 A214		E0	FORBIDDEN		951	No limit
*	**Vehicle, flammable liquid powered**	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A203 A207		E0	950	No limit	950	No limit
≠	**Vehicle, flammable liquid powered**	3166	9		Miscellaneous		A70 A87 A118 A120 A214		E0	950	No limit	950	No limit

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: 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
≠	**Vehicle, fuel cell, flammable gas powered** †	3166	9		Miscellaneous		A70 A87 A118 A120 A176 A214		E0	FORBIDDEN		951	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
≠	**Vehicle, fuel cell, flammable liquid powered** †	3166	9		Miscellaneous		A70 A87 A118 A120 A176 A214		E0	950	No limit	950	No limit
*	**Battery-powered equipment**	3171	9		Miscellaneous		☑ A21 A67 A87 A94 A164 A182		E0	952	No limit	952	No limit
≠	**Battery-powered equipment**	3171	9		Miscellaneous		A67 A87 A94 A164 A182 A214		E0	952	No limit	952	No limit

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**Battery-powered vehicle**	3171	9		Miscellaneous		☑ A21 A67 A87 A94 A164		E0	952	No limit	952	No limit
≠	**Battery-powered vehicle**	3171	9		Miscellaneous		A67 A87 A94 A164 A214		E0	952	No limit	952	No limit
*	☑ **2-Dimethylaminoethyl acrylate**	3302	6.1		Toxic		☑	II	E4	654 Y641	5 L 1 L	662	60 L
≠	**2-Dimethylaminoethyl acrylate, stabilized**	3302	6.1		Toxic		A209	II	E4	654 Y641	5 L 1 L	662	60 L
*	**Chemical kit**	3316	9		Miscellaneous		A44 A163	☑ II III	E0	960 Y960 960 Y960	☑ 10 kg 1 kg 10 kg 1 kg	960 960	10 kg 10 kg
≠	**Chemical kit**	3316	9		Miscellaneous		A44 A163		E0	960 Y960	10 kg 1 kg	960	10 kg
*	**First aid kit**	3316	9		Miscellaneous		A44 A163	☑ II III	E0 E0	960 Y960 960 Y960	☑ 10 kg 1 kg 10 kg 1 kg	960 960	10 kg 10 kg
≠	**First aid kit**	3316	9		Miscellaneous		A44 A163		E0	960 Y960	10 kg 1 kg	960	10 kg
*	**Lithium ion batteries** (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	US 3	☑ A88 A99 A154 A164 A183 A201 A206		E0	FORBIDDEN		See 965	
≠	**Lithium ion batteries** (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	US 3	A88 A99 A154 A164 A183 A201 A206 A213		E0	FORBIDDEN		See 965	

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft		Cargo aircraft only	
										Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**Lithium ion batteries 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 contained in equipment** (including lithium ion polymer batteries)	3481	9		Miscellaneous — Lithium batteries	US 3	A48 A88 A99 A154 A164 A181 A185 A206 A213		E0	967	5 kg	967	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
≠	**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 A213		E0	966	5 kg	966	35 kg
*	**Engine, internal combustion, flammable liquid powered**	3528	3		Liquid flammable		☑ A67 A70 A87 A208		E0	378	No limit	378	No limit
≠	**Engine, internal combustion, flammable liquid powered**	3528	3		Liquid flammable		A70 A87 A208		E0	378	No limit	378	No limit

	Name	UN No.	Class or division	Subsidiary hazard	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 liquid powered †**	3528	3		Liquid flammable		☑ A67 A70 A87 A176 A208		E0	378	No limit	378	No limit
≠	**Engine, fuel cell, flammable liquid powered †**	3528	3		Liquid flammable		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, internal combustion, flammable liquid powered**	3528	3		Liquid flammable		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
≠	**Machinery, fuel cell, flammable liquid powered**	3528	3		Liquid flammable		A70 A87 A176 A208		E0	378	No limit	378	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 gas powered**	3529	2.1		Gas flammable		A70 A87 A208		E0	FORBIDDEN		220	No limit

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**Engine, fuel cell, flammable gas powered** †	3529	2.1		Gas flammable		☑ A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
≠	**Engine, fuel cell, flammable gas powered** †	3529	2.1		Gas flammable		A70 A87 A176 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
≠	**Machinery, internal combustion, flammable gas powered**	3529	2.1		Gas flammable		A70 A87 A208		E0	FORBIDDEN		220	No limit
*	**Machinery, fuel cell, flammable gas powered**	3529	2.1		Gas flammable		☑ A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
≠	**Machinery, fuel cell, flammable gas powered**	3529	2.1		Gas flammable		A70 A87 A176 A208		E0	FORBIDDEN		220	No limit
+	**Toxic solid, flammable, inorganic, n.o.s.***	3535	6.1	4.1	Toxic & Solid flammable			I II	E5 E4	665 668 Y644	1 kg 15 kg 1 kg	672 675	15 kg 50 kg
+	**Lithium batteries installed in cargo transport unit** lithium ion batteries or lithium metal batteries	3536	9							FORBIDDEN		FORBIDDEN	
+	**Articles containing flammable gas, n.o.s.***	3537	2.1	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing non-flammable, non toxic gas, n.o.s.***	3538	2.2	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing toxic gas, n.o.s.***	3539	2.3	See 2;0.6						FORBIDDEN		FORBIDDEN	
+	**Articles containing flammable liquid, n.o.s.***	3540	3	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing flammable solid, n.o.s.***	3541	4.1	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing a substance liable to spontaneous combustion, n.o.s.***	3542	4.2	See 2;0.6						FORBIDDEN		FORBIDDEN	
+	**Articles containing a substance which emits flammable gas in contact with water, n.o.s.***	3543	4.3	See 2;0.6						FORBIDDEN		FORBIDDEN	

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
+	**Articles containing oxidizing substance, n.o.s.***	3544	5.1		See 2;0.6					FORBIDDEN		FORBIDDEN	
+	**Articles containing organic peroxide, n.o.s.***	3545	5.2		See 2;0.6					FORBIDDEN		FORBIDDEN	
+	**Articles containing toxic substance, n.o.s.***	3546	6.1		See 2;0.6		A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing corrosive substance, n.o.s.***	3547	8		See 2;0.6		A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing miscellaneous dangerous goods, n.o.s.***	3548	9		See 2;0.6		A2			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	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**Ammonium nitrate based fertilizer**	2067	5.1		Oxidizer		☑ A64 A79 A89	III	E1	559 Y546	25 kg 10 kg	563	100 kg
≠	**Ammonium nitrate based fertilizer**	2067	5.1		Oxidizer		A64 A79	III	E1	559 Y546	25 kg 10 kg	563	100 kg
*	**Ammonium nitrate based fertilizer**	2071	9		Miscellaneous		☑ A89 A90	III	E1	958 Y958	200 kg 30 kg G	958	200 kg
≠	**Ammonium nitrate based fertilizer**	2071	9		Miscellaneous		A90	III	E1	958 Y958	200 kg 30 kg G	958	200 kg
+	**Articles containing a substance liable to spontaneous combustion, n.o.s.***	3542	4.2	See 2;0.6						FORBIDDEN		FORBIDDEN	
+	**Articles containing a substance which emits flammable gas in contact with water, n.o.s.***	3543	4.3	See 2;0.6						FORBIDDEN		FORBIDDEN	
+	**Articles containing corrosive substance, n.o.s.***	3547	8	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing flammable gas, n.o.s.***	3537	2.1	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing flammable liquid, n.o.s.***	3540	3	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing flammable solid, n.o.s.***	3541	4.1	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing miscellaneous dangerous goods, n.o.s.***	3548	9	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing non-flammable, non toxic gas, n.o.s.***	3538	2.2	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
+	**Articles containing organic peroxide, n.o.s.***	3545	5.2	See 2;0.6						FORBIDDEN		FORBIDDEN	
+	**Articles containing oxidizing substance, n.o.s.***	3544	5.1	See 2;0.6						FORBIDDEN		FORBIDDEN	
+	**Articles containing toxic gas, n.o.s.***	3539	2.3	See 2;0.6						FORBIDDEN		FORBIDDEN	
+	**Articles containing toxic substance, n.o.s.***	3546	6.1	See 2;0.6			A2			FORBIDDEN		FORBIDDEN	
*	**Articles, explosive, n.o.s.***	0349	1.4S		Explosive 1.4		☑ A62		E0	101	25 kg	101	100 kg
≠	**Articles, explosive, n.o.s.***	0349	1.4S		Explosive 1.4		A62 A165		E0	101	25 kg	101	100 kg
*	**Asbestos, amphibole*** (amosite, tremolite, actinolite, anthophyllite, crocidolite)†	2212	9				☑ A61			FORBIDDEN		FORBIDDEN	
≠	**Asbestos, amphibole*** (amosite, tremolite, actinolite, anthophyllite, crocidolite) †	2212	9				A2 A61			FORBIDDEN		FORBIDDEN	

	Name	UN No.	Class or division	Subsidiary hazard	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
*	**Battery-powered equipment**	3171	9		Miscellaneous		☑ A21 A67 A87 A94 A164 A182		E0	952	No limit	952	No limit
≠	**Battery-powered equipment**	3171	9		Miscellaneous		A67 A87 A94 A164 A182 A214		E0	952	No limit	952	No limit
*	**Battery-powered vehicle**	3171	9		Miscellaneous		☑ A21 A67 A87 A94 A164		E0	952	No limit	952	No limit
≠	**Battery-powered vehicle**	3171	9		Miscellaneous		A67 A87 A94 A164 A214		E0	952	No limit	952	No limit
*	**Chemical kit**	3316	9		Miscellaneous		A44 A163	☑ II III	E0	960 Y960 960 Y960	☑ 10 kg 1 kg 10 kg 1 kg	960 960	10 kg 10 kg
≠	**Chemical kit**	3316	9		Miscellaneous		A44 A163		E0	960 Y960	10 kg 1 kg	960	10 kg
*	**Components, explosive train, n.o.s.*** †	0384	1.4S		Explosive 1.4		☑ A62		E0	101	25 kg	101	100 kg
≠	**Components, explosive train, n.o.s.*** †	0384	1.4S		Explosive 1.4		A62 A165		E0	101	25 kg	101	100 kg
*	☑ **2-Dimethylaminoethyl acrylate**	3302	6.1		Toxic		☑	II	E4	654 Y641	5 L 1 L	662	60 L
≠	**2-Dimethylaminoethyl acrylate, stabilized**	3302	6.1		Toxic		A209	II	E4	654 Y641	5 L 1 L	662	60 L

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**Engine, fuel cell, flammable gas powered †**	3529	2.1		Gas flammable		☑ A67 A70 A87 A208		E0	FORBIDDEN		220	No limit
≠	**Engine, fuel cell, flammable gas powered †**	3529	2.1		Gas flammable		A70 A87 A176 A208		E0	FORBIDDEN		220	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, fuel cell, flammable liquid powered †**	3528	3		Liquid flammable		A70 A87 A176 A208		E0	378	No limit	378	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 gas powered**	3529	2.1		Gas flammable		A70 A87 A208		E0	FORBIDDEN		220	No limit
*	**Engine, internal combustion, flammable liquid powered**	3528	3		Liquid flammable		☑ A67 A70 A87 A208		E0	378	No limit	378	No limit
≠	**Engine, internal combustion, flammable liquid powered**	3528	3		Liquid flammable		A70 A87 A208		E0	378	No limit	378	No limit
*	**First aid kit**	3316	9		Miscellaneous		A44 A163	☑ II III	E0 E0	960 Y960 960 Y960	☑ 10 kg 1 kg 10 kg 1 kg	960 960	10 kg 10 kg
≠	**First aid kit**	3316	9		Miscellaneous		A44 A163		E0	960 Y960	10 kg 1 kg	960	10 kg

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**Fuzes, detonating †**	0367	1.4S		Explosive 1.4		☑		E0	141	25 kg	141	100 kg
≠	**Fuzes, detonating †**	0367	1.4S		Explosive 1.4		A165		E0	141	25 kg	141	100 kg
+	**Lithium batteries installed in cargo transport unit** lithium ion batteries or lithium metal batteries	3536	9							FORBIDDEN		FORBIDDEN	
*	**Lithium ion batteries** (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	US 3	☑ A88 A99 A154 A164 A183 A201 A206		E0	FORBIDDEN		See 965	
≠	**Lithium ion batteries** (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	US 3	A88 A99 A154 A164 A183 A201 A206 A213		E0	FORBIDDEN		See 965	
*	**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 contained in equipment** (including lithium ion polymer batteries)	3481	9		Miscellaneous — Lithium batteries	US 3	A48 A88 A99 A154 A164 A181 A185 A206 A213		E0	967	5 kg	967	35 kg

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**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
≠	**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 A213		E0	966	5 kg	966	35 kg
*	**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** (including lithium alloy batteries) †	3090	9		Miscellaneous — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A183 A201 A206 A213		E0	FORBIDDEN		See 968	

	Name	UN No.	Class or division	Subsidiary hazard	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 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 contained in equipment** (including lithium alloy batteries) †	3091	9		Miscellaneous — Lithium batteries	US 2 US 3	A48 A88 A99 A154 A164 A181 A185 A206 A213		E0	970	5 kg	970	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
≠	**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 A213		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
≠	**Machinery, fuel cell, flammable gas powered**	3529	2.1		Gas flammable		A70 A87 A176 A208		E0	FORBIDDEN		220	No limit

	Name	UN No.	Class or division	Subsidiary hazard	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, fuel cell, flammable liquid powered**	3528	3		Liquid flammable		A70 A87 A176 A208		E0	378	No limit	378	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 gas powered**	3529	2.1		Gas flammable		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
≠	**Machinery, internal combustion, flammable liquid powered**	3528	3		Liquid flammable		A70 A87 A208		E0	378	No limit	378	No limit
*	**Substances, explosive, n.o.s.***	0481	1.4S		Explosive 1.4		☑ A62		E0	101	25 kg	101	100 kg
≠	**Substances, explosive, n.o.s.***	0481	1.4S		Explosive 1.4		A62 A165		E0	101	25 kg	101	100 kg
+	**Toxic solid, flammable, inorganic, n.o.s.***	3535	6.1	4.1	Toxic & Solid flammable			I II	E5 E4	665 668 Y644	1 kg 15 kg 1 kg	672 675	15 kg 50 kg

	Name	UN No.	Class or division	Subsidiary hazard	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, flammable gas powered**	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A203 A207		E0	FORBIDDEN		951	No limit
≠	**Vehicle, flammable gas powered**	3166	9		Miscellaneous		A70 A87 A118 A120 A214		E0	FORBIDDEN		951	No limit
*	**Vehicle, flammable liquid powered**	3166	9		Miscellaneous		☑ A67 A70 A87 A118 A120 A134 A203 A207		E0	950	No limit	950	No limit
≠	**Vehicle, flammable liquid powered**	3166	9		Miscellaneous		A70 A87 A118 A120 A214		E0	950	No limit	950	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 gas powered** †	3166	9		Miscellaneous		A70 A87 A118 A120 A176 A214		E0	FORBIDDEN		951	No limit

	Name	UN No.	Class or division	Subsidiary hazard	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger and cargo aircraft: Packing instruction	Passenger and cargo aircraft: Max. net quantity per package	Cargo aircraft only: Packing instruction	Cargo aircraft only: Max. net quantity per package
	1	2	3	4	5	6	7	8	9	10	11	12	13
*	**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
≠	**Vehicle, fuel cell, flammable liquid powered** †	3166	9		Miscellaneous		A70 A87 A118 A120 A176 A214		E0	950	No limit	950	No limit

APPENDIX B

AMENDMENT TO THE TRAINING PROVISIONS IN THE TECHNICAL INSTRUCTIONS

Part 1

GENERAL

. . .

DPG/26 (see paragraph 2.1.4 of this report)

The amendments below are based on Attachment 4, Chapter 1 to the 2017-2018 Edition of the Technical Instructions.

~~**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

Note.— The training provisions contained in Part 1;4 of the 2017-2018 Edition of the Instructions are provided in Attachment 4 and may be used until 31 December 2020.

4.1 ~~GENERAL REQUIREMENTS~~ESTABLISHMENT OF DANGEROUS GOODS TRAINING PROGRAMMES

The following note has been moved from under 4.2.1:

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.

~~DGP/25 discussed 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. 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.*~~

4.2.14.1.1 The employer must establish and maintain a dangerous goods training programme for personnel performing any function described in these Instructions.

4.1.2 The employer must establish and maintain a dangerous goods training programme for personnel who may not perform any function described in these Instructions but do perform functions related to the movement of cargo, baggage, passengers, or mail. The aim of the programme is to ensure personnel are competent to perform functions aimed at preventing undeclared dangerous goods or dangerous goods not permitted from being carried on an aircraft.

4.2.4*Note.— Security personnel who are involved with the screening of passengers and crew and their baggage and cargo or mail must are required to be trained irrespective of whether the operator on which the passenger or cargo is to be transported carries dangerous goods as cargo.*

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.

4.2.24.1.3 All operators must establish a dangerous goods training programme regardless of whether or not they are approved to transport dangerous goods as cargo.

4.2.61.4 Training courses may be developed and delivered by or for the employer.

4.2 OBJECTIVE OF DANGEROUS GOODS TRAINING

4.2.34.2.1 The employer must ensure that personnel are competent to perform any function for which they are responsible prior to performing any of these functions.Personnel must be trained and assessed commensurate with the functions for which they are responsible prior to performing any of these functions. This must be achieved through training and assessment commensurate with the functions for which they are responsible. Such training must include:

a) general awareness/familiarization training — Personnel must be trained to be familiar with the general provisions;

b) function-specific training — Personnel must be trained to perform any function for which they are responsible competently; and

c) safety training — Personnel must be trained to recognize the hazards presented by dangerous goods, safe handling and emergency response procedures.

Note 1.— An approach to ensuring personnel are competent to perform any function for which they are responsible is provided in Guidance on a Competency-Based Approach to Dangerous Goods Training and Assessment *(Circ xxxx).*

The following is moved from under 4.2.6:

Note 2.— General information on the provisions for dangerous goods carried by passengers and crew (see Part 8) should be included in training courses, as appropriate.

4.2.2 Personnel who have received training but who 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.

4.2.3 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, such as passenger or cargo reservation personnel and engineering personnel, who performs functions that may indirectly impact the movement of cargo, COMAT, baggage, passengers, or mail 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 the passenger or cargo is to be transported carries dangerous goods as cargo.

4.3 RECURRENT TRAINING AND ASSESSMENT

~~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.

Note.— An example would be the following: If recurrent training is required by the end of May 2020, then any training occurring between March 2020 and end of May 2020 will result in a new recurrent training date of May 2022.

~~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.*~~

4.4 TRAINING AND ASSESSMENT RECORDS

~~4.2.7~~4.4.1 The employer must maintain a record of training and assessment for personnel.

~~4.2.7.1~~4.4.2 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~~4.4.3 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.

4.5 APPROVAL OF TRAINING PROGRAMMES

~~4.2.8~~4.5.1 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~~4.5.2 Dangerous goods training programmes required for entities other than operators and designated postal operators should be approved as determined by the appropriate national authority.

Note.— See 4.7 for approval of training programmes for designated postal operators.

~~4.3~~4.6 INSTRUCTOR QUALIFICATIONS AND COMPETENCIES

~~4.3.1~~4.6.1 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(s) that they will instruct prior to delivering such training.

~~4.3.2~~4.6.2 Instructors delivering initial and recurrent dangerous goods training must ~~at least every 24 months~~ deliver such courses at least every 24 months, or in the absence of this, attend recurrent training.

~~4.4~~4.7 DESIGNATED POSTAL OPERATORS

~~4.4.1~~4.7.1 Staff of designated postal operators must be trained commensurate with their responsibilities. The subject matter with which their various categories of staff should be familiar is indicated in Table 1-4.

~~4.4.2~~4.7.2 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

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

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.

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Attachment 4

~~PROPOSED NEW TRAINING PROVISIONS~~EXTRACT FROM THE 2017-2018 EDITION OF THE TECHNICAL INSTRUCTIONS
(MAY BE USED IN PLACE OF THE PROVISIONS IN PART 1;4 UNTIL 31 DECEMBER 2020~~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 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 the 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 and will remain 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 the 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 at its 26th meeting, which will be held during the fourth quarter of 2017.~~

INTRODUCTORY NOTE

The successful application of regulations concerning the transport of dangerous goods and the achievement of their objectives are greatly dependent on the appreciation by all individuals concerned of the hazards involved and on a detailed understanding of the regulations. This can only be achieved by properly planned and maintained initial and recurrent training programmes in the transport of dangerous goods for all persons concerned.

Chapter 4

TRAINING

Parts of this Chapter are affected by State Variations AE 2, BR 7, CA 11, HK 1, VE 5, VE 6; see Table A-1

4.1 DANGEROUS GOODS TRAINING PROGRAMMES

4.1.1 Establishment and maintenance

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 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 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 b) and h) should be subjected to review and approval as determined by the appropriate national authority.

4.2 TRAINING CURRICULA

4.2.1 Personnel must be trained in the requirements commensurate with their responsibilities. Such training must include:

a) general familiarization training — which must be aimed at providing familiarity with the general provisions;

b) function-specific training — which must provide detailed training in the requirements applicable to the function for which that person is responsible; and

c) safety training — which must cover the hazards presented by dangerous goods, safe handling and emergency response procedures.

4.2.2 Personnel identified in the categories specified in Table 1-4, 1-5 or 1-6 must be trained or training must be verified prior to the person performing any duty specified in Table 1-4, 1-5 or 1-6.

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

4.2.4 A test to verify understanding must be provided following training. Confirmation that the test has been completed satisfactorily is required.

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

a) the individual's name;

b) the most recent training completion month;

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

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

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

Training records must be retained by the employer for a minimum period of 36 months from the most recent training completion month and must be made available upon request to the employee or appropriate national authority.

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

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

Note.— Security staff are required to be trained irrespective of whether the operator on which passengers or cargo are to be transported carries dangerous goods as cargo.

Table 1-4. Content of training courses

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

CATEGORIES

1 — Shippers and persons undertaking the responsibilities of shippers
2 — Packers
3 — Staff of freight forwarders involved in processing dangerous goods
4 — Staff of freight forwarders involved in processing cargo or mail (other than dangerous goods)
5 — Staff of freight forwarders involved in the handling, storage and loading of cargo or mail
6 — Operator's and ground handling agent's staff accepting dangerous goods
7 — Operator's and ground handling agent's staff accepting cargo or mail (other than dangerous goods)
8 — Operator's and ground handling agent's staff involved in the handling, storage and loading of cargo or mail and baggage
9 — Passenger handling staff
10 — Flight crew members, loadmasters, load planners and flight operations officers/flight dispatchers
11 — Crew members (other than flight crew members)
12 — Security staff who are involved with the screening of passengers and crew and their baggage and cargo or mail, e.g. security screeners, their supervisors and staff involved in implementing security procedures

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

Contents	*Categories of staff*				
	13	14	15	16	17
General philosophy	X	X	X	X	X
Limitations	X	X	X	X	X
Labelling and marking	X	X	X	X	X
Dangerous goods transport document and other relevant documentation	X				
Recognition of undeclared dangerous goods	X	X	X	X	X
Provisions for passengers and crew	X	X	X	X	X
Emergency procedures	X	X	X	X	X

CATEGORIES

13 — Operator's and ground handling agent's staff accepting cargo or mail (other than dangerous goods)
14 — Operator's and ground handling agent's staff involved in the handling, storage and loading of cargo or mail (other than dangerous goods) and baggage
15 — Passenger handling staff
16 — Flight crew members, loadmasters, load planners and flight operations officers/flight dispatchers
17 — Crew members (other than flight crew members)

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

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

4.2.8 Staff of designated postal operators must be trained commensurate with their responsibilities. The subject matter with which their various categories of staff should be familiar is indicated in Table 1-6.

4.3 INSTRUCTOR QUALIFICATIONS

4.3.1 Unless otherwise provided for by the appropriate national authority, instructors of initial and recurrent dangerous goods training programmes must have adequate instructional skills and have successfully completed a dangerous goods training programme in the applicable category, or Category 6, prior to delivering such a dangerous goods training programme.

4.3.2 Instructors delivering initial and recurrent dangerous goods training programmes must at least every 24 months deliver such courses, or in the absence of this attend recurrent training.

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

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

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.

4.4 COMPETENCY-BASED TRAINING AND ASSESSMENT

Competency-based training and assessment should be used in accordance with the general provisions contained in Chapter 2 of the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868).

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APPENDIX C

PROPOSED NEW GUIDANCE MATERIAL ON A COMPETENCY-BASED APPROACH TO DANGEROUS GOODS TRAINING AND ASSESSMENT

GUIDANCE ON A COMPETENCY-BASED APPROACH TO DANGEROUS GOODS TRAINING AND ASSESSMENT

Chapter 1

GENERAL

1.1 INTRODUCTION

1.1.1 A safe and efficient air transport system is dependent on a competent workforce. ICAO has recognized that this can be achieved through the implementation of a competency-based approach to training and assessment. The *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284, "Technical Instructions") require that employers ensure personnel are competent to perform any function for which they are responsible prior to performing them. A competency-based approach to training and assessment is an effective way to ensure this requirement is met.

1.1.2 This document provides guidance 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.

1.2 COMPETENCY-BASED TRAINING AND ASSESSMENT

1.2.1 The goal of competency-based training and assessment is to produce a competent workforce by providing focused training. It does so by identifying key competencies that need to be achieved, determining the most effective way of achieving them and establishing valid and reliable assessment tools to evaluate their achievement.

1.2.2 A competency is defined by the PANS-TRG as a dimension of human performance that is used to reliably predict successful performance on the job. It is manifested and observed through behaviours that mobilize the relevant knowledge, skills and attitudes to carry out activities or tasks under specified conditions. A competency framework with associated performance criteria provides a means of assessing whether trainees achieve the desired performance. A competency framework and associated task list for dangerous goods personnel is described in paragraph 1.7.

1.2.3 A critical feature of competency-based training is assessment to ensure training is efficient and effective in developing the skills, knowledge and attitudes required to perform the function competently.

Note.— Competency-based training and assessment is described in more detail in the PANS-TRG, Part I, Chapter 2.

1.3 BENEFITS OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

1.3.1 The main benefit of a competency-based approach to training and assessment is its potential to encourage and enable personnel to reach their highest level of capability while ensuring a basic level of competence as a minimum standard. It does this by:

a) targeting specific training needs;

b) supporting continuous learning and performance improvement;

c) gearing towards learning rather than simply passing a test;

d) ensuring the integration of knowledge, skills and attitudes needed to perform effectively; and

e) establishing sufficient, well-trained and competent instructors.

1.3.2 Ensuring personnel are able to perform their functions competently is critical to any organization. A competent workforce reduces cost caused by poor performance or miscommunication of job expectations. An incompetent dangerous goods workforce could result in costs and delays in shipment. Even more critically, it could result in the introduction of safety risks. As an example, identifying, classifying, packing, marking, labelling and documenting dangerous goods for transport are critical to the safe transport of dangerous goods by air. The operator depends on these functions being performed competently by those preparing and offering a consignment for transport so that they are aware of the hazards posed and the required measures to mitigate them. If personnel performing these functions are not trained to competently perform them, unknown risks may be introduced into air transport. As another example, accepting dangerous goods for air transport requires an operator to verify that dangerous goods are properly prepared for transport through use of a checklist. If personnel accepting dangerous goods are not trained to competently perform this function, they may unnecessarily reject properly prepared shipments thereby delaying shipments and increasing costs to the shipper and the operator. Alternatively, personnel not trained to competently perform this function may accept improperly prepared shipments of dangerous goods into air transport thereby introducing risks to the aircraft and its occupants.

1.3.3 A competency-based approach to training and assessment ensures trainees know what they are expected to competently perform and evaluators know what performance to assess.

1.4 RELATIONSHIP BETWEEN COMPETENCY-BASED TRAINING AND ASSESSMENT AND SAFETY MANAGEMENT

1.4.1 Safety is ICAO's guiding and most fundamental strategic objective. Annex 19 to the Convention on International Civil Aviation — *Safety Management* contains Standards and Recommended Practices (SARPs) intended to assist States in managing aviation safety risks. The foundation of safety management is the implementation of a State safety programme (SSP) by States and safety management systems (SMS) by service providers. An operator's SMS addresses the aviation activities that are related to the safe operation of the aircraft in accordance with Annex 6, Part I or Part III. These aviation activities include the carriage of dangerous goods. Other entities in the dangerous goods transport chain should be encouraged to implement a similar safety system.

1.4.2 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. To ensure that personnel have the knowledge, skills and abilities to support SMS, training activities should follow the competency-based approach.

1.4.3 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 2.2 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.

1.5 FUNCTION-SPECIFIC TRAINING

1.5.1 The Technical Instructions state that personnel must be trained commensurate with the functions for which they are responsible. These responsibilities are determined by the specific functions personnel perform and not by their job titles. Concentrating on functions and responsibilities rather than a job title or description ensures that a person is competent to perform the function in compliance with the Technical Instructions. For example, entities such as ground handling companies and freight forwarders may need personnel to perform some functions that are typically performed by shippers or operators.

The ground handling and freight forwarder personnel would need to be trained to perform these functions competently regardless of their job title.

1.5.2 In smaller operations, personnel may perform many functions such as accepting dangerous goods and loading and securing dangerous goods on board an aircraft. They would need to be trained to perform all of these functions competently. In larger operations, personnel may only perform a small number of functions. They would only need to be trained to perform those specific functions competently.

1.5.3 The depth of training each person receives should be appropriate to the functions performed. This could range from a familiarization level to an expert level for certain personnel.

1.6 ROLES AND RESPONSIBILITIES IN A COMPETENCY-BASED APPROACH TO TRAINING

1.6.1 Employer

1.6.1.1 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. Employers need to determine the purpose and objective of the competency-based training programme based on the functions for which their personnel are responsible. 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.

1.6.1.2 The employer must study the target population (future trainees) with a view to identifying the knowledge, skills and attitudes that they already possess, to collect information on preferred learning styles, and on the social and linguistic environments of prospective trainees. The target population may be a mixture of experienced and newly recruited personnel, groups differing in age, etc. All these components could have an impact on the design of the training. Employers must also consider the domestic and international regulatory requirements that apply to their operations.

1.6.1.3 Some employers may utilize third parties for assistance. This approach may be the most suitable for employers who do not have the resources to train their personnel in house. While utilizing third parties may be cost effective, whether or not the training needs are being addressed needs to be the deciding factor in selecting a third party and not costs alone. The potential for third parties to cater to the training needs of multiple employers and not address all required competencies needs to be taken into account. Employers remain responsible for ensuring its personnel are competent to perform their functions prior to performing them even if certain aspects of the training programme have been delegated to third parties.

1.6.1.4 Employers should liaise directly with the regulator to ensure that the latter's requirements are taken into account prior to proceeding with the development of competency-based training,

1.6.2 Instructor

In competency-based training, the instructor facilitates the trainee's progression towards the achievement of competencies. Instructors also collect information about the effectiveness of the training materials which supports continuous improvement. Examples of instructor competencies can be found in Part I, Chapter 3 of the PANS-TRG.

1.6.3 Trainee

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.

1.6.4 Regulator

1.6.4.1 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 regulator may assess the course components and final test against knowledge elements and not on the competencies that need to be acquired. The fact that all knowledge components are addressed or appear to be included in a course and all trainees have passed the required test does not necessarily mean that they can competently perform their assigned functions.

1.6.4.2 Where competency-based training has been implemented, regulators should oversee the training programme to ensure that it actually produces personnel who can perform the functions for which they are responsible in a specific

operational setting and in compliance with the national regulatory framework. The *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) provides guidance on overseeing dangerous goods training programmes.

1.7 DEVELOPING COMPETENCY-BASED TRAINING FOR DANGEROUS GOODS

1.7.1 ICAO framework and adapted competency model

The purpose of competency-based training and assessment is to train and assess the capacity of an individual to perform at the standard expected in an organizational workplace. Therefore, organizations electing to implement competency-based training and assessment should adapt the corresponding generic ICAO competency framework for dangerous goods personnel (Chapter 2, Table 2-1) to suit their context by developing an adapted competency model (Chapter 2, Table 2-2). The framework consists of competencies and their associated descriptions and observable behaviours and forms the basis from which an adapted competency model is derived. Employers implementing competency-based training and assessment should adapt this framework to reflect their specific requirements. An adapted competency model is an effective tool for defining successful job performance and provides a means of assessing whether trainees achieve the desired performance. The adapted competency model will include the final competency standards and conditions that need to be assessed in addition to the adapted competencies and their associated descriptions and observable behaviours.

1.7.2 Relationship between competencies and tasks

1.7.2.1 Traditional approaches to training development involve the decomposition of jobs into tasks. For each task there is a related objective, an assessment and associated elements in a training plan. A limitation of this approach is that each task must be taught and assessed. In complex systems or when jobs evolve rapidly, it may not be possible to teach and assess each task. Moreover, learners may demonstrate the ability to perform tasks in isolation without being competent in their job.

1.7.2.2 Competency-based training and assessment is based on the concept that competencies are transferable. In the design of a competency-based training and assessment programme, a limited number of competencies are defined. Typically, an activity will involve several competencies and competencies may apply across a variety of activities and contexts. In the design of training and assessments, tasks and activities are incorporated because they are good candidates for facilitating, developing or assessing a competency or competencies. Specific tasks may be used to develop specific competencies. Lack of specific competencies may be identified as root causes for the failure of a task.

1.7.2.3 A generic list of tasks typically performed by dangerous goods personnel is provided in Chapter 3. It consists of dangerous goods tasks and sub-tasks. A complementary flowchart is provided in Chapter 4. It illustrates the typical processes of performing these tasks. The employer should adapt this task list to reflect the specific tasks performed by its personnel.

1.7.3 Development and implementation of competency-based training and assessment programmes

1.7.3.1 Phase 1 — Training needs analysis

The first phase in the development and implementation of a competency-based training programme specific to an employer's environment and requirements is to conduct a training needs analysis. An employer conducts a training needs analysis to determine the results that the training needs to achieve and what resources exist to achieve these results. This critical step will ensure that the training fits the employer's purpose and is effective. A training specification is developed during this phase of development that details the requirements that need to be fulfilled when designing the training. This should include the purpose of the training along with its requirements, including operational, technical, regulatory and organizational. This phase also involves the development of the task list (see paragraph 1.7.2).

1.7.3.2 Phase 2 — Design local competency based training and assessment

The second phase in the development and implementation of a competency-based training and assessment programme is its design. This is done taking into account the training specifications identified in Phase 1 (see paragraph 1.7.3.1) and will involve:

a) designing an adapted competency model that addresses the training specification identified in Phase 1 (see 1.7.3.1);

b) designing an assessment plan that will be used to assess the competence of trainees;

b) designing a training plan that will enable the development and delivery of the training course.

1.7.3.2.1 Designing the adapted competency model

The competency model for dangerous goods should be adapted from the generic ICAO competency framework provided in Chapter 2. This generic framework provides a set of competencies that are typically needed to perform the dangerous goods tasks identified in the generic task list provided in Chapter 3. The vast majority of adapted competency models will contain similar lists of competencies, but there may be a need to add or remove a competency depending on the employers' own operational and organizational environments. The generic framework also provides a comprehensive list of observable behaviours associated with each of the competencies. The appropriate observable behaviours should be selected from it and, if necessary, adapted.

1.7.3.2.2 Designing an assessment plan

1.7.3.2.2.1 The purpose of the assessment plan is to detail how competence is going to be determined. The assessment plan details the:

a) the final competency standard associated with the final milestone;

b) the interim competency standard associated with each milestone (if required);

c) the list of assessments (formative and summative assessments, examinations, oral assessments, etc.) required for each of the milestone(s) that have been defined;

d) when assessments should take place;

e) the tools to be used to collect evidence during practical assessment.

f) the pass marks for projects, examinations or oral assessments;

g) if required, the minimum number of formative assessments to be undertaken prior to starting summative assessments; and

h) the number of observations required to assess performance for the interim and final competency standards.

1.7.3.2.2.2 Additional administrative procedures may be necessary in the implementation of the assessment plan in relation to: who is authorized to perform a specific task or assessment, record keeping, actions to be taken if a trainee fails a competency assessment, etc.

1.7.3.2.2.3 Competency-based training requires assessment of the trainees' progress until they are competent to perform their assigned function. A trainee's assessment may be completed using 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 assessed and of obtaining consistent results when administered by different instructors.

1.7.3.2.2.4 The assessment of personnel can be accomplished in a variety of ways. Some common examples to accomplish an assessment would be to utilize a written test, online test, oral test, observed practical exercises, online practical exercises and observation of on-the-job performance by fully trained personnel. An employer might choose to utilize one assessment method or a combination of multiple assessment methods, as long as the assessment confirms that personnel have acquired the necessary competencies to perform the assigned functions. The employer therefore establishes the assessment plan with all the specific details that would need to be accomplished to determine whether competence has been achieved by the trainee.

1.7.3.2.2.5 Employers electing to send personnel to third-party training providers also need to establish an assessment plan for ensuring that competence has been achieved by the trainee. The employer may incorporate the third-party provider's assessment into their established assessment plan. Even if the employer does not deliver any of the training themselves, they can still choose to assess the trainee in the workplace to ensure they can perform their assigned tasks competently and incorporate that process into their assessment plan.

1.7.3.2.3 Designing a training plan

1.7.3.2.3.1 The training plan details the:

a) composition and structure of the course;

b) syllabus;

c) milestones (if required);

d) modules, training events and their delivery sequence; and

e) course schedule.

1.7.3.2.3.2 The training plan will be used by the training designer(s) to create the training and assessment materials.

1.7.3.2.4 Relationship between the adapted competency model and the assessment and training plans

1.7.3.2.4.1 The training specification developed in Phase 1 (see paragraph 1.7.3.1) serves as the common basis for the development of the adapted competency model and the training and assessment plans. The task list is generally used to aid the selection of the observable behaviours from the generic competency framework provided in Chapter 2. The operational, technical, regulatory and organizational requirements aid the development of the conditions and standards that will apply to the competencies and observable behaviours.

1.7.3.2.4.2 The same task list and requirements are used to develop the training plan. The training plan is used to prepare the trainee to undertake assessment to determine if they are competent in accordance with the adapted competency model. The adapted competency model and the training plan are used to develop the assessment plan.

1.7.3.2.4.3 The syllabus in the training plan is composed of training objectives derived from tasks and sub-tasks as well as the underlying knowledge, skills and attitudes necessary to perform them. The knowledge, skills and attitudes are determined on the basis of the task list in conjunction with operational, technical, regulatory and organizational requirements. Chapter 5 provides a generic task/knowledge matrix tool that can be used as a tool to map out the knowledge that is necessary to perform specific tasks. Tasks corresponding to the list 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 task within the organization with a check mark at the point at which the task element and the knowledge element intersect. To facilitate this process, some knowledge components have been blacked out if they are considered to be completely irrelevant to specific tasks. The level of knowledge and/or skills necessary will differ depending on the task. 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.

1.7.3.2.4.4 When assessing whether competence has been achieved, the adapted competency model, not the syllabus, is referenced. Consequently, the performance criteria are used to assess if competence has been achieved and the tasks/sub-tasks that are carried out by the trainee are the “vehicle” for enabling the assessment to be conducted.

1.7.3.3 Phase 3 — Develop the training and assessment materials

The third phase in the development and implementation of a competency-based training and assessment programme is the development of the training and assessment materials. Development is based on the adapted competency model and the training and assessment plans. Training and assessment materials include but are not limited to training notes, exercise briefings, practical exercises, case studies, presentations, video clips, self-test quizzes, examinations, assessments and assessment tools.

1.7.3.4 Phase 4 — Conduct the course in accordance with the training and assessment plans

The fourth phase in the development and implementation of a competency-based training and assessment programme is conducting the course in accordance with the training and assessment plans. This involves delivering the training; monitoring the progress of the trainees; providing timely and continuous feedback on their performance; diagnosing deficiencies in the training and addressing them in a timely manner; and carrying out assessments according to the assessment plan. The goal of this phase is a competent employee.

1.7.3.5 Phase 5 — Evaluate the course including the training and assessment plans

The employer is responsible for ensuring the effectiveness of the training programme. At the end of a period of training, feedback on performance on the job from trainees, instructors, assessors and employers should be gathered to determine the effectiveness of the training and assessment in supporting the progression of learning towards competence in the workplace. Evaluation of the training should be based on valid and reliable evidence such as course results, trainee feedback, instructor feedback, audit reports, and occurrence reports. This evaluation may lead to changes or improvements being made to the competency based training and assessment design.

Chapter 2

GENERIC COMPETENCY FRAMEWORK FOR DANGEROUS GOODS PERSONNEL AND TEMPLATE FOR ADAPTED COMPETENCY MODEL

This chapter contains a generic ICAO competency framework for dangerous goods personnel (Table 2-1) and a template for an adapted competency model (Table 2-2). These are described in Chapter 1, paragraph 1.7. Employers implementing competency-based training and assessment should adapt the framework in Table 2-1 into a competency model based on their specific requirements. The adapted competency model should include the elements shown in Table 2-2.

Table 2-1. Generic ICAO competency framework for dangerous goods personnel

Generic competency	*Description*	*Observable behaviour*
Application of procedures and compliance with regulations	Identifies and applies appropriate procedures in accordance with published operating instructions and in compliance with applicable regulations	Identifies where to find procedures and regulations
		Follows relevant procedures in a timely manner
		Complies with applicable regulations
		Applies relevant procedural knowledge
Communication	Communicates through appropriate means in the work environment, in both normal and non-normal situations	Ensures the recipient is ready and able to receive information
		Selects appropriately what, when, how and with whom to communicate
		Conveys messages clearly, accurately and concisely
		Confirms that the recipient correctly understands important information
		Listens actively and demonstrates understanding when receiving information
		Asks relevant and effective questions
		Completes accurate reports as required by operating procedures
		Announces deviations from normal or intended conditions
		Correctly uses and interprets non-verbal communication
Leadership, teamwork and self-management	Demonstrates effective leadership, team working and self-management	Encourages team participation and open communication
		Demonstrates initiative and provides direction when required
		Engages others in planning
		Considers inputs from others
		Gives and receives feedback constructively
		Addresses and resolves conflicts and disagreements in a constructive manner
		Exercises decisive leadership
		Admits mistakes and takes responsibility for own performance, detecting and resolving own errors
		Carries out instructions when directed and applies effective intervention strategies when necessary
		Confidently intervenes when important for safety
		Self-evaluates the effectiveness of actions

Generic competency	*Description*	*Observable behaviour*
Problem solving and decision making	Identifies problem precursors and resolves actual problems using decision making techniques, in a timely manner	Seeks accurate and adequate information from appropriate sources
		Identifies and verifies what and why things have gone wrong
		Employ(s) proper problem-solving strategies
		Perseveres in working through problems while prioritizing safety
		Uses appropriate and timely decision-making techniques
		Sets priorities appropriately
		Identifies and considers options as appropriate
		Monitors, reviews, and adapts decisions as required
		Identifies, assesses and manages risks and threats to safety effectively
		Adapts when faced with situations where no guidance or procedure exists
		When an event conducive to startle is encountered, recognizes and manages the situation
Workload Management	Maintain available workload capacity by prioritizing and distributing tasks using appropriate resources	Exercises self-control in all situations
		Plans, prioritizes and schedules tasks effectively
		Manages time efficiently when carrying out tasks
		Offers and gives assistance, delegates when necessary
		Seeks and accepts assistance, when appropriate
		Monitors, reviews and cross-checks actions conscientiously
		Verifies that tasks are completed to the expected outcome
		Manages and recovers from interruptions, distractions, variations and failures effectively while performing tasks

Table 2-2. Template for an adapted competency model

Adapted competency	*Description*	*Performance criteria*		
		Observable behaviour	*Competency assessment*	
Adapted competency 1	Description 1	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		
Adapted competency 2	Description 2	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		
Adapted competency 3	Description 3	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		

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Chapter 3

DANGEROUS GOODS TASK LIST

This chapter contains a generic list of tasks typically performed by dangerous goods personnel (Table 3-1) as described in Chapter 1, paragraph 1.7. The employer should adapt this task list to reflect the specific tasks performed by its personnel.

Table 3-1. Generic dangerous goods task list

1	**Classifying dangerous goods**		
	1.1	Evaluate substance or article against classification criteria	
		1.1.1	Determine if it is dangerous goods
		1.1.2	Determine if it is forbidden under any circumstances
	1.2	Determine dangerous goods description	
		1.2.1	Determine class or division
		1.2.2	Determine packing group
		1.2.3	Determine proper shipping name and UN number
		1.2.4	Determine if it is forbidden unless approval or exemption is granted
	1.3	Review special provisions	
		1.3.1	Assess if special provision(s) is applicable
		1.3.2	Apply special provision(s)
2	**Preparing dangerous goods shipment**		
	2.1	Assess packing options including quantity limitations	
		2.1.1	Consider limitations (de minimis quantities, excepted quantities, limited quantities, passenger aircraft, cargo aircraft only, special provisions, dangerous goods in the mail)
		2.1.2	Consider State and operator variations
		2.1.3	Determine if all-packed-in-one can be used
		2.1.4	Select how dangerous goods will be shipped based on limitations and variations
	2.2	Apply packing requirements	
		2.2.1	Consider constraints of packing instructions
		2.2.2	Select appropriate packaging materials (absorbent, cushioning, etc.)
		2.2.3	Assemble package
		2.2.4	Comply with the packaging test report when UN specification packaging is required
	2.3	Apply marks and labels	
		2.3.1	Determine applicable marks
		2.3.2	Apply marks
		2.3.3	Determine applicable labels
		2.3.4	Apply labels
	2.4	Assess use of overpack	
		2.4.1	Determine if overpack can be used
		2.4.2	Apply marks if necessary
		2.4.3	Apply labels if necessary

	2.5	Prepare documentation	
		2.5.1	Complete the dangerous goods transport document
		2.5.2	Complete other transport documents (e.g. air waybill)
		2.5.3	Include other required documentation (approvals/exemptions, etc.)
		2.5.4	Retain copies of documents as required
3	**Processing/accepting cargo**		
	3.1	Review documentation	
		3.1.1	Verify dangerous goods transport document
		3.1.2	Verify other transport documents (e.g. air waybill)
		3.1.3	Verify other documents (exemptions, approvals, etc.)
		3.1.4	Verify State/operator variations
	3.2	Review package(s)	
		3.2.1	Verify marks
		3.2.2	Verify labels
		3.2.3	Verify package type
		3.2.4	Verify package conditions
		3.2.5	Verify State/operator variations
	3.3	Complete acceptance procedures	
		3.3.1	Complete acceptance checklist
		3.3.2	Provide shipment information for load planning
		3.3.3	Retain documents as required
	3.4	Process/accept cargo other than dangerous goods	
		3.4.1	Check documentation for indications of undeclared dangerous goods
		3.4.2	Check packages for indications of undeclared dangerous goods
4	**Managing cargo pre-loading**		
	4.1	Plan loading	
		4.1.1	Determine stowage requirements
		4.1.2	Determine segregation, separation, aircraft/compartment limitations
	4.2	Prepare load for aircraft	
		4.2.1	Check packages for indications of undeclared dangerous goods
		4.2.2	Check for damage and/or leakage
		4.2.3	Apply stowage requirements (e.g. segregation, separation, orientation)
		4.2.4	Apply ULD tags when applicable
		4.2.5	Transport cargo to aircraft
	4.3	Issue NOTOC	
		4.3.1	Enter required information
		4.3.2	Verify conformance with load plan
		4.3.3	Transmit to loading personnel

5	**Accepting passenger and crew baggage**		
	5.1	Process baggage	
		5.1.1	Identify forbidden dangerous goods
		5.1.2	Apply approval requirements
	5.2	Accept baggage	
		5.2.1	Apply operator requirements
		5.2.2	Verify passenger baggage requirements
		5.2.3	Advise pilot-in-command
6	**Transporting cargo/baggage**		
	6.1	Load aircraft	
		6.1.1	Transport cargo/baggage to aircraft
		6.1.2	Check packages for indications of undeclared dangerous goods
		6.1.3	Check for damage and/or leakage
		6.1.4	Apply stowage requirements (e.g. segregation, separation, orientation, securing and protecting from damage)
		6.1.5	Verify that NOTOC reflects against aircraft load
		6.1.6	Verify passenger baggage requirements
		6.1.7	Inform pilot-in-command and flight operations officer/flight dispatcher
	6.2	Manage dangerous goods pre and during flight	
		6.2.1	Detect presence of dangerous goods not permitted in baggage
		6.2.2	Interpret NOTOC
		6.2.3	Apply procedures in the event of an emergency
		6.2.4	Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
		6.2.5	Inform emergency services of the dangerous goods on board in the event of an emergency
	6.3	Unload aircraft	
		6.3.1	Apply specific unloading considerations
		6.3.2	Check packages for indications of undeclared dangerous goods
		6.3.3	Check for damage and/or leakage
		6.3.4	Transport cargo/baggage to facility/terminal
7	**Collecting safety data**		
	7.1	Report dangerous goods accidents	
	7.2	Report dangerous goods incidents	
	7.3	Report undeclared/misdeclared dangerous goods	
	7.4	Report dangerous goods occurrences	

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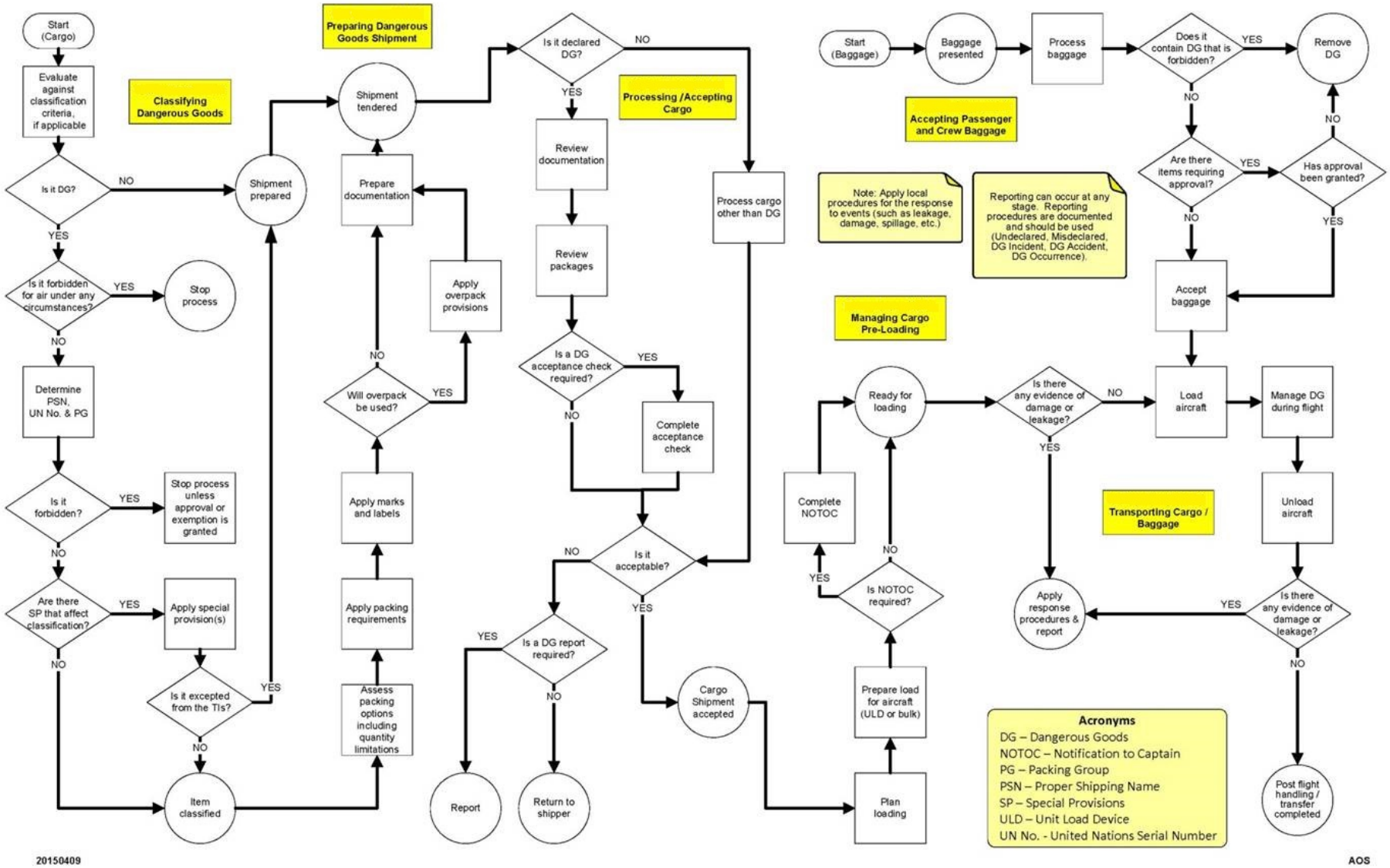
Chapter 4

DANGEROUS GOODS FUNCTIONS — PROCESS FLOWCHART


Start (Cargo)
Evaluate against classification criteria, if applicable
Classifying Dangerous Goods
Is it DG?
NO
YES
Is it forbidden for air under any circumstances?
YES
Stop process
NO
Determine PSN, UN No. & PG
Is it forbidden?
YES
Stop process unless approval or exemption is granted
NO
Are there SP that affect classification?
YES
Apply special provision(s)
NO
Is it excepted from the TIs?
YES
NO
Item classified
Shipment prepared
Preparing Dangerous Goods Shipment
Shipment tendered
Prepare documentation
Will overpack be used?
YES
Apply overpack provisions
NO
Apply marks and labels
Apply packing requirements
Assess packing options including quantity limitations
Is it declared DG?
NO
YES
Processing /Accepting Cargo
Review documentation
Review packages
Process cargo other than DG
Is a DG acceptance check required?
YES
Complete acceptance check
NO
Is it acceptable?
NO
YES
Is a DG report required?
YES
Report
NO
Return to shipper
Cargo Shipment accepted
Plan loading
Prepare load for aircraft (ULD or bulk)
Is NOTOC required?
NO
YES
Complete NOTOC
Ready for loading
Start (Baggage)
Baggage presented
Process baggage
Does it contain DG that is forbidden?
YES
Remove DG
NO
Accepting Passenger and Crew Baggage
Are there items requiring approval?
YES
Has approval been granted?
NO
YES
NO
Accept baggage
Note: Apply local procedures for the response to events (such as leakage, damage, spillage, etc.)
Reporting can occur at any stage. Reporting procedures are documented and should be used (Undeclared, Misdeclared, DG Incident, DG Accident, DG Occurrence).
Managing Cargo Pre-Loading
Is there any evidence of damage or leakage?
NO
YES
Load aircraft
Manage DG during flight
Transporting Cargo / Baggage
Unload aircraft
Apply response procedures & report
Is there any evidence of damage or leakage?
YES
NO
Post flight handling / transfer completed
Acronyms
DG – Dangerous Goods
NOTOC – Notification to Captain
PG – Packing Group
PSN – Proper Shipping Name
SP – Special Provisions
ULD – Unit Load Device
UN No. - United Nations Serial Number
20150409
AOS

Chapter 5

TASK/KNOWLEDGE MATRIX TOOL

This chapter contains a generic task/knowledge matrix table that can be used as a tool to map out the knowledge that is necessary to perform specific tasks. Tasks corresponding to the task list provided in Table 3-1 are listed across the columns of the table and knowledge elements are listed down the rows. The employer should indicate what knowledge is needed for a particular task within the organization with a check mark at the point at which the task element and the knowledge element intersect. To facilitate this process, some cells in the table have been shaded. These shaded cells identify knowledge elements that would normally be irrelevant to the corresponding task and for which a checkmark would not normally be necessary.

Template for determining the knowledge that should be maintained by personnel performing specific tasks

Note.— The numbers under "Dangerous goods tasks" refer to tasks and sub-tasks from Table 3-1. The titles of the tasks are replicated in a legend below the following table.

	Dangerous goods tasks																							
	1. Classifying dangerous goods			2. Preparing dangerous goods shipment					3. Processing/ accepting cargo				4. Managing cargo pre-loading			5. Accept-ing passenger and crew baggage		6. Transporting cargo/baggage			7. Collecting safety data			
Dangerous goods knowledge	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3	7.1	7.2	7.3	7.4
Scope and applicability																								
Limitation of dangerous goods on aircraft																								
Definitions																								
Training																								
Dangerous goods security																								
General provisions concerning radioactive material																								
Reporting of dangerous goods accidents, incidents and other occurrences																								
Classification — General																								
Classification — Class 1																								
Classification — Class 2																								
Classification — Class 3																								
Classification — Class 4																								
Classification — Class 5																								
Classification — Class 6																								
Classification — Class 7																								
Classification — Class 8																								
Classification — Class 9																								
Dangerous goods list — General																								

	Dangerous goods tasks																							
	1. Classifying dangerous goods			2. Preparing dangerous goods shipment					3. Processing/ accepting cargo				4. Managing cargo pre-loading			5. Accept-ing passenger and crew baggage		6. Transporting cargo/baggage			7. Collecting safety data			
Dangerous goods knowledge	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3	7.1	7.2	7.3	7.4
Dangerous goods list — Arrangement	■						■					■				■	■	■	■	■				
Special provisions							■						■	■	■			■	■	■				
Dangerous goods in limited quantities	■	■										■	■	■	■	■	■	■	■	■				
Dangerous goods packed in excepted quantities	■	■								■	■	■	■	■	■	■	■	■	■	■				
Packing Instructions — General	■											■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 1												■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 2	■	■										■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 3	■		■									■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 4	■		■									■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 5	■											■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 6	■											■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 7												■	■	■	■	■	■	■	■	■				
Packing Instructions — Class 8	■											■	■	■	■			■	■	■				
Packing Instructions — Class 9	■											■	■	■	■	■	■	■	■	■				
Preparing dangerous goods shipment — general												■	■	■	■	■	■	■	■	■				
Package markings	■	■																						
Labelling	■	■		■																				
Documentation	■	■	■	■	■	■	■						■	■		■	■	■	■	■				
Packaging applicability, nomenclature and codes	■	■	■			■	■					■	■	■	■	■	■	■	■	■				
Marking of packagings other than inner packagings	■	■		■	■							■	■		■	■	■		■					
Requirements for packagings	■	■										■	■	■	■	■	■	■	■	■				
Packaging performance tests	■	■				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
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	■					■	■					■	■	■	■	■	■	■	■	■				
Packagings for infectious substances of Category A	■	■	■			■	■					■	■	■	■	■	■	■	■	■				

	Dangerous goods tasks																							
	1. Classifying dangerous goods			2. Preparing dangerous goods shipment					3. Processing/ accepting cargo				4. Managing cargo pre-loading			5. Accept-ing passenger and crew baggage		6. Transporting cargo/baggage			7. Collecting safety data			
Dangerous goods knowledge	1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3	7.1	7.2	7.3	7.4
Requirements for the construction, testing and approval of packages for radioactive material and for the approval of such material							■					■	■	■	■	■	■	■	■	■				
Acceptance procedures	■	■	■	■	■	■	■	■				■	■		■	■	■	■		■				
Storage and loading	■	■	■	■	■	■	■	■	■			■					■							
Inspection and decontamination	■	■	■	■	■	■	■	■	■			■	■				■							
Provision of information	■	■	■	■	■	■	■	■	■	■	■	■		■		■	■			■				
Provisions concerning passengers and crew																								
Provisions to aid recognition of undeclared dangerous goods	■																							
Helicopter operations	■	■	■	■	■	■	■	■	■	■	■	■				■	■							
~~Provisions for dangerous goods carried by passengers or crew~~																								

Tasks

1. Classifying dangerous goods
   - 1.1 — Evaluate substance or article against classification criteria
   - 1.2 — Determine dangerous goods description
   - 1.3 — Review special provisions
2. Preparing dangerous goods shipment
   - 2.1 — Assess packing options including quantity limitations
   - 2.2 — Apply packing requirements
   - 2.3 — Apply marks and labels
   - 2.4 — Assess use of overpack
   - 2.5 — Prepare documentation
3. Processing/accepting cargo
   - 3.1 — Review documentation
   - 3.2 — Review package(s)
   - 3.3 — Complete acceptance procedures
   - 3.4 — Process/accept cargo other than dangerous goods
4. Managing cargo pre-loading
   - 4.1 — Plan loading
   - 4.2 — Prepare load for aircraft
   - 4.3 — Issue NOTOC
5. Accepting passenger and crew baggage
   - 5.1 — Process baggage
   - 5.2 — Accept baggage
6. Transporting cargo/baggage
   - 6.1 — Load aircraft
   - 6.2 — Manage dangerous goods pre and during flight
   - 6.3 — Unload aircraft
7. Collecting safety data
   - 7.1 — Report dangerous goods accidents
   - 7.2 — Report dangerous goods incidents
   - 7.3 — Report undeclared/misdeclared dangerous goods
   - 7.4 — Report dangerous goods occurrences

Chapter 6

ADAPTED TASK LISTS FOR CERTAIN WELL-DEFINED ROLES

A. INTRODUCTION

The examples below indicate the tasks from the task list provided in Chapter 3 that personnel responsible for certain well-defined functions would typically perform and for which training and assessment would therefore be required. Personnel would need to have relevant knowledge to competently perform these tasks. The task/knowledge matrix tool provided in Chapter 5 may be used as a guide for determining what knowledge is needed for a given task. The examples in this chapter and the task/knowledge tool provided in Chapter 5 may be used for designing training programmes. However, they should not be considered as mandatory. Additional training and assessment may be required for personnel assigned additional responsibilities and less training and assessment may be required for personnel assigned less responsibilities to those presented in these lists. The employer is responsible for ensuring employees are competent to perform the functions for which they are responsible and must therefore ensure that training programmes are designed to accomplish this. Dangerous goods training programmes are subject to State approval in accordance with national regulations, policies and procedures.

B. PERSONNEL RESPONSIBLE FOR PREPARATION OF DANGEROUS GOODS CONSIGNMENTS

Training and assessment for personnel preparing dangerous goods consignments for transport may be tailored to address only those classes, divisions or even UN numbers that they prepare for transport. Training and assessment may also be limited to address only the specific tasks personnel perform. For example, where personnel are only responsible for the packing, marking and labelling of packages and overpacks, training and assessment may be tailored to address just those tasks. Personnel would need to have relevant knowledge to competently perform these functions. The task/knowledge matrix tool provided in Chapter 5 may be used as a guide for determining what knowledge is needed. The following are tasks personnel responsible for preparation of dangerous goods consignments typically perform and for which training and assessment would therefore be required:

1 Classifying dangerous goods

1.1 Evaluate substance or article against classification criteria
- 1.1.1 Determine if it is dangerous goods
- 1.1.2 Determine if it is forbidden under any circumstances

1.2 Determine dangerous goods description
- 1.2.1 Determine class or division
- 1.2.2 Determine packing group
- 1.2.3 Determine proper shipping name and UN number
- 1.2.4 Determine if it is forbidden unless approval or exemption is granted

1.3 Review special provisions
- 1.3.1 Assess if special provision(s) is applicable
- 1.3.2 Apply special provision(s)

2 Preparing dangerous goods shipment

2.1 Assess packing options including quantity limitations
- 2.1.1 Consider limitations (de minimis quantities, excepted quantities, limited quantities, passenger aircraft, cargo aircraft only, special provisions, dangerous goods in the mail)
- 2.1.2 Consider State and operator variations
- 2.1.3 Determine if all-packed-in-one can be used
- 2.1.4 Select how dangerous goods will be shipped based on limitations and variations

2.2 Apply packing requirements
- 2.2.1 Consider constraints of packing instructions
- 2.2.2 Select appropriate packaging materials (absorbent, cushioning, etc.)
- 2.2.3 Assemble package
- 2.2.4 Comply with the packaging test report when UN specification packaging is required

2.3 Apply marks and labels
- 2.3.1 Determine applicable marks
- 2.3.2 Apply marks
- 2.3.3 Determine applicable labels
- 2.3.4 Apply labels

2.4 Assess use of overpack
- 2.4.1 Determine if overpack can be used
- 2.4.2 Apply marks if necessary
- 2.4.3 Apply labels if necessary

2.5 Prepare documentation
- 2.5.1 Complete the dangerous goods transport document
- 2.5.2 Complete other transport documents (e.g. air waybill)
- 2.5.3 Include other required documentation (approvals/exemptions, etc.)
- 2.5.4 Retain copies of documents as required

7 Collecting safety data

7.1 Report dangerous goods accidents
7.2 Report dangerous goods incidents
7.3 Report undeclared/misdeclared dangerous goods
7.4 Report dangerous goods occurrences

C. PERSONS RESPONSIBLE FOR PROCESSING OR ACCEPTING GOODS PRESENTED AS GENERAL CARGO

Personnel responsible for processing goods presented as general cargo [should/must] be competent to perform tasks aimed at preventing undeclared dangerous goods from being loaded on an aircraft. They may work for freight forwarders, ground handling agents or operators. Personnel would need to have relevant knowledge to competently perform these tasks. The task/knowledge matrix tool provided in Chapter 5 may be used as a guide for determining what knowledge is needed. They may need additional knowledge and be capable of performing at a more advanced skill level depending on the actual responsibilities assigned. The following are tasks aimed at preventing undeclared dangerous goods from being loaded on aircraft such personnel would typically perform and for which training and assessment may be required.

3 Processing/accepting cargo

3.4 Process/accept cargo other than dangerous goods
- 3.4.1 Check documentation for indications of undeclared dangerous goods
- 3.4.2 Check packages for indications of undeclared dangerous goods

7 Collecting safety data

7.1 Report dangerous goods accidents
7.2 Report dangerous goods incidents
7.3 Report undeclared/misdeclared dangerous goods
7.4 Report dangerous goods occurrences

D. PERSONNEL RESPONSIBLE FOR PROCESSING OR ACCEPTING DANGEROUS GOODS CONSIGNMENTS

The following are tasks personnel responsible for processing or accepting dangerous goods consignments typically perform and for which training and assessment would therefore be required:

3 Processing/accepting cargo

3.1 Review documentation
- 3.1.1 Verify air waybill
- 3.1.2 Verify dangerous goods transport document
- 3.1.3 Verify other documents (exemptions, approvals, etc.)
- 3.1.4 Verify State/operator variations

3.2 Review package(s)
- 3.2.1 Verify marks
- 3.2.2 Verify labels
- 3.2.3 Verify package type
- 3.2.4 Verify package conditions
- 3.2.5 Verify State/operator variations

3.3 Complete acceptance procedures
- 3.3.1 Complete acceptance checklist
- 3.3.2 Provide shipment information for load planning
- 3.3.3 Retain documents as required

7 Collecting safety data

7.1 Report dangerous goods accidents
7.2 Report dangerous goods incidents
7.3 Report undeclared/misdeclared dangerous goods
7.4 Report dangerous goods occurrences

E. PERSONS RESPONSIBLE FOR HANDLING CARGO IN A WAREHOUSE, LOADING AND UNLOADING UNIT LOAD DEVICES AND LOADING AND UNLOADING AIRCRAFT CARGO COMPARTMENTS

The following are tasks personnel responsible for handling cargo in a warehouse, loading and unloading unit load devices and loading and unloading passenger baggage and aircraft cargo compartments typically perform and for which training and assessment would therefore be required:

4 Managing cargo pre-loading

4.2 Prepare load for aircraft
- 4.2.1 Check packages for indications of undeclared dangerous goods
- 4.2.2 Check for damage and/or leakage
- 4.2.3 Apply stowage requirements (e.g. segregation, separation, orientation)
- 4.2.4 Apply ULD tags when applicable
- 4.2.5 Transport cargo to aircraft

6 Transporting cargo/baggage

6.1 Load aircraft
- 6.1.1 Transport cargo/baggage to aircraft
- 6.1.2 Check packages for indications of undeclared dangerous goods
- 6.1.3 Check for damage and/or leakage
- 6.1.4 Apply stowage requirements (e.g. segregation, separation, orientation, securing and protecting from damage)
- 6.1.5 Verify that NOTOC reflects against aircraft load
- 6.1.6 Verify passenger baggage requirements
- 6.1.7 Inform pilot-in-command and flight operations officer/flight dispatcher

6.3 Unload aircraft
- 6.3.1 Apply specific unloading considerations
- 6.3.2 Check packages for indications of undeclared dangerous goods
- 6.3.3 Check for damage and/or leakage

7 Collecting safety data

7.1 Report dangerous goods accidents
7.2 Report dangerous goods incidents
7.3 Report undeclared/misdeclared dangerous goods
7.4 Report dangerous goods occurrences

F. PERSONS RESPONSIBLE FOR ACCEPTING PASSENGER AND CREW BAGGAGE, MANAGING AIRCRAFT BOARDING AREAS AND OTHER TASKS INVOLVING DIRECT PASSENGER CONTACT AT AN AIRPORT

The following are tasks personnel responsible for accepting passenger and crew baggage, managing aircraft boarding areas and other functions involving direct passenger contact at an airport typically perform and for which training and assessment would therefore be required.

5 Accepting passenger and crew baggage

5.1 Process baggage
- 5.1.1 Identify forbidden dangerous goods
- 5.1.2 Apply approval requirements

5.2 Accept baggage
- 5.2.1 Apply operator requirements
- 5.2.2 Verify passenger baggage requirements
- 5.2.3 Advise pilot-in-command

7 Collecting safety data

7.1 Report dangerous goods accidents
7.2 Report dangerous goods incidents
7.3 Report undeclared/misdeclared dangerous goods
7.4 Report dangerous goods occurrences

G. PERSONNEL RESPONSIBLE FOR THE PLANNING OF AIRCRAFT LOADING

The following are tasks personnel responsible for planning of aircraft loading (passengers, baggage, mail and cargo) would typically perform and for which training and assessment would therefore be required:

4 Managing cargo pre-loading

4.1 Plan loading
  4.1.1 Determine stowage requirements
  4.1.2 Determine segregation, separation, aircraft/compartment limitations

4.3 Issue NOTOC
  4.3.1 Enter required information
  4.3.2 Verify conformance with load plan
  4.3.3 Transmit to loading personnel

H. FLIGHT CREW

The following are tasks the flight crew would typically perform and for which training and assessment would therefore be required:

6 Transporting cargo/baggage

6.2 Manage dangerous goods pre and during flight
  6.2.1 Detect presence of dangerous goods not permitted in baggage
  6.2.2 Interpret NOTOC
  6.2.3 Apply procedures in the event of an emergency
  6.2.4 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
  6.2.5 Inform emergency services of the dangerous goods on board in the event of an emergency

7 Collecting safety data

7.1 Report dangerous goods accidents
7.2 Report dangerous goods incidents
7.3 Report undeclared/misdeclared dangerous goods
7.4 Report dangerous goods occurrences

I. FLIGHT OPERATIONS OFFICERS AND FLIGHT DISPATCHERS

The following are tasks flight operations officers and flight dispatchers would typically perform and for which training and assessment would therefore be required:

6 Transporting cargo/baggage

6.2 Manage dangerous goods during and flight
  6.2.1 Detect presence of dangerous goods not permitted in baggage
  6.2.2 Interpret NOTOC
  6.2.3 Apply procedures in the event of an emergency
  6.2.4 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
  6.2.5 Inform emergency services of the dangerous goods on board in the event of an emergency

J. CABIN CREW

The following are tasks the cabin crew would typically perform and for which training and assessment would therefore be required:

5 Accepting passenger and crew baggage

5.2 Accept baggage
- 5.2.1 Apply operator requirements
- 5.2.2 Verify passenger baggage requirements
- 5.2.3 Advise pilot-in-command

6. Transporting cargo/baggage

6.2 Manage dangerous goods pre and flight
- 6.2.1 Detect presence of dangerous goods not permitted in baggage
- 6.2.2 Interpret NOTOC
- 6.2.3 Apply procedures in the event of an emergency
- 6.2.4 Inform flight operations officer/flight dispatcher/air traffic control in the event of an emergency
- 6.2.5 Inform emergency services of the dangerous goods on board in the event of an emergency

7 Collecting safety data

7.1 Report dangerous goods accidents
7.2 Report dangerous goods incidents
7.3 Report undeclared/misdeclared dangerous goods
7.4 Report dangerous goods occurrences

K. PERSONNEL RESPONSIBLE FOR THE SCREENING PASSENGERS AND CREW AND THEIR BAGGAGE, CARGO AND MAIL

The following are tasks that personnel responsible for the screening passengers and crew and their baggage, cargo and mail would typically perform and for which training and assessment would therefore be required:

3 Processing/accepting cargo

3.4 Process/accept cargo other than dangerous goods
- 3.4.2 Check packages for indications of undeclared dangerous goods

5 Accepting passenger and crew baggage

5.1 Process baggage
- 5.1.1 Identify forbidden dangerous goods

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APPENDIX D

DRAFT JOB CARD FOR ACCESSIBILITY REQUIREMENTS FOR DANGEROUS GOODS PERMITTED ONLY ON CARGO AIRCRAFT

Title	Accessibility requirements for cargo aircraft	Reference:	DGP.006.01
Source	DGP/26		
Problem Statement	Accessibility requirements for cargo aircraft in the Technical Instructions leave room for interpretation and are potentially misaligned with operation and airworthiness requirements		
Specific Details (including impact statements)	Specific loading requirements for packages or overpacks of dangerous goods bearing the "Cargo aircraft only" label are included in Part 7;2.4.1of the Technical Instructions. This provision applies to packages or overpacks of dangerous goods which need to be loaded for carriage by a cargo aircraft in either a Class C aircraft cargo compartment, in a unit load device equipped with a fire detection/suppression system equivalent to that required by the certification requirements of a Class C aircraft cargo compartment, or accessible to a crew member or other authorized person so that they could handle and separate the packages or overpacks from other cargo in the event of an emergency. There are inconsistent interpretations as to what is meant by "handle", "separate" and "accessible" and a lack of data to demonstrate whether or not accessibility is effective emergency response. Furthermore, current FAR/CS 25 design regulations do not take accessibility as a form of emergency response into account for Class E compartments, e.g.: a) The ability to identify and respond to a threat is dependent on adequate visibility, but there are no design requirements for aircraft systems to eliminate smoke from the compartment for this purpose; b) standard side-by-side loading configurations and loading levels may not leave enough space for adequate access; c) two-man crew in the cockpit requirements would not allow for a crew member to leave the cockpit to respond to an emergency; d) access to packages or overpacks in a ULD would be difficult and may affect successful emergency response; e) hand-held fire extinguishers do not have the capacity to extinguish a fire involving high volume cargo Accessibility is a measure referred to as justification for allowing dangerous goods on cargo aircraft which are not permitted on passenger aircraft. Coordination between airworthiness, operations and dangerous goods experts is needed to ensure this justification is still valid. The assumptions underlying cargo accessibility requirements therefore need to be reviewed and modified as necessary.		
Expected Benefit	Appropriate emergency response procedures		
Reference Documents	DGP/26 Report (paragraph 2.7.3 under the Report on Agenda Item 2)	Attachments	
Primary Expert Group:	DGP		

WPE No.	Document affected	Description of Amendment proposal or Action	Supporting Expert Group	Expected dates:		
				Expert Group	Effective	Applicability
	Technical Instructions	Amendment to cargo aircraft provisions	AIRP FLTOPSP			
	Annex 6?					
	Annex 8?					

Initial Issue Date:	Date approved by ANC:	Session/Meeting:

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 2019-2020 Edition

3.1 DRAFT AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS TO ALIGN WITH THE UN RECOMMENDATIONS (DGP/26-WP/19)

3.1.1 The meeting reviewed amendments to the Supplement to the Technical Instructions to reflect the decisions taken by UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/17. They were agreed, subject to the following:

a) DGP-WG/17 proposed that the new UN entries for articles, n.o.s. should be forbidden from transport by air under normal circumstances unless approval was granted by the State of Origin and the State of the Operator in accordance with Special Provision A2. It was noted that in accordance with the UN Recommendations, competent authority approval was needed for the transport of:

- UN 3539 — **Articles containing toxic gas, n.o.s.**;
- UN 3542 — **Articles containing a substance liable to spontaneous combustion, n.o.s.**;
- UN 3543 — **Articles containing a substance which emits flammable gas in contact with water, n.o.s.**;
- UN 3544 — **Articles containing oxidizing substance, n.o.s.**; and
- UN 3545 — **Articles containing organic peroxide, n.o.s.**

The panel therefore agreed to only allow transport of these articles by air through the exemption process.

b) A new special provision (Special Provision A332) was introduced allowing for the transport of UN 3363 **— Dangerous goods in apparatus** or **Dangerous goods in machinery** when the quantity of dangerous goods exceeded the limits permitted in Packing Instruction 962 while meeting the limits established in the UN Recommendations with the approval of the State of Origin and the State of the Operator. The provision was added as a consequence to the introduction of the new UN entries for articles containing dangerous goods, n.o.s.

c) A new special provision (Special Provision A333) allowing transport of articles containing dangerous goods n.o.s. of certain classes or divisions only through the exemption process was added to Part S-3;6 for the sake of alignment with the UN Recommendations.

d) A new packing instruction for the new UN entries for articles containing dangerous goods n.o.s. was developed. The panel agreed to include a separate packing instruction for each class assigned to the new entries instead of one packing instruction assigned to all.

3.2 PACKING INSTRUCTION NUMBER FOR DANGEROUS GOODS CARRIED UNDER APPROVAL OR EXEMPTION (DGP/26-WP/34)

3.2.1 An amendment to the guidance for processing exemptions and approvals provided in Attachment 1 to Chapter 1 of Part S-1 was proposed recommending that:

a) the exemption or approval document include the packing instruction number that is to be shown on the dangerous goods transport document by the shipper; and

b) a copy of the entire packing instruction be provided with the exemption or approval when it is one that was only contained in the Supplement to the Technical Instruction and not in the Technical Instructions.

It was suggested the operator was not always able to correctly complete the acceptance check without the packing instruction.

3.2.2 While there was sympathy for the intent, there was no support for the proposal. The Supplement was meant as guidance and the packing instructions were provided as a basis for developing approvals or exemptions. An approval or an exemption might contain many more requirements than what is contained in the packing instructions. There were suggestions for making the information in the Supplement more widely available. The panel had strongly encouraged the Secretariat to allow free web access to the Supplement in the past. This would facilitate compliance by making the information easy to find.

3.2.3 The proposer would consider the comments raised for a potential future proposal.

3.3 RECOMMENDATION

3.3.1 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 2019-2020 Edition

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

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APPENDIX

PROPOSED AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

Part S-1

GENERAL

(ADDITIONAL INFORMATION FOR PART 1 OF THE TECHNICAL INSTRUCTIONS)

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Chapter 4

GUIDANCE TO STATES ON THE TRANSPORT OF LITHIUM BATTERIES AS CARGO

4.1 INTRODUCTION

4.1.1 Lithium batteries have the potential to create thermal runaway, a chain reaction which leads to repeated self-heating and the release of a battery's stored energy. Once one battery experiences thermal runaway, it can generate enough heat to trigger thermal runaway in adjacent batteries. Thermal runaway can occur for a number of reasons, including poor cell design, cell manufacturing flaws and external abuse. It has been demonstrated through testing that thermal runaway can result in fire and/or explosion.

4.1.2 A prohibition on the transport of UN 3090 — **Lithium metal batteries** as cargo on passenger aircraft was introduced into the 2015-2016 Edition of the Technical Instructions with the knowledge that aircraft cargo fire protection systems could not control a lithium metal fire. More recent test results demonstrate that a fire involving high-density packages of UN 3480 — **Lithium ion batteries** may exceed the capability of aircraft cargo fire protection systems. High-density packages of lithium ion batteries may consist of any number of batteries or cells having the potential to overwhelm cargo compartment fire protection features. The potential is dependent on a number of variables including the battery or cell chemistry, size, design type, quantities and the cargo compartment configuration. The inability to determine an absolute safe quantity limit for lithium ion batteries and the absence of a packaging standard to mitigate the risks has led to the decision to introduce a prohibition on the transport of UN 3480 — **Lithium ion batteries** as cargo on passenger aircraft.

4.1.3 Development of a performance-based packaging standard for lithium ion batteries is currently under way. It is anticipated that once this standard is completed and any additional controls necessary to mitigate risks are established, an amendment to the Technical Instructions will be made to allow for their transport as cargo on passenger aircraft.

DGP/26 (see paragraph 6.3.8 under Agenda Item 6 of this report):

4.1.4 At a minimum, the following criteria should be identified as part of a safety risk assessment when considering whether or not to grant an approval or an exemption to transport UN 3480 — **Lithium ion batteries** or UN 3090 — **Lithium metal batteries** as cargo on passenger aircraft under Special Provision A201:

a) capabilities of the operator;

b) overall capability of the aircraft and its systems;

c) packing and packaging;

d) quantity of batteries and cells;

e) containment characteristics of unit load devices;

f) specific hazards and safety risks associated with each battery and cell type to be carried alone or in combination; and

g) chemical composition of the batteries and cells.

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Part S-3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND QUANTITY LIMITATIONS

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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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UN Model Regulations, Chapter 3.3, Special Provision 271 (see ST/SG/AC.10/44/Add.1)	
A317	Lactose or glucose or similar materials, may be used as a phlegmatizer provided that the substance contains not less than 90 per cent, by mass, of phlegmatizer. The appropriate national authority may authorize these mixtures to be classified in Division 4.1 on the basis of a Series 6(c) test on at least three packages as prepared for transport. Mixtures containing at least 98 per cent, by mass, of phlegmatizer are not subject to these Instructions. Packages containing mixtures with not less than 90 per cent, by mass, of phlegmatizer need not bear a “Toxic” subsidiary ~~risk~~ hazard label.

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See paragraph 3.1.1 b) of this report:	
A332	This entry only applies to machinery or apparatus containing dangerous goods as a residue or as an integral element of the machinery or apparatus. It must not be used for machinery or apparatus for which a proper shipping name already exists in Table 3-1 of the Technical Instructions. Where the quantity of dangerous goods contained as an integral element in machinery or apparatus exceeds the limits permitted by Packing Instruction 962 in the Technical Instructions, the machinery or apparatus may contain dangerous goods up to the limits permitted by Special Provision 301 of the UN Model Regulations.

See paragraph 3.1.1 c) of this report:	
A333	Articles containing dangerous goods of Division 2.3, 4.2, 4.3, 5.1, 5.2 or Division 6.1 for substances of inhalation toxicity of Packing Group I and articles containing more than one of the hazards listed in Part 2, Introductory Chapter, 4.1 b), c), or d) may only be transported under an exemption.

DGP/26 (see paragraph 6.3.8 under Agenda Item 6 of this report):

A334

a) In instances where other forms of transport (including cargo aircraft) is impracticable, lithium cells or batteries may be transported on passenger aircraft with the prior approval of the authority of the State of Origin, the State of the Operator and the State of Destination under the written conditions established by those authorities, provided that the following types and quantities are met:

1) quantities of lithium metal cells or batteries (UN 3090) are limited to the allowance permitted in Table 968-II of Packing Instruction 968; and

2) quantities of lithium ion cells or batteries (UN 3480) are limited to the allowance permitted in Table 965-II of Packing Instruction 965.

b) 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:

1) no amount of flame is allowed outside the package;

2) 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;

3) no fragments can exit the package and the package must maintain structural integrity;

4) 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; and

5) when the package or overpack is exposed to an external fire (e.g. five-minute oil burner flame penetration resistance test) or elevated temperature environment (e.g. oven thermal resistance test), any hazardous effects caused by thermal runaway of the lithium cell or battery must be contained within the package.

Adequate information and documentation on the above criteria (b)1) through 5)) must be provided to the appropriate authority of the State issuing the approval upon request.

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Part S-4

PACKING INSTRUCTIONS

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Chapter 4

CLASS 2 — GASES

See paragraph 3.1.1 d) of this report:

Packing Instruction 221

Cargo aircraft only for UN 3537 and UN 3538 only

General requirements

Part 4;1.1.1, 4;1.1.3, 4;1.1.12 and 4;2 requirements must be met.

This entry applies to articles which do not have an existing proper shipping name and which contain only dangerous goods permitted under Part 3;4.1.2 of the Technical Instructions, and exceed both the quantity limits for UN 3363 as prescribed in Special Provision A107 and the quantity limits permitted by Special Provision 301 of the UN Model Regulations.

The following table provides the recommended maximum quantities of individual substances contained in a single article.

UN number and name	*Net quantity per package*
UN 3537 **Articles containing flammable gas, n.o.s.***	150 kg
UN 3538 **Articles containing non-flammable, non toxic gas, n.o.s.***	150 kg

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials must be properly secured, and any leakage of the contents must not substantially impair the protective properties of the article or of the outer packaging.
— Receptacles containing gases within articles must meet the requirements of 4;4.1 and 6;5 of the Technical Instructions as appropriate or be capable of providing an equivalent level of protection as provided for in Packing Instruction 200 or 219.
— Where there is no receptacle within the article, the article must fully enclose the dangerous goods and prevent their release under normal conditions of transport.
— Articles must be packed to prevent movement and inadvertent operation during normal conditions of transport.

ROBUST ARTICLES

Robust articles may alternatively be transported in strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use. The packagings must meet achieve a level of protection that is at least equivalent to that provided by Part 6;1 of the Technical Instructions. Articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained. In such cases the additional requirement related to Packing Group II performance requirements and the requirement for UN specification outer packagings do not apply.

Note.— See Part S-5;2.1 for labelling requirements.

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
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)		

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Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

See paragraph 3.1.1 d) of this report:

Packing Instruction 379

Cargo aircraft only for UN 3540 only

General requirements

Part 4;1.1.1, 4;1.1.3, 4;1.1.12 and 4;2 requirements must be met.

This entry applies to articles which do not have an existing proper shipping name and which contain only dangerous goods permitted under Part 3;4.1.2 of the Technical Instructions, and exceed both the quantity limits for UN 3363 as prescribed in Special Provision A107 and the quantity limits permitted by Special Provision 301 of the UN Model Regulations.

The following table provides the recommended maximum quantities of individual substances contained in a single article.

UN number and name	*Net quantity per package*
UN 3540 **Articles containing flammable liquid, n.o.s.***	60 L

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Receptacles must be constructed of suitable materials and secured in the article in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the article itself or the outer packaging.
— Receptacles must be packed with their closures correctly oriented. The receptacles must in addition conform to the internal pressure test provisions of 6;4.5 of the Technical Instructions.
— Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials must be properly secured, and any leakage of the contents must not substantially impair the protective properties of the article or of the outer packaging.
— Where there is no receptacle within the article, the article must fully enclose the dangerous goods and prevent their release under normal conditions of transport.
— Articles must be packed to prevent movement and inadvertent operation during normal conditions of transport.

ROBUST ARTICLES

Robust articles may alternatively be transported in strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use. The packagings must meet achieve a level of protection that is at least equivalent to that provided by Part 6;1 of the Technical Instructions. Articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained. In such cases the additional requirement related to Packing Group II performance requirements and the requirement for UN specification outer packagings do not apply.

Note.— See Part S-5;2.1 for labelling requirements.

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
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)		

Chapter 6

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

. . .

See paragraph 3.1.1 d) of this report:

Packing Instruction 400

Cargo aircraft only for UN 3541 only

General requirements

Part 4;1.1.1, 4;1.1.3, 4;1.1.12 and 4;2 requirements must be met.

This entry applies to articles which do not have an existing proper shipping name and which contain only dangerous goods permitted under Part 3;4.1.2 of the Technical Instructions, and exceed both the quantity limits for UN 3363 as prescribed in Special Provision A107 and the quantity limits permitted by Special Provision 301 of the UN Model Regulations.

The following table provides the recommended maximum quantities of individual substances contained in a single article.

UN number and name	*Net quantity per package*
UN 3541 **Articles containing flammable solid, n.o.s.***	50 kg

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Receptacles must be constructed of suitable materials and secured in the article in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the article itself or the outer packaging.
— Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials must be properly secured, and any leakage of the contents must not substantially impair the protective properties of the article or of the outer packaging.
— Where there is no receptacle within the article, the article must fully enclose the dangerous goods and prevent their release under normal conditions of transport.
— Articles must be packed to prevent movement and inadvertent operation during normal conditions of transport.

ROBUST ARTICLES

Robust articles may alternatively be transported in strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use. The packagings must meet achieve a level of protection that is at least equivalent to that provided by Part 6;1 of the Technical Instructions. Articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained. In such cases the additional requirement related to Packing Group II performance requirements and the requirement for UN specification outer packagings do not apply.

Note.— See Part S-5;2.1 for labelling requirements.

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
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)		

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Chapter 8

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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See paragraph 3.1.1 d) of this report:

Packing Instruction 600

Cargo aircraft only for UN 3546 only

General requirements

Part 4;1.1.1, 4;1.1.3, 4;1.1.12 and 4;2 requirements must be met.

This entry applies to articles which do not have an existing proper shipping name and which contain only dangerous goods permitted under Part 3;4.1.2 of the Technical Instructions, and exceed both the quantity limits for UN 3363 as prescribed in Special Provision A107 and the quantity limits permitted by Special Provision 301 of the UN Model Regulations.

The following table provides the recommended maximum quantities of individual substances contained in a single article.

UN number and name	*Net quantity per package*	
	Liquid	*Solid*
UN 3546 **Articles containing toxic substance, n.o.s.***	60 L	100 kg

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Receptacles containing liquids or solids within articles must be constructed of suitable materials and secured in the article in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the article itself or the outer packaging.
— Receptacles containing liquids with closures must be packed with their closures correctly oriented. The receptacles must in addition conform to the internal pressure test provisions of 6;4.5 of the Technical Instructions.
— Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials must be properly secured, and any leakage of the contents must not substantially impair the protective properties of the article or of the outer packaging.
— Where there is no receptacle within the article, the article must fully enclose the dangerous goods and prevent their release under normal conditions of transport.
— Articles must be packed to prevent movement and inadvertent operation during normal conditions of transport.

ROBUST ARTICLES

Robust articles may alternatively be transported in strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use. The packagings must meet achieve a level of protection that is at least equivalent to that provided by Part 6;1 of the Technical Instructions. Articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained. In such cases the additional requirement related to Packing Group II performance requirements and the requirement for UN specification outer packagings do not apply.

Note.— See Part S-5;2.1 for labelling requirements.

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
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)		

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Chapter 10

CLASS 8 — CORROSIVES

See paragraph 3.1.1 d) of this report:

Packing Instruction 877

Cargo aircraft only for UN 3547 only

General requirements

Part 4;1.1.1, 4;1.1.3, 4;1.1.12 and 4;2 requirements must be met.

This entry applies to articles which do not have an existing proper shipping name and which contain only dangerous goods permitted under Part 3;4.1.2 of the Technical Instructions, and exceed both the quantity limits for UN 3363 as prescribed in Special Provision A107 and the quantity limits permitted by Special Provision 301 of the UN Model Regulations.

The following table provides the recommended maximum quantities of individual substances contained in a single article.

UN number and name	*Net quantity per package*	
	Liquid	*Solid*
UN 3547 **Articles containing corrosive substance, n.o.s.***	30 L	50 kg

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Receptacles containing liquids or solids within articles must be constructed of suitable materials and secured in the article in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the article itself or the outer packaging.
— Receptacles containing liquids with closures must be packed with their closures correctly oriented. The receptacles must in addition conform to the internal pressure test provisions of 6;4.5 of the Technical Instructions.
— Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials must be properly secured, and any leakage of the contents must not substantially impair the protective properties of the article or of the outer packaging.
— Receptacles containing gases within articles must meet the requirements of 4;4.1 and 6;5 of the Technical Instructions as appropriate or be capable of providing an equivalent level of protection as provided for in Packing Instruction 200 or 219.
— Where there is no receptacle within the article, the article must fully enclose the dangerous goods and prevent their release under normal conditions of transport.
— Articles must be packed to prevent movement and inadvertent operation during normal conditions of transport.

ROBUST ARTICLES

Robust articles may alternatively be transported in strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use. The packagings must meet achieve a level of protection that is at least equivalent to that provided by Part 6;1 of the Technical Instructions. Articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained. In such cases the additional requirement related to Packing Group II performance requirements and the requirement for UN specification outer packagings do not apply.

Note.— See Part S-5;2.1 for labelling requirements.

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
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)		

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

UN Model Regulations, Chapter 4.1.4.1, packing instruction P910 (see ST/SG/AC.10/44/Add.1) and paragraph 3.1.1 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~~ or batteries and to pre-production prototypes of cells ~~and~~ or batteries when these prototypes are transported for testing.

General requirements

Part 4, Chapter 1 requirements must be met.

Packing Instruction 910

ADDITIONAL PACKING REQUIREMENTS

— 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 an electrically 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 electrically 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 electrically 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 electrically 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 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.

Packing Instruction 910

OUTER PACKAGINGS

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

. . .

See paragraph 3.1.1 d) of this report:

Packing Instruction 973

Cargo aircraft only for UN 3548 only

General requirements

Part 4;1.1.1, 4;1.1.3, 4;1.1.12 and 4;2 requirements must be met.

This entry applies to articles which do not have an existing proper shipping name and which contain only dangerous goods permitted under Part 3;4.1.2 of the Technical Instructions, and exceed both the quantity limits for UN 3363 as prescribed in Special Provision A107 and the quantity limits permitted by Special Provision 301 of the UN Model Regulations.

The following table provides the recommended maximum quantities of individual substances contained in a single article.

UN number and name	*Net quantity per package*
UN 3548 **Articles containing miscellaneous dangerous goods, n.o.s.***	As indicated for the substance in Table 3-1 of the Technical Instructions

ADDITIONAL PACKING REQUIREMENTS

— Packagings must meet Packing Group II performance requirements.
— Receptacles containing liquids or solids within articles must be constructed of suitable materials and secured in the article in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the article itself or the outer packaging.
— Receptacles containing liquids with closures must be packed with their closures correctly oriented. The receptacles must in addition conform to the internal pressure test provisions of 6;4.5 of the Technical Instructions.
— Receptacles that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials must be properly secured, and any leakage of the contents must not substantially impair the protective properties of the article or of the outer packaging.
— Receptacles containing gases within articles must meet the requirements of 4;4.1 and 6;5 of the Technical Instructions as appropriate or be capable of providing an equivalent level of protection as provided for in Packing Instruction 200 or 219.
— Where there is no receptacle within the article, the article must fully enclose the dangerous goods and prevent their release under normal conditions of transport.
— Articles must be packed to prevent movement and inadvertent operation during normal conditions of transport.

ROBUST ARTICLES

Robust articles may alternatively be transported in strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packaging capacity and its intended use. The packagings must meet achieve a level of protection that is at least equivalent to that provided by Part 6;1 of the Technical Instructions. Articles may be transported unpackaged or on pallets when the dangerous goods are afforded equivalent protection by the article in which they are contained. In such cases the additional requirement related to Packing Group II performance requirements and the requirement for UN specification outer packagings do not apply.

Note.— See Part S-5;2.1 for labelling requirements.

OUTER PACKAGINGS (see 6;3.1)

Boxes	*Drums*	*Jerricans*
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)		

. . .

Part S-5

STATE'S RESPONSIBILITIES WITH RESPECT TO SHIPPERS

(ADDITIONAL INFORMATION FOR PART 5 OF THE TECHNICAL INSTRUCTIONS)

. . .

UN Model Regulations, 5.2.2.1.13 (see ST/SG/AC.10/44/Add.1) and DGP-WG/17 (see paragraph 3.2.2.1.3 of DGP/26-WP/3) and DGP/26 (see paragraph 3.1.1 d) of this report):

Chapter 2

LABELLING

2.1 Labels for articles containing dangerous goods transported as UN Nos. 3537, 3538, 3539, 3540, 3541, 3542, 3543, 3544, 3545, 3546, 3547 and 3548

2.1.1 Packages containing dangerous goods in articles and dangerous goods in articles transported unpackaged must bear labels according to 5;3.1.1 of the Technical Instructions reflecting the hazards established according to Part 2, Introductory Chapter, paragraph 6 of the Technical Instructions. If the article contains one or more lithium batteries with, for lithium metal batteries, an aggregate lithium content of 2 g or less, and for lithium ion batteries, a Watt-hour rating of 100 Wh or less, the lithium battery mark (Figure 5-3 of the Technical Instructions) must be affixed to the package or unpackaged article. If the article contains one or more lithium batteries with, for lithium metal batteries, an aggregate lithium content of more than 2 g and for lithium ion batteries, a Watt-hour rating of more than 100 Wh, the lithium battery label (Figure 5-26 of the Technical Instructions) must be affixed to the package or unpackaged article.

2.1.2 When it is required to ensure articles containing liquid dangerous goods remain in their intended orientation, orientation marks meeting the requirements of 4;1.1.13 must be affixed and visible on at least two opposite vertical sides of the package or of the unpackaged article where possible, with the arrows pointing in the correct upright direction.

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ATTACHMENT

PROPOSED AMENDMENTS TO TABLE S-3-1

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

	Name	UN No.	Class or division	Subsidiary hazard	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												
+	**Articles containing a substance liable to spontaneous combustion, n.o.s.***	3542	4.2	See 2;0.6	Spontaneous combustion		A333			FORBIDDEN		FORBIDDEN	
+	**Articles containing a substance which emits flammable gas in contact with water, n.o.s.***	3543	4.3	See 2;0.6	Danger if wet		A333			FORBIDDEN		FORBIDDEN	
+	**Articles containing corrosive substance, n.o.s.***	3547	8	See 2;0.6	Corrosive		A2 A333			FORBIDDEN		See 877	
+	**Articles containing flammable gas, n.o.s.***	3537	2.1	See 2;0.6	Gas flammable		A2 A333			FORBIDDEN		221	150 kg
+	**Articles containing flammable liquid, n.o.s.***	3540	3	See 2;0.6	Liquid flammable		A2 A333			FORBIDDEN		378	60 L
+	**Articles containing flammable solid, n.o.s.***	3541	4.1	See 2;0.6	Solid flammable		A2 A333			FORBIDDEN		400	50 kg
+	**Articles containing miscellaneous dangerous goods, n.o.s.***	3548	9	See 2;0.6	Miscellaneous		A2 A333			FORBIDDEN		See 973	
+	**Articles containing non-flammable, non toxic gas, n.o.s.***	3538	2.2	See 2;0.6	Gas non-flammable		A2 A333			FORBIDDEN		221	150 kg
+	**Articles containing organic peroxide, n.o.s.***	3545	5.2	See 2;0.6	Organic peroxide		A333			FORBIDDEN		FORBIDDEN	
+	**Articles containing oxidizing substance, n.o.s.***	3544	5.1	See 2;0.6	Oxidizer		A333			FORBIDDEN		FORBIDDEN	
+	**Articles containing toxic gas, n.o.s.***	3539	2.3	See 2;0.6	Gas toxic		A333			FORBIDDEN		FORBIDDEN	
+	**Articles containing toxic substance, n.o.s.***	3546	6.1	See 2;0.6	Toxic		A2 A333			FORBIDDEN		See 600	
≠	**Asbestos, amphibole*** (amosite, tremolite, actinolite, anthophyllite, crocidolite) †	2212	9		Miscellaneous		A2 A61	II		FORBIDDEN		958	200 kg
	E												
≠	**Engine, fuel cell, flammable gas powered** †	3529	2.1		Gas flammable		A70 A87 A176 A208		E0	FORBIDDEN		220	No limit
≠	**Engine, internal combustion, flammable gas powered**	3529	2.1		Gas flammable		A70 A87 A208		E0	FORBIDDEN		220	No limit

	Name	UN No.	Class or division	Subsidiary hazard	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
	L												
+	**Lithium batteries installed in cargo transport unit** lithium ion batteries or lithium metal batteries	3536	9		Miscellaneous					FORBIDDEN		FORBIDDEN	
≠	**Lithium ion batteries** (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	US 3	A88 A99 A154 A164 A183 A201 A206 A213 A331 A334		E0	FORBIDDEN		See 965	
≠	**Lithium metal batteries** (including lithium alloy batteries) †	3090	9		Miscellaneous — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A183 A201 A206 A213 A334		E0	FORBIDDEN		See 968	
	M												
≠	**Machinery, fuel cell, flammable gas powered**	3529	2.1		Gas flammable		A70 A87 A176 A208		E0	FORBIDDEN		220	No limit
≠	**Machinery, internal combustion, flammable gas powered**	3529	2.1		Gas flammable		A70 A87 A208		E0	FORBIDDEN		220	No limit
	V												
≠	**Vehicle, flammable gas powered**	3166	9		Miscellaneous		A70 A87 A118 A120 A214		E0	FORBIDDEN		951	No limit
≠	**Vehicle, fuel cell, flammable gas powered** †	3166	9		Miscellaneous		A70 A87 A118 A120 A176 A214		E0	FORBIDDEN		951	No limit

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 2019-2020 Edition

4.1 DRAFT AMENDMENTS TO THE EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS TO ALIGN WITH THE UN RECOMMENDATIONS (DGP/26-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 UNCOE at its eighth session (Geneva, 9 December 2016). The amendments also reflected proposals agreed by DGP-WG/17.

4.1.2 A new drill number "12" was added and assigned to the lithium battery entries (UN 3091, 3091, 3480 and 3481) to better characterize their inherent risk for dangerous heat, evolution of smoke, and generation of explosive gases. Drill letter "Z", which had already been assigned to the lithium metal entries, was assigned to the lithium ion entries (see paragraph 3.5.3.6 of the DGP-WG/16 Report contained in DGP/26-WP/2). It was agreed that this drill code (12FZ) should be assigned to the new entry for UN 3536 — **Lithium batteries installed in cargo transport unit**.

4.1.3 Twelve new entries for articles containing dangerous goods, n.o.s. had been added to the dangerous goods list, each assigned a different primary hazard. No subsidiary risks were assigned, but a reference to new provisions for determining the subsidiary risk was provided in the subsidiary hazard column of Table 3-1 of the Technical Instructions. It was agreed to assign drill letter "L" to those with no other letter assigned. A new paragraph was added to Section 4 advising that the drill code assigned to the articles was based on their primary hazard and that the drill letter may need to be altered depending on any subsidiary hazard(s) posed by the specific article containing dangerous goods.

4.1.4 The amendments were agreed.

4.2 GUIDANCE FOR THE USE OF CABIN CREW CHECKLISTS FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT (DGP/24-WP/50)

4.2.1 A flowchart was developed to assist in the selection of the appropriate emergency response checklist for incidents in the cabin contained in Section 3 of Doc 9481. It was argued that the division of the lists into those involving portable electronic devices and those involving other dangerous goods had resulted in six different checklists and that it was difficult to determine which list best applied to a particular incident. Choosing the appropriate list quickly was essential during an incident.

4.2.2 The Cabin Safety Group (ICSG), who had contributed to previous revisions to Section 3, was meeting at the same time as DGP/26 and agreed to review the proposal. The secretary of that group briefed the panel on this review. He emphasized that responding to incidents in the cabin was time critical and that cabin crew therefore performed emergency response procedures through memory and not through the use of flowcharts or checklists. In fact, the material in Section 3 was used to build procedures and not checklists. He suggested that the panel consider renaming the section to "Procedures for

Dangerous Goods Incidents". He acknowledged that the material in Section 3 was useful for training and post emergency debriefs, and a flowchart could assist in this regard. He noted that the ICSG had an approach to developing flowcharts and would be pleased to revise the proposed flowchart to align with their methodology. There were no objections to this approach. An airworthiness expert noted that manufacturers provided operators with cabin crew procedures for smoke and fire events within the cabin and questioned whether or not the material in Section 3, which was dangerous-goods specific, was incorporated in these procedures. It was confirmed that it was.

4.2.3 It was agreed that a revised flowchart developed by the ICSG would be incorporated in Section 3 of Doc 9481, pending a review by the DGP through correspondence.

4.3 RECOMMENDATION

4.3.1 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 2019-2020 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.

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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

. . .

4.3 NUMERICAL LIST OF DANGEROUS GOODS WITH DRILL CODES

The list of proper shipping names used for dangerous goods, arranged in numerical order of the associated UN identification number, is shown in Table 4-3. For each entry, a drill code is shown and this should be used to find the appropriate drill on the chart of Aircraft Emergency Response Drills.

In a few cases, besides the UN number, the class or division, the packing group or the subsidiary risk must also be used to identify the correct drill code. Where this is necessary, the possible classes or divisions, packing groups or subsidiary risks are given below the UN number and the relevant drill code can be selected. These additional details are shown on the pilot-in-command's notification form.

Where alternative proper shipping names can be used with the same UN number, these are all shown separated by oblique lines.

Those dangerous goods which have not yet been allocated a UN identification number are listed first.

See paragraph 4.1.3 of this report:

4.4 DRILL CODES FOR ARTICLES CONTAINING DANGEROUS GOODS N.O.S.

The drill code assigned to the articles below is based on their primary hazard. The drill letter may need to be altered if there are also subsidiary hazard(s) to consider. Subsidiary hazards, when applicable, are assigned in accordance with Part 2;0.6 of the Technical Instructions.

UN 3537 — **Articles containing flammable gas, n.o.s.***
UN 3538 — **Articles containing non-flammable, non toxic gas, n.o.s.***
UN 3539 — **Articles containing toxic gas, n.o.s.***
UN 3540 — **Articles containing flammable liquid, n.o.s.***
UN 3541 — **Articles containing flammable solid, n.o.s.***
UN 3542 — **Articles containing a substance liable to spontaneous combustion, n.o.s.***
UN 3543 — **Articles containing a substance which emits flammable gas in contact with water, n.o.s.***
UN 3544 — **Articles containing oxidizing substance, n.o.s.***
UN 3545 — **Articles containing organic peroxide, n.o.s.***
UN 3546 — **Articles containing toxic substance, n.o.s.***

UN 3547 — **Articles containing corrosive substance, n.o.s.***
UN 3548 — **Articles containing miscellaneous dangerous goods, n.o.s.***

Table 4-1. Aircraft Emergency Response Drills

. . .

DRILL NO.	INHERENT RISK	RISK TO AIRCRAFT	RISK TO OCCUPANTS	SPILL OR LEAK PROCEDURE	FIREFIGHTING PROCEDURE	ADDITIONAL CONSIDERATIONS
	. . .					
DGP-WG/17 (see paragraph 3.4.1 of DGP/26-WP/3):						
9	No general inherent risk	As indicated by the drill letter	As indicated by the drill letter	Use 100% oxygen; establish and maintain maximum ventilation if "A" drill letter	All agents according to availability ~~— use water if available on "Z" drill letter; no water on "W" drill letter~~	~~If "Z" drill letter, consider landing immediately; otherwise, n~~None
10	Gas, flammable, high fire risk if any ignition source present	Fire and/or explosion	Smoke, fumes and heat, and as indicated by the drill letter	Use 100% oxygen; establish and maintain maximum ventilation; no smoking; minimum electrics	All agents according to availability	Possible abrupt loss of pressurization
11	Infectious substances may affect humans or animals if inhaled, ingested or absorbed through the mucous membrane or an open wound	Contamination with Infectious substances	Delayed infection to humans or animals	Do not touch. Minimum re-circulation and ventilation in affected area	All agents according to availability. No water on "Y" drill Letter	Call for a qualified person to meet the aircraft
DGP-WG/16 (see paragraph 3.5.3.6 of DGP/26-WP/2) and DGP-WG/17 (see paragraph 3.4.2 of DGP/26-WP/3):						
12	Fire, heat, smoke, toxic and flammable vapour	Fire and/or explosion	Smoke, fumes, heat	Use 100% oxygen; establish and maintain maximum ventilation	All agents according to availability. Use water if available	Possible abrupt loss of pressurization; consider landing immediately
	. . .					

. . .

DGP-WG/16 (see paragraph 3.5.3.6 of DGP/26-WP/2):

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

UN No.	*Drill Code*	*Proper shipping name*
3090	~~9FZ~~12FZ	Lithium metal batteries
3091	~~9FZ~~12FZ	Lithium metal batteries contained in equipment
3091	~~9FZ~~12FZ	Lithium metal batteries packed with equipment
3480	~~9F~~12FZ	Lithium ion batteries
3481	~~9F~~12FZ	Lithium ion batteries contained in Equipment
3481	~~9F~~12FZ	Lithium ion batteries packed with Equipment

UN Model Regulations, Dangerous goods list (see ST/SG/AC.10/44/Add.1) and DGP-WG/17 (see paragraph 3.4.2 of DGP/26-WP/3) and paragraph 4.1 of this report:

UN No.	*Drill Code*	*Proper shipping name*
3535	6F	Toxic solid, flammable, inorganic, n.o.s.*
3536	12FZ	Lithium batteries installed in cargo transport unit
3537	10L	Articles containing flammable gas, n.o.s.*
3538	2L	Articles containing non-flammable, non toxic gas, n.o.s.*
3539	2P	Articles containing toxic gas, n.o.s.*
3540	3L	Articles containing flammable liquid, n.o.s.*
3541	3L	Articles containing flammable solid, n.o.s.*
3542	4L	Articles containing a substance liable to spontaneous combustion, n.o.s.*
3543	4W	Articles containing a substance which emits flammable gas in contact with water, n.o.s.*
3544	5L	Articles containing oxidizing substance, n.o.s.*
3545	5L	Articles containing organic peroxide, n.o.s.*
3546	6L	Articles containing toxic substance, n.o.s.*
3547	8L	Articles containing corrosive substance, n.o.s.*
3548	9L	Articles containing miscellaneous dangerous goods, n.o.s.*

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Agenda Item 5: Harmonization of *Guidance Material for the Dangerous Goods Panel (DGP) to Aid in the Preparation of the Technical Instructions and Supporting Documents* with revised dangerous goods provisions

5.1 GUIDANCE MATERIAL FOR THE DANGEROUS GOODS PANEL (DGP) TO AID IN THE PREPARATION OF THE TECHNICAL INSTRUCTIONS AND SUPPORTING DOCUMENTS (DGP/26-IP/7)

2.1.1.1 Guidance material to aid in the preparation of the Technical Instructions and supporting documents had been developed by the DGP but had not been updated in some time. The guidance document contained general principles used in developing the dangerous goods documents and guidance for deciding how to make changes to them.

2.1.1.2 The document was referred to when discussing an exception from the principles applied for accessibility requirements on cargo aircraft only. It was agreed that an explanation should be added to the DGP guidance document (see paragraph 2.7.2 under Agenda Item 2 of this report).

2.1.1.3 The meeting agreed that a complete review of the document was necessary. A working group met to compare the document against the current provisions. Their work would continue through correspondence. The document would be published on the ICAO dangerous goods public website. It was agreed that maintaining this document should become a standing practice of the panel.

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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:

6.1: Aviation security/dangerous goods coordination *(Job card DGP.001.01)*

6.1.1 REPORT OF THE SECOND MEETING OF THE CARGO SAFETY GROUP (CSG) (DGP/26-IP/1)

6.1.1.1 The Secretary presented the report of the Second Meeting of the Cargo Safety Group (CSG/2). The CSG had been established to address the potential safety impact from security measures that had been implemented by various Member States prohibiting the carriage of certain portable electronic devices (PEDs) in aircraft cabins on flights over certain routes. The group was composed of experts in the fields of flight operations, dangerous goods, airworthiness, aerodromes, safety management, security and facilitation.

6.1.1.2 An introductory meeting of the CSG was held from 1 to 2 June 2017 to establish terms of reference and a work programme. The second meeting of the CSG met in Paris, France from 19 to 21 July 2017. CSG/2 was tasked with evaluating existing aircraft capabilities, identifying the safety hazards posed by the carriage of PEDs in checked baggage and assessing the associated safety risks. The meeting was provided with conclusions drawn by the Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA) on the likelihood of a fire event in the cargo compartment of a passenger aircraft should all large PEDs be placed there and test results from the FAA conducted to assess the potential hazards from the carriage of laptop computers and other large PEDs in thermal runaway in checked baggage. Among its conclusions were:

a) there would be a potential ten-fold increase in the risk of cargo fires if PEDs were relocated from the cabin to aircraft cargo compartments. This was based on two separate data analyses of available reports by the U.S. Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA) following a review of aircraft designs and fire occurrences;

b) PEDs should not be permitted in checked baggage in the aircraft cargo hold on the basis that this would result in an unacceptable increase of fire risk for one single cause and that the resulting fire may not be controlled. The group recognized that additional mitigation measures could be taken by operators if the transport of PEDs were directly under their control;

c) combining PEDs with other dangerous goods could result in an explosion before halon could be sufficiently discharged if in a Class C compartment, and no protection would be provided in a Class D compartment for a similar event; and

d) more comprehensive data was required in order to reassess cargo fire probability.

6.1.1.3 CSG/2 developed nine recommendations, the first five of which were addressed to the DGP:

a) that the DGP should amend the Technical Instructions so that PEDs may only be transported in carry-on baggage unless with the approval of the operator;

b) that the DGP review the items permitted to be carried by passengers in checked baggage and to establish if certain combinations should be forbidden;

c) that the DGP together with the battery manufacturing industry develop a clear definition of what was meant by PEDs;

d) that the AIRP, FLTOPSP and DGP review the issue of operators placing charged PEDs in the cabin for passenger use, utilizing the provisions of the Technical Instructions rather than seeking airworthiness certification approval;

e) that the battery manufacturing industry continue its research into lithium battery hazards and for this information to be provided to the AIRP and DGP;

f) that ICCAIA be asked to provide the assumptions used by aircraft manufacturers when calculating a fire probability of 1E-7 per flight hour and that this be provided to the AIRP;

g) that ICCAIA and the International Air Transport Association (IATA) be asked to provide data on the number of aircraft with Class D cargo compartments, and that States be asked to provide data on the number of such aircraft registered in their States and that this be provided to the AIRP;

h) that ICCAIA, IATA and States be asked to provide: i) data on the number of PEDs being transported; and ii) information on all accidents and incidents involving PEDs; and that this be provided to the SMP, DGP, AIRP and FLTOPSP-CSSG; and

i) that members of the SMP join CSSG so that appropriate expertise is provided to that group when developing guidance on risk assessments when transporting items in the aircraft hold.

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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:

6.2: Dangerous goods accident and incident reporting system *(Job card DGP.002.01)*

6.2.1 REPORT OF THE WORKING GROUP ON REPORTING (DGP/26-IP/6)

6.2.1.1 Work on the development of a dangerous goods incident reporting system began, at the request of the Air Navigation Commission (ANC), following the Twenty-Third Meeting of the DGP and the First DGP Working Group of the Whole on Lithium Batteries Meeting (Montréal, 6 to 10 February 2012). The lithium battery working group had recommended that incidents involving lithium batteries be reported to ICAO for publishing on a publicly-accessible website. It was recognized that such information could be used as a tool 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 incidents and specified during its review of the DGP/25 Report that the system should be a management-oriented tool to identify gaps in regulations.

6.2.1.1.1 The DGP established a DGP Working Group on Reporting (DGP-WG/Reporting) to progress the work. DGP-WG/Reporting recognized the vast amount of data that could potentially be collected from a global reporting system, the need for extensive analysis to generate useful information to identify potential dangerous goods-related safety issues, and the substantial resources that would be needed to do so and questioned whether development of an effective global system was feasible. The group concluded that the best approach would be to focus on developing provisions and supporting guidance material that would enable development of effective systems within each State and adding a requirement for States to report to ICAO whenever they identified through their data analysis systems dangerous goods-related safety issues which may have an impact on global safety.

6.2.1.1.2 DGP-WG/Reporting developed amendments to Annex 18 to support this goal while aligning with Annex 19 — *Safety Management* and with Annex 13 — *Aircraft Accident and Incident Investigation.* It also developed consequential amendments to the Technical Instructions. Terminology for reporting and compliance provisions were aligned with existing provisions in Annex 19, Chapter 5 by adding references to Annex 19 instead of repeating provisions already required by that Annex. Annex 19 provisions were repeated in cases where further clarity was needed or where entities other than operators needed to be addressed. The group concluded that this approach would strengthen the link between dangerous goods and safety management oversight responsibilities.

6.2.1.2 DGP-WG/Reporting developed initial draft guidance material on dangerous goods reporting and dangerous goods investigations. A conclusion as to where the guidance material should be located had not yet been reached. Including it as an attachment to Annex 18 or as a chapter in the Supplement to the Technical Instructions would be considered, noting that a high degree of visibility to entities other than State authorities would need to be taken into account for some of the guidance material.

6.2.1.3 DGP-WG/Reporting would continue refining the amendments to Annex 18 and completing the guidance material over the next biennium with the goal of presenting a finalized package to the twenty-seventh meeting of the DGP.

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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: Mitigating risks posed by the carriage of lithium batteries by air *(Job card DGP.003.01)*

6.3.1 NUMBER OF SPARE LITHIUM BATTERIES PACKED WITH EQUIPMENT (DGP/26-WP/22)

6.3.1.1 An amendment to the packing instructions for lithium ion and lithium metal batteries packed with equipment (Packing Instructions 966 and 969) was proposed to clarify the intent of the limit applied to the number of spare batteries permitted in a package. A similar amendment was proposed at DGP-WG/17, and, although the working group agreed that the intent of the provision was to allow for two sets of spares, the proposed wording remained ambiguous (see paragraph 3.5.3.8 of the DGP-WG/17 Report contained in DGP/26-WP/3). The amendment proposed to DGP/26 attempted to remove any ambiguity by referring specifically to "two spare sets" of cells or batteries and defined what was meant by a set.

6.3.1.2 It was noted that Packing Instructions 966 and 969 placed limits on the mass but not the energy density of the batteries or cells. There were concerns raised with the potential for a two-fold increase in energy density in the package that this provision legally allowed. There were known cases of shippers using this provision to get around the prohibition on the transport of lithium batteries by air. Although the concerns were noted, this was considered a separate issue to the one the amendment addressed. The amendment did not introduce any new provisions, it simply clarified what was already permitted.

6.3.1.3 The amendment was agreed, subject to the replacement of "appropriate number" with "the number required".

6.3.2 CLARIFICATION OF INFORMATION TO PILOT-IN-COMMAND (DGP/26-WP/23)

6.3.2.1 Part 7;4.1.3 allowed for a more condensed version of dangerous goods information required to be provided to the pilot-in-command for UN 3090 — **Lithium metal batteries** and UN 3480 — **Lithium ion batteries.** It was suggested that the aerodrome where the package(s) were intended to be unloaded should be included in this condensed version. An amendment to Part 7;4.1.3 was agreed.

6.3.3 APPLICABILITY OF SECTION IA (DGP/26-WP/28) AND CHOOSING BETWEEN LITHIUM BATTERIES SECTION IA AND IB (DGP/26-WP/29)

6.3.3.1 Whether or not the introductory text of Packing Instructions 965 and 968 for Section IA could be interpreted to mean that shippers would not be permitted to package their cells or batteries in accordance with the requirements of Section IA if the Watt hour rating or lithium metal content did not exceed the limits established for that section had been discussed at DGP-WG/16 (see paragraph 3.5.3.12

of the DGP-WG/16 Report contained in DGP/26-WP/2) and DGP-WG/17 (see paragraph 3.5.3.3 of the DGP-WG/17 Report contained in DGP/26-WP/3). The working groups agreed that it was not the intent to preclude anyone from applying more stringent requirements and that an anomaly had inadvertently been introduced that should be clarified in order to remove any ambiguity. Amendments were proposed, but an agreement on the wording used could not be agreed.

6.3.3.2 Revised amendments were considered at DGP/26, but each of them introduced other anomalies.

6.3.4 **POWER BANKS (DGP/26-WP/45)**

6.3.4.1 DGP-WG/17 had recommended an amendment to the passenger provisions prohibiting spare batteries and power banks from being recharged or from being electrically connected or providing power to an external device. The need for the amendment was prompted by a number of reported incidents involving power banks in the cabin, and the fact that manufacturing and use of them was on the rise (see paragraph 3.5.3.7 of the DGP-WG/17 Report contained in DGP/26-WP/3). DGP-WG/17 believed the amendment provided safety enhancements which justified incorporation in the 2017-2018 Edition of the Technical Instructions by way of an addendum. The Air Navigation Commission considered the working group's recommendation and, although a number of questions on the availability of data and interpretation of the proposed provisions were raised, agreed to recommend it to the Council. Subsequent to the Commission's but prior to the Council's review, consequential difficulties for some operators should the amendment be adopted were reported. These operators were using power banks as a secondary or emergency power supply for electronic flight bags (EFBs) and other devices used during flight through the use of the operator exception in Part 1;2.2.1 d). It was assumed that because this exception required the batteries to meet the provisions of the entry for PEDs in Table 8-1, the operator would no longer be permitted to use the power banks during flight should the amendment be adopted. The ANC decided that the amendment should be withdrawn to allow time for the panel to re-consider how best to address the risks posed.

6.3.4.2 Some panel members had questioned, during the discussion at DGP-WG/17, whether referring to passenger provisions in the operator exceptions or even including operator exceptions in the Technical Instructions at all was appropriate. The ANC asked the panel to take this into account when considering how to address the risks posed by power banks. The Cargo Safety Group, tasked with addressing the safety impact of requiring PEDs to be carried in checked baggage, recommended that the Airworthiness Panel (AIRP), Flight Operations Panel (FLTOPSP) and the DGP take this into account and also whether the exceptions should be considered during airworthiness certification approval (see paragraph 6.1.1 of this report).

6.3.4.3 Based on the above, the DGP agreed that a working group should be established to consider how best to mitigate the risks posed, taking into account feedback provided by the ANC, and to consider whether the Technical Instructions was the most appropriate place for the current exceptions for the operator contained in Part 1;2.2. It recommended that a job card on the subject be submitted to the ANC for approval (see paragraph 6.3.12 of this report).

6.3.5 REQUIREMENTS FOR LUGGAGE WITH INSTALLED POWER BANKS (DGP/26-WP/33)

6.3.5.1.1 New types of luggage known as "smart luggage" were on the market with high-tech features such as location tracking, battery charging and digital weighing designed to make travel easier. Lithium batteries, USB ports, power banks, GPS and other technology were integrated in the luggage. It was suggested that passengers carrying such luggage would need to comply with the provisions for portable electronic devices in Table 8-1 (Item 20). However, there were concerns that luggage containing power banks would be checked in, despite the fact that the Technical Instructions required articles whose primary purpose was to provide power to another device to be carried as spare batteries and would therefore be restricted to the cabin. An amendment to the provisions for PEDs was therefore proposed requiring power banks to be removed from baggage intended to be checked and carried in the cabin in accordance with the provisions for spare batteries. To ensure this was feasible, the amendment included recommendations for the luggage to be designed in a manner to allow the user to remove the power bank and for the power bank to be marked with the Watt-hour rating.

6.3.5.1.2 A revised amendment was agreed, subject to it being reflected in the restructured Part 8 of the Instructions (see paragraph 2.8.2 under Agenda Item 2 of this report).

6.3.6 PORTABLE ELECTRONIC DEVICES CARRIED BY PASSENGERS AND CREW (DGP/26 WP/43), TRANSPORT OF PEDS BY PASSENGERS AND CREW (DGP/26-WP/37), RISKS POSED BY COMBINATIONS OF PERMITTED DANGEROUS GOODS CONTAINED IN CHECKED BAGGAGE (DGP/26-WP/38) AND DEFINITION FOR PORTABLE ELECTRONIC DEVICES (DGP/26-WP/46)

6.3.6.1 The Fire Safety Branch at the Federal Aviation Administration (FAA) William J. Hughes Technical Center (FAA Technical Center) conducted testing to assess the potential hazards from the carriage of laptop computers and other large PEDs in thermal runaway in checked baggage. The need for testing was prompted by concerns that the security measures established in March 2017 prohibiting the carriage of large PEDs in the cabin (see paragraph 6.1.1 of this report) would have a consequential impact on safety because of the unexpected increase in the number of lithium battery-powered PEDs in the cargo compartment that would result. An assessment of the risk needed to be done.

6.3.6.2 There was a lack of data regarding the likelihood of a PED entering thermal runaway in a cargo compartment and a lack of specific data regarding the number of large PEDs that passengers were carrying in checked baggage, although it was believed that most passengers carried PEDs in the cabin. It was noted that the Cargo Safety Group had recommended that ICAO collect data from States and international organizations, but until the appropriate data was collected, an accurate analysis would be impossible to do. There was also little research data available on the behaviour, effects and risks associated with PEDs being placed in checked baggage. The FAA Technical Center was able to gather research data in this regard.

6.3.6.3 Ten tests were conducted. For each test, a fully charged laptop computer was placed in a suitcase and a heater was placed against a lithium ion cell in the battery of the laptop to force it into thermal runaway. The suitcases were filled with other articles but no other dangerous goods for five of the

tests. In all but one of those tests, the fire was contained and it eventually self-extinguished. In that one test, the fire burned out of the suitcase and fully consumed it. For the five remaining tests, other dangerous goods permitted to be carried by passengers and crew were added to the suitcase with the laptop. One of those five tests involved an aerosol can. Within 40 seconds after thermal runaway was initiated, a rapidly growing fire and an explosion of the can occurred. It was concluded that the fire suppression system could not dispense the Halon quickly enough to reach a sufficient concentration to suppress the fire and prevent the explosion. Of the remaining four tests, all but one resulted in the can or bottle containing the dangerous goods bursting leading to a large fire. The conclusion was that large PEDs in checked baggage mixed with an aerosol could produce an explosion and fire that the aircraft cargo fire suppression system in Class C cargo compartments may not be able to safely manage and that the risk in cargo compartments that did not provide the same level of protection as Class C would be even greater.

6.3.6.4 The results of the tests conducted by the FAA Technical Center were provided to the Cargo Safety Group (CSG, see paragraph 6.1.1 of this report). The CSG, at its second meeting (CSG/2, Paris, 19 to 21 July 2017) reviewed these results and developed a recommendation for the DGP to amend the Technical Instructions to restrict PEDs to carry-on baggage unless the operator approved carriage in checked baggage. CSG/2 had also recommended that the DGP, together with the battery industry, develop a clear definition of what was meant by a PED. This would allow for consistency when conducting safety risk assessments and implementing mitigating measures. The Secretary noted that the CSG/2 Report had been reviewed by the ANC but had yet to be reviewed by the Council. Both bodies agreed that, for the sake of efficiency, the panel should be tasked with addressing the recommendations ahead of the Council's review. The Secretary also noted that the ANC concluded that the panel should be asked to *evaluate* the need and feasibility of forbidding PEDSs in checked baggage instead of focusing on amending the Technical Instructions and that this had been supported by the Council.

6.3.6.5 A separate proposal was presented to the panel restricting large PEDs containing lithium metal or lithium ion cells or batteries to carry-on baggage, unless approval was granted by the operator for a passenger to carry them in checked baggage. The amendment defined large PEDs as a laptop, tablet or similar device that was larger than a cell phone or smart phone. Although there was a lack of data to accurately assess the likelihood of a thermal runaway event involving PEDs in checked baggage, it was suggested the potential for this to lead to a catastrophic event could not be ignored. Alternative mitigating measures were considered, but it was concluded that the only feasible measure would be to require large PEDs to be carried in the cabin.

6.3.6.6 The majority of panel members did not consider the proposals mature enough to adopt. They believed further analysis was needed with respect to the likelihood of an event occurring in the cargo compartment and questioned whether the conclusions remained valid, since the security measures that had prompted the need for analysis were no longer in place. They also questioned the feasibility of implementing a prohibition on PEDs from checked baggage and managing approvals to carry them in checked baggage. Other members believed the potential for a catastrophic event, even if the likelihood was remote, necessitated immediate action. They also believed the fact that the CSG developed its recommendations through consensus meant action needed to be taken. They recognized that there were operational difficulties that would need to be overcome, but believed this could be achieved with additional guidance. There was equally no consensus on whether or not there was a need to clearly define PEDs. Some believed a definition was irrelevant as it was the hazards from the batteries that was the concern. Others believed it was necessary for statistical purposes and to ensure a common understanding by regulators, industry, passengers and crew.

6.3.6.7 Recognizing that the Council would be reviewing the CSG/2 Report in the near future, it was decided to wait for guidance from the Council on the way forward. If the Council decided that action needed to be taken before the next biennium, the Secretary suggested that terms of reference for a working group could be developed at that time.

6.3.6.8 Despite the lack consensus on whether or not to restrict PEDs to the cabin, there was no disagreement that measures should be taken to communicate the risk and to recommend simple ways to mitigate it. Some panel members reported that they had already taken measures to inform operators and to encourage passengers to carry their PEDs in the cabin, to remove the batteries before placing the PED in baggage intended to be checked, or to ensure that PEDs were not packed near aerosols.

6.3.6.9 An itemized list of operational arguments against restricting large PEDS to carry-on baggage, a list of operational difficulties that would hinder effective implementation of a prohibition, and a list of arguments supporting a prohibition are provided in Appendix C to the report on this agenda item.

6.3.7 ACCIDENTAL ACTIVATION OF E-CIGARETTES CARRIED BY PASSENGERS AND CREW (DGP/26-WP/42)

6.3.7.1 Provisions prohibiting passengers and crew from carrying battery-powered portable electronic smoking devices in checked baggage and from recharging the devices in the cabin and requiring spare batteries to be protected from short circuit had been incorporated in the 2015-2016 Edition of the Technical Instructions by way of an addendum. The need for the addendum was prompted by safety concerns after several incidents had been reported involving e-cigarettes overheating as a result of their heating element being accidentally activated resulting in a fire in checked baggage. Despite the extra safety measures introduced, incidents involving heat, smoke and fire from the e-cigarettes were still occurring with one State reporting ten documented incidents since they became applicable. Accidental activation of the e-cigarette devices was suspected in all incidents. It was noted that once activated, the power from the battery was capable of energizing a heating coil which, if energized for longer than a few seconds, causes the device to overheat, smoke and potentially catch fire and potentially drive the battery, normally lithium ion, into thermal runaway. An amendment to the passenger provisions was therefore proposed requiring passengers or crew to take effective measures for preventing accidental activation of the heating element while on board the aircraft.

6.3.7.2 The amendment was agreed, subject to some editorial amendments and it being reflected in the restructured Part 8 of the Instructions (see paragraph 2.8.2 under Agenda Item 2 of this report).

6.3.8 APPROVALS FOR LITHIUM BATTERIES ON PASSENGER AIRCRAFT (DGP/26-WP/44)

6.3.8.1 UN 3090 **— Lithium metal batteries** and UN 3480 **— Lithium ion batteries** had been forbidden for transport as cargo on passenger aircraft since 1 January 2015 and 1 April 2016 respectively. Special Provision A201 was assigned to both entries allowing States concerned to grant an exemption from the prohibition in accordance with Part 1;1.1.3 and requiring authorities to advise ICAO when issuing them. Guidance for processing such exemptions was provided in Part S-1;4 of the Supplement.

6.3.8.2 Difficulties in transporting certain lithium batteries in a timely manner when transport by cargo aircraft was not an option had been raised. It was suggested that methods of transporting these batteries safely had been established and that approval by States other than the State of Origin and State of the Operator was not necessary. An amendment to Special Provision A201 was therefore proposed allowing for the transport of either lithium ion or lithium metal batteries on passenger aircraft with the approval of the States of Origin and the Operator in quantities not exceeding those permitted in accordance with Section II of Packing Instruction 965 or 968. A new special provision assigned to UN 3090 and UN 3480 was also proposed for inclusion in the Supplement to the Technical Instructions which included control measures for achieving a level of safety equivalent to that provided by the Technical Instructions. The measures were aimed at mitigating the consequences of a lithium battery failure within the package so as to prevent uncontrolled fire and pressure pulses that could compromise the cargo fire suppression system. It was noted that many of the principles being used by the SAE lithium battery committee (see paragraph 7.4 under Agenda Item 7 of this report) were used in the development of the proposed new special provision.

6.3.8.3 Several panel members noted that transporting lithium batteries on passenger aircraft was virtually impossible to do because of difficulties in obtaining exemptions from all States concerned, particularly from the States of overflight, and that guidance to States that would allow for an approval process was badly needed. The Secretary noted that there had been no notifications to ICAO from States issuing exemptions in accordance with Special Provision A201 and questioned whether this might be an indication that there was no need. It was suggested that the reason there had been no notifications was because seeking them was considered a futile effort, and shippers were finding other ways to transport batteries on passenger aircraft, not always legally. Allowing transport through an approval process would provide a legal mechanism to transport them safely.

6.3.8.4 A number of revisions to the original proposal were made in response to concerns raised:

a) An approval from the authority of the State of Destination would be required in addition to the States of Origin and Operator. There were cases where the State of Origin and of the Operator was the same. Requiring the State of Destination would ensure that at least two States would be involved.

b) Reference to the cells or batteries being assigned to Class 9 was added to make it clear that exceptions from full regulation were not permitted;

c) Requirements for the dangerous goods transport document were added to Special Provision A201;

d) The new special provision included in the Supplement limited its use to instances where other forms of transport were impractical. The limitation was added to Special Provision A201 in the Technical Instructions as it was intended as a mandatory requirement and shippers needed to be aware of it before seeking an approval from States;

e) Performance criteria for an external fire test contained in the new special provision in the Supplement were revised to require any hazardous effects caused by thermal runaway to be contained within the package instead of requiring that thermal runaway not be initiated.

6.3.8.5 The amendment, as revised, was agreed.

6.3.9 SPECIAL PROVISION A154 (DGP/26-WP/47)

6.3.9.1 It was noted that Special Provision A154, which was assigned to all lithium battery entries in Table 3-1, was not aligned with the corresponding special provision in the UN Model Regulations (SP 376) and it was suggested that the Technical Instructions were less restrictive. Both special provisions prohibited damaged or defective batteries from transport. However, the Model Regulations provided guidance on how to determine this and included cells or batteries that could not be diagnosed as damaged or defective prior to transport. The Technical Instructions referred to batteries identified by the manufacturer as being defective for safety reasons and provided those being returned to the manufacturer for safety reasons as the only example. It was suggested that providing this one example could lead to the interpretation that the special provision only applied to batteries identified by the manufacturer as being defective. An amendment aligning Special Provision A154 with SP 376 of the UN Model Regulations was therefore proposed.

6.3.9.2 It was reported that the provisions in the UN Recommendations had caused confusion and efforts were underway to clarify their intent. It was suggested that the amendments proposed to the Technical Instructions were premature. However, it was agreed that the gap that made the Technical Instructions potentially less restrictive needed to be addressed. A revised proposal which maintained existing Special Provision A154 while including a reference to cells or batteries that could not be diagnosed as damaged or defective prior to transport was agreed.

6.3.10 NEW DANGEROUS GOODS LIST ENTRY FOR "LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT" (UN 3536) (DGP/26-WP/48)

6.3.10.1 DGP-WG/17 had considered the new entry that the UN Sub-Committee had added to the dangerous goods list for UN 3536 — **Lithium batteries installed in cargo transport unit**. These cargo transport units were very large and could have significant quantities of powerful batteries installed. While it was not believed that there would be any need to transport these by air on a regular basis, it was suggested there might be a need to transport them on an exceptional basis. It was therefore recommended that they be forbidden for transport by air under normal circumstances but that a special provision be developed so as to allow their transport under certain conditions with the approval of the State of Origin and the State of the Operator.

6.3.10.2 Proposed guidance material was considered by DGP/26 for inclusion in the Supplement to the Technical Instructions through a new special provision. A new special provision for inclusion in the Technical Instructions was also proposed which limited consideration of an approval to lithium ion or lithium metal batteries installed in a cargo transport unit for the sole purpose of providing external power and required the batteries to have been subject to the requirements of Part 2;9.3.1.

6.3.10.3 The material proposed for the Supplement was based on text in the UN special provision assigned to UN 3536 (SP 389) and an additional provision limiting the lithium ion batteries to a state of charge of not more than 30 per cent was added. It was noted that in some cases, such as natural disasters, it would be impossible to charge the units upon arrival. Provision for an approval to transport at a higher

state of charge was therefore provided. A recommendation for installed fire extinguishing systems to remain activated during transport was also included.

6.3.10.4 It was noted during discussion that the UN entry included lithium metal batteries and questioned whether this was necessary. A reduced state of charge for lithium ion batteries was seen to be a significant benefit to safety, but this was not relevant for lithium metal batteries. A representative of the battery industry reported that a reduced state of charge may be relevant for some lithium metal batteries, as there was a movement towards rechargeable lithium metal batteries. However, the batteries installed in cargo transport units at that time were lithium ion, so it would be acceptable to restrict the provisions to lithium ion.

6.3.10.5 There were arguments for and against establishing a 30 percent state of charge limit. Some believed that this should be left up to the authorities issuing the approvals, recognizing that arriving at the destination at a higher states of charge would sometimes be necessary. Others cautioned that a 30 per cent state of charge may not be safe for all batteries and that only the manufacturer would know the state at which there would be no propagation.

6.3.10.6 The proposed new special provision included a recommendation for the fire extinguishing system that may be installed in the cargo transport unit to remain active during transport. It was suggested that this should be a requirement, although concerns of a potential negative interaction between an active system and the certified systems of the aircraft were raised.

6.3.10.7 A revised proposal was presented which removed reference to lithium metal batteries, limited the state of charge to the lowest state practicable without exceeding 30 per cent of the battery's rated capacity, and, if fire extinguishers were installed in the cargo transport unit, required them to remain activated during transport.

6.3.10.8 While some members supported the proposal, others believed the risks to air transport had not been fully identified. The material was based on what was provided in the UN Recommendations, but there were potential risks which would not have been a factor for surface transport that needed to be taken into account for air transport. These included the effects of depressurization on the container's installed fire suppression system and the interaction of the container systems with the aircraft systems, such as those necessary for smoke detection and fire suppression. It would be difficult to fully understand the risks without having representative information on the fire suppression systems. Under certain circumstances, the use of the fire suppression system could lead to an even worse outcome at the aircraft level. It was suggested that guidance to States needed to be performance based and would be dependent on input from AIRP and FLTOPSP.

6.3.10.9 While there was sympathy for these concerns, members who supported the proposal noted that it was for these reasons that they were recommending a prohibition unless approval to transport on cargo aircraft was granted from the relevant States. These members considered the guidance material to be a baseline from which the State of the Operator and the State of Origin could determine safe methods of transport. They did not think it necessary to consult with the AIRP or FLTOPSP, as they believed it would be up to the States to consider the areas of expertise needed when considering the issuance of approvals.

6.3.10.10 On the basis that there was no consensus, the amendment was withdrawn. It was agreed to forbid UN 3536 — **Lithium batteries installed in cargo transport unit** on aircraft unless an

exemption was granted by the States of Origin, Operator, Transit, Overflight and Destination in accordance with Part 1;1.1.3 of the Technical Instructions.

6.3.11 **1.2 M DROP TEST FOR LITHIUM BATTERY PACKAGES (DGP/26-WP/51)**

6.3.11.1 Amendments to Section II of Packing Instructions 966 — **Lithium ion batteries packed with equipment** and 969 — **Lithium metal batteries packed with equipment** were proposed to clarify that a retail package may be subjected to the 1.2 m drop test requirement. It was noted that some shippers subjected retail packages to the drop test, applied the applicable markings and labels to them, then placed them in an overpack. Others treated the retail packages as inner packaging and placed them in outer packaging and subjected the complete package to the drop test. The panel was invited to consider whether both scenarios provided the same level of safety and if so, to agree to an amendment to clarify this.

6.3.11.2 The amendment was not supported. Panel members did not believe the proposed text was necessary as the scenarios described were already covered by the Technical Instructions. “Retail” packaging was an undefined term, and referring to it would only add confusion.

6.3.12 **RECOMMENDATIONS**

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

Recommendation 6/1 —Carriage of dangerous goods by passengers, crew, and the operator

That the provisions for passenger and crew to carry dangerous goods on aircraft be reviewed with the aim of:

a) ensuring that measures to mitigate risks posed are effective and can be feasibly implemented by operators, passengers and crew taking into account specific risks posed by portable electronic devices being used during flight; and

b) evaluating the relationship between the exceptions for dangerous goods of the operator and the provisions for passengers and crew to avoid misinterpretation and unintended consequences

as described in the draft job card contained in Appendix C to the report on this agenda item.

Recommendation 6/2 — Amendment to lithium battery provisions for incorporation in the 2019-2020 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 the Appendix A to the report on this agenda item.

Recommendation 6/3 — Amendment to lithium battery provisions for incorporation in the 2019-2020 Edition of the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU)

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

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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:
6.4: Scope of Annex 18 *(Job card DGP.004.01)*}

6.4.1 DRAFT AMENDMENTS TO ANNEX 18 (DGP/26-WP/10) AND RISKS POSED BY UNDECLARED DANGEROUS GOODS — PROPOSED AMENDMENT TO ANNEX 18 (DGP/26-WP/41)

6.4.1.1 Proposal

6.4.1.1.1 An amendment to Chapter 10 of Annex 18 was proposed with the intent of ensuring that the requirement for the establishment of training programmes applied to entities who were not included within the scope of Annex 18 and who were not intending to handle dangerous goods (e.g. freight forwarders handling general cargo). It was originally discussed at DGP-WG/17. A majority of panel members had strongly supported the amendment at that meeting, and an almost equal number did not.

6.4.1.2 Background

6.4.1.2.1 The amendment was developed in follow-up to discussions on whether or not States had oversight authority over entities not intending to handle dangerous goods by air (see paragraph 1.2 of the DGP/25 Report, paragraph 3.2.1.6 of the DGP-WG/17 report, and paragraph 2.1.4.5 under Agenda Item 2 of this report). The amendment was meant to address all entities handling cargo, but the focus of discussions had been freight forwarders. Although the existing training provisions in the Technical Instructions required training for freight forwarders processing and handling general cargo through the application of Tables 1-4 and 1-5, some panel members had not interpreted these provisions to be mandatory since the tables were intended as guidance. These members did not have oversight authority over entities not performing any functions described in the Technical Instructions. The ICAO Legal Bureau's position at DGP/25 was that training for freight forwarders not handling dangerous goods was recommended but not mandated through Annex 18 (see paragraph 1.2 of the DGP/25 Report).

6.4.1.2.2 The Legal Bureau was consulted once again for advice with respect to the feasibility of implementing the amendment proposed at DGP-WG/17, and their position remained unchanged. A letter had been sent to States after DGP/25 requesting specific information related to the extent of oversight authority over freight forwarders. Thirty-six of the sixty-one States who responded indicated that the civil aviation administration (CAA) had oversight authority of freight forwarders handling cargo other than dangerous goods within their State, and twenty-six reported that training programmes of such entities were subject to approval by the CAA.

6.4.1.3 Arguments supporting the amendment

6.4.1.3.1 Those in support of the amendment were encouraged that there was State oversight of freight forwarders in the majority of States who responded to the survey. They did not see any reason not to adopt it, as they did not consider there to be any new responsibilities introduced. Training for freight forwarders and other entities handling general cargo had been consciously introduced into the 2005-2006 Edition of the Technical Instructions with the recognition that they played a key role in preventing undeclared dangerous goods from entering the cargo stream. An amendment to the Annex would make

States' oversight responsibilities with respect to this clear. Members who supported the amendment believed a major threat to flight safety would be introduced if training were not mandated. They did not see the inability of some States to implement the amendment as justification for not recommending it if the majority of States could. They were not convinced that all States stating they did not have oversight authority was an indication that it was not legally feasible. The amendment would oblige States to comply, and any State which could not comply would be required to file a difference to Annex 18.

6.4.1.4 **Arguments against the amendment**

6.4.1.4.1 Those who opposed the amendment maintained that requiring the establishment of dangerous goods training programmes for entities not involved with dangerous goods was beyond the scope of Annex 18, and doing so was not legally feasible within their States. They acknowledged that a majority of panel members had agreed to introduce mandatory requirements in the Technical Instructions in 2003, but States had never been consulted on this. They believed that the number of States who responded to the survey that did not have oversight authority over freight forwarders was an indication that the Annex amendment could not be implemented globally. States not able to comply would be required to file differences, which might result in impediments to transport between certain States. These members supported training, but they believed there were other methods to achieve the objective that could be implemented globally. It was suggested that a more realistic approach would be for the operator to only accept cargo from freight forwarders who were trained, something which would need to be considered as part of their safety management responsibilities. The Secretary noted how the relationship among operators, freight forwarders and shippers was a key part of the secure supply chain. She suggested that an operator not knowing who they were doing business with or not implementing additional measures to mitigate risks when they did not deviated from this principle. Others commented that the secure supply change was specific to security and that cargo was often consolidated several times, making it impossible for the operator to trace multiple freight forwarders throughout the supply chain.

6.4.1.5 **Alternate proposal**

6.4.1.5.1 Members had suggested that not requiring training would result in a major threat to flight safety. Those not in support suggested that the threat would not be eliminated if mitigating measures could not be implemented. An alternate proposal was presented in an effort to achieve consensus and to provide a solution that could be implemented globally. The proposal was based on the concept that entities who performed functions described in the Technical Instructions were required to have been trained regardless of whether they were knowingly or unknowingly doing so. It included an amendment to the general applicability and training provisions of Annex 18 specifying that compliance with the Technical Instructions was required by anyone performing dangerous goods functions, whether knowingly or unknowingly, and that this included training. This approach provided oversight authorities the ability to investigate reports of undeclared dangerous goods being offered by any entity. It would make it clear that entities who introduced dangerous goods into air transport, whether knowingly or unknowingly, were required to have been trained. Some members reported that the approach would not be legally feasible in their States. They questioned how a person would know they needed to be trained for something they did not know they were doing. It was noted that the same argument could be made for mandating dangerous goods training in Annex 18 for entities who didn't know they were performing dangerous goods functions. The goal of the proposal was to provide a more performance-based approach to achieving the same objective so that States could determine a system that was feasible within their legal system. The majority of panel members, however, could not support any approach that did not explicitly mandate training for all entities. The amendment was not agreed.

6.4.1.6 **Additional amendments**

6.4.1.6.1 Despite the differences of opinion among panel members on what was legally possible, all agreed that the risk of undeclared dangerous goods entering the air transport stream needed to be mitigated. Yet the only provisions in Annex 18 related to undeclared dangerous goods were for States to establish procedures for investigating and compiling information concerning instances of undeclared or misdeclared dangerous goods in cargo. There were no direct requirements for States to ensure measures were in place to mitigate against this risk. Stating what safety risks needed to be addressed was key to determining what mitigating measures needed to be implemented. A separate amendment to Annex 18 was therefore proposed requiring that States implement measures aimed at preventing undeclared dangerous goods from entering the air transport stream and to ensure operators established procedures for preventing undeclared dangerous goods from entering the air transport stream. The amendment addressed undeclared dangerous goods introduced as cargo and dangerous goods carried by passengers and crew. The provisions were intended as high-level requirements so as to allow States and operators the flexibility to determine which measures would effectively mitigate the risks according to their risk profile and within their regulatory and operational environments.

6.4.1.6.2 There was support to this amendment in principle, although some members did not believe it was necessary. Some believed the need to mitigate risks posed by undeclared dangerous goods was clear through the dangerous goods reporting provisions. Others thought it necessary to explicitly set out the intent of the provisions, and the proposed amendment did that. There was a concern that the amendment placed too much responsibility on the operator, as the wording implied that an operator was required to prevent undeclared dangerous goods from being transported, but a revision to the wording alleviated these concerns. The amendment was agreed, with the recognition that States would need guidance. A working group would be established to develop the material.

6.4.1.7 **Conclusion**

6.4.1.7.1 A consensus on the amendment to the training provisions in Chapter 10 could not be achieved. A decision was made during discussions on the new training provisions in the Technical Instructions through a show of hands (see paragraph 2.1.4.6 under Agenda Item 2 of this report). A majority supported a mandatory requirement, although several members did not.

6.4.2 **RECOMMENDATIONS**

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

RSPP	**Recommendation 6/4 — Amendment to the training and compliance provisions in Annex 18** That comments from States be sought on a proposed amendment to Annex 18 related to training and compliance as presented in the appendix to the report on Agenda Item 1.

— — — — — — — —

Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:
6.5: Clarifying State oversight responsibilities in Annex 18 *(Job card DGP.005.01)*}

6.5.1 ESTABLISHMENT OF A WORKING GROUP ON CLARIFYING STATE OVERSIGHT RESPONSIBILITIES IN ANNEX 18

6.5.1.1 The DGP Working Group on Reporting (see paragraph 6.2.1 under Agenda Item 6 of this report) had determined that that there was a need to enhance the provisions in Annex 18 so as to more clearly outline States' responsibilities with respect to the safe transport of dangerous goods by air. The ANC had approved Job card DGP.005.01 with the initial task of identifying interdependencies between Annex 18 and other Annexes.

6.5.2 A working group was established and met during the meeting. It developed a high-level plan for completion of the work. The work would be carried out through monthly virtual meetings with the goal of presenting a finalized package to the twenty-seventh meeting of the DGP.

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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

. . .

Chapter 1

GENERAL

. . .

Chapter 3

SPECIAL PROVISIONS

. . .

Table 3-2. Special provisions

TIs	*UN*	

. . .

DGP/26 (see paragraph 6.3.9 of this report)

A154	Lithium batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons or cells or batteries that cannot be diagnosed as damaged or defective prior to transport).

. . .

DGP/26 (see paragraph 6.3.8 of this report)

A201	~~States concerned may grant an exemption from the prohibition to transport lithium metal or lithium ion batteries on passenger aircraft in accordance with Part 1;1.1.3.~~ In instances where other forms of transport (including cargo aircraft) is impracticable, lithium cells or batteries may be transported as Class 9 (UN 3480 or UN 3090) on passenger aircraft with the prior approval of the authority of the State of Origin, the State of the Operator and the State of Destination under the written conditions established by those authorities, provided that the following types and quantities are met: a) quantities of lithium metal cells or batteries (UN 3090) are limited to the allowance permitted in Table 968-II of Packing Instruction 968; and b) quantities of lithium ion cells or batteries (UN 3480) are limited to the allowance permitted in Table 965-II of Packing Instruction 965. When States, other than the State of Origin, the State of the Operator or State of Destination have notified ICAO that they require prior approval of shipments made under this special provision, approval must also be obtained from these States, as appropriate. The requirements of Part 5 for Class 9 (UN 3090 or UN 3480) lithium metal and lithium ion batteries apply. A copy of the document of approval including the quantity limitations must accompany the consignment. Transport in accordance with this special provision must be noted on the dangerous goods transport document. If transport in accordance with this special provision is not possible, States concerned may grant an exemption from the prohibition to transport lithium metal or lithium ion batteries on passenger aircraft in accordance with Part 1;1.1.3. Authorities issuing exemptions or approvals in accordance with this special provision must provide a copy to the Chief of the Cargo Safety Section within three months via email at CSS@icao.int, via facsimile at +1 514-954-6077 or via post to the following address:

TIs UN

Chief, Cargo Safety Section
International Civil Aviation Organization
999 Robert-Bourassa Boulevard
Montréal, Quebec
CANADA H3C 5H7

Note.— Guidance for the processing of exemptions or approvals from the prohibition to transport lithium batteries may be found in Part S-1;4 and Table S-3-1, Special Provision A334 of the Supplement to the Technical Instructions.

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Part 4

PACKING INSTRUCTIONS

. . .

Chapter 3

CLASS 1 — EXPLOSIVES

. . .

Packing Instruction 965

Cargo aircraft only for UN 3480

1. **Introduction**

This entry applies to lithium ion or lithium polymer batteries. This packing instruction is structured as follows:

— Section IA applies to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
— Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and
— Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.

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.

Packing Instruction 965

IA.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**	Forbidden	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.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Lithium ion cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
— 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)

Packing Instruction 965

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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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	Forbidden	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.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically 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 marked with the appropriate lithium battery mark (Figure 5-3) in addition to the appropriate Class 9 hazard label (Figure 5-26) and the cargo aircraft only label (Figure 5-28).

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

IB.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 965

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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	*Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh*	*Lithium ion cells with a Watt-hour rating more than 2.7 Wh, but not more than 20 Wh*	*Lithium ion batteries with a Watt-hour rating more than 2.7 Wh, but not more than 100 Wh*
1	*2*	*3*	*4*
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

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

Packing Instruction 965

II.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with other dangerous goods.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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 marked with the appropriate lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 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 mark, if the package dimensions are adequate.

~~Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.~~

— 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” — cargo aircraft only” or “lithium ion batteries, in compliance with Section II of PI965 — CAO” 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.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

Packing Instruction 965

II.4 **Overpacks**

Not more than one package prepared in accordance with this section may be placed into an overpack.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

Packages prepared in accordance with this section must not be placed into an overpack with packages containing substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When the package is placed in an overpack, the lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 5-28) required by this packing instruction must either be clearly visible or the mark and label must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

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

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.

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.

Packing Instruction 966

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

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.

DGP/26 (see paragraph 6.3.1 of report):

— The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.

— 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*
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other metal (1N2)	Steel (3A2)
Other metal (4N)	Plastics (1H2)	
Plastics (4H1, 4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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;

Packing Instruction 966

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 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).

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

II.2 **Additional requirements**

— Lithium ion cells and batteries must:
  — be placed in inner packagings that completely enclose the cell or battery, then placed in a strong 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.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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.

DGP/26 (see paragraph 6.3.1 of report):

— The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.
— 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 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.

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

— 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.
— 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

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

Packing Instruction 967

Passenger and cargo aircraft for UN 3481 (contained in equipment) only

1. **Introduction**

This entry applies to lithium ion or lithium polymer batteries contained in equipment.

Section I of this packing instruction applies to lithium ion and lithium polymer cells and batteries that are assigned to Class 9. Certain lithium ion and lithium polymer cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

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.

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**

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).

Packing Instruction 967

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**

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

— 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 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.
— Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

I.3 **Outer packagings**

DGP-WG/16 (see paragraph 3.5.3.1.3 of DGP/26-WP/2) (incorporated in the 2017-2018 Edition of the Technical Instructions through Addendum/Corrigendum No. 1) (Steel, although not included in of DGP/26-WP/2, was also added under "boxes"):

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

~~Strong outer packagings~~

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) ~~and~~, e) and g) 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

Packing Instruction 967

manufactured before 1 January 2009.

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport.

II.1 **General requirements**

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

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

II.2 **Additional requirements**

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- The equipment must be packed in strong 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 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.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~
- Where a consignment includes packages bearing the lithium battery 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.

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

Packing Instruction 968

Cargo aircraft only for UN 3090

1. **Introduction**

This entry applies to lithium metal or lithium alloy batteries. This packing instruction is structured as follows:

— Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
— Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
— Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

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

2. **Lithium batteries forbidden from transport**

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. **SECTION IA**

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

IA.1 **General requirements**

Part 4;1 requirements must be met.

Table 968-IA

UN number and proper shipping name	*Net quantity per package*	
	Passenger	*Cargo*
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.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Lithium metal cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
— 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	*Drums*	*Jerricans*
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)		

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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) and the following:

1) for lithium metal cells, the lithium content is not more than 1 g;
2) for lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g.

IB.1 **General requirements**

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

Table 968-IB

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

IB.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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 marked with the appropriate lithium battery mark (Figure 5-3) in addition to the appropriate Class 9 hazard label (Figure 5-26) and the cargo aircraft only label (Figure 5-28).

~~*Note. The provisions for a lithium battery handling label as contained in the 2015 2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015 2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

IB.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) and the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g.

II.1 **General requirements**

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

Table 968-II

Contents	*Lithium metal cells and/or batteries with a lithium content not more than 0.3 g*	*Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g*	*Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g*
1	*2*	*3*	*4*
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

II.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong rigid outer packaging.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

— Cells and batteries must not be packed in the same outer packaging with other dangerous goods.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically 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 marked with the appropriate lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 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 mark, if the package dimensions are adequate.

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

- 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.
- Packages and overpacks of lithium metal 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.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

Not more than one package prepared in accordance with this section may be placed into an overpack.

DGP-WG/17 (see paragraph 3.5.3.1 of DGP/26-WP/3):

Packages prepared in accordance with this section must not be placed into an overpack with packages containing substances and articles of Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When the package is placed in an overpack, the lithium battery mark (Figure 5-3) and the cargo aircraft only label (Figure 5-28) required by this packing instruction must either be clearly visible or the mark and label must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word “Overpack” in lettering of at least 12 mm high.

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

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.

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**

Part 4;1 requirements must be met.

UN number and proper shipping name		*Package quantity (Section I)*	
		Passenger	*Cargo*
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.

DGP/26 (see paragraph 6.3.1 of report):

- The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.

- 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

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

II. **SECTION II**

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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) ~~-~~ 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).

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

II.2 **Additional requirements**

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

— Lithium metal cells ~~or~~ 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.

UN Model Regulations, Chapter 3.3, Special Provision 188 (d) (see ST/SG/AC.10/44/Add.1)

— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material~~s~~ 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.

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DGP/26 (see paragraph 6.3.1 of this report):

- The number of cells or batteries in each package must not exceed the ~~appropriate~~ number required for the equipment's operation, plus two ~~spares~~ spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment.
- 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 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.

~~*Note.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

- 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.
- 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.

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

Packing Instruction 970

Passenger and cargo aircraft for UN 3091 (contained in equipment) only

1. **Introduction**

This entry applies to lithium metal or lithium alloy batteries contained in equipment.

Section I of this packing instruction applies to lithium metal and lithium alloy cells and batteries that are assigned to Class 9. Certain lithium metal and lithium alloy cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

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.

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.

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

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.

DGP-WG/16 (see paragraph 3.5.3.11 of DGP/26-WP/2):

— 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.
— The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

Packing Instruction 970

I.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II. **SECTION II**

Error discovered and corrected through Addendum/Corrigendum No. 1 to 2017-2018 Edition):

Lithium metal or lithium alloy cells and batteries contained ~~with~~ 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);

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2) (incorporated in 2017-2018 Edition through Addendum/Corrigendum No. 1):

— Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries);
— 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.

DGP/26 (see paragraph 2.4.1.2 d) of this report):

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), f) (if applicable) and g) 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**

DGP-WG/16 (see paragraph 3.5.3.10 of DGP/26-WP/2)

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).

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

II.2 **Additional requirements**

— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— Cells and batteries must be protected so as to prevent short circuits.
— The equipment must be packed in strong rigid outer packagings constructed of suitable material of adequate

Packing Instruction 970

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 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.— The provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions (Part 5;3.5.2 and Figure 5-32 of the 2015-2016 Edition) may continue to be used in lieu of the lithium battery mark until 31 December 2018.*~~

— Where a consignment includes packages bearing the lithium battery mark, the words "lithium metal batteries, in compliance with Section II of PI970" must be placed on the air waybill, when an air waybill is used.

— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 **Outer packagings**

Boxes	*Drums*	*Jerricans*
Aluminium	Aluminium	Aluminium
Fibreboard	Fibre	Plastics
Natural wood	Other metal	Steel
Other metal	Plastics	
Plastics	Plywood	
Plywood	Steel	
Reconstituted wood		
Steel		

II.4 **Overpacks**

UN Model Regulations, Chapter 3.3, Special Provision 188 f) (see ST/SG/AC.10/44/Add.1)

When packages are placed in an overpack, the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be ~~affixed~~ reproduced on the outside of the overpack and the overpack must be marked with the word "Overpack" in lettering of at least 12 mm high.

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Part 7

OPERATOR'S RESPONSIBILITIES

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Chapter 2

STORAGE AND LOADING

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2.2 INCOMPATIBLE DANGEROUS GOODS

2.2.1 Segregation

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DGP/26 (see paragraph 2.7.1.2 a) under Agenda Item 2 of this report):

2.2.1.2 Packages and overpacks containing lithium ion batteries prepared in accordance with Section IA or Section IB of Packing Instruction 965 and packages and overpacks containing lithium metal batteries prepared in accordance with Section IA or Section IB of Packing Instruction 968 must not be stowed on an aircraft next to, or in a position that would allow interaction with packages or overpacks containing dangerous goods which bear a Class 1, other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1 hazard label. To maintain acceptable segregation between packages and overpacks, the segregation requirements shown in Table 7-1 must be followed. The segregation requirements apply based on all hazard labels applied on the package or overpack, irrespective of whether the hazard is the primary or subsidiary hazard.

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DGP-WG/17 (see paragraphs 3.2.7.1 and 3.5.3.1 of DGP/26-WP/3):

Table 7-1. Segregation between packages

Hazard label	*Class or division*										
	1	*2.1*	*2.2, 2.3*	*3*	*4.1*	*4.2*	*4.3*	*5.1*	*5.2*	*8*	*9 see 2.2.1.2*
1	Note 1	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
2.1	Note 2	—	—	—	—	—	—	—	—	—	x
2.2, 2.3	Note 2	—	—	—	—	—	—	—	—	—	—
3	Note 2	—	—	—	—	—	—	x	—	—	x
4.1	Note 2	—	—	—	—	—	—	—	—	—	x
4.2	Note 2	—	—	—	—	—	—	x	—	—	—
4.3	Note 2	—	—	—	—	—	—	—	—	x	—
5.1	Note 2	—	—	x	—	x	—	—	—	—	x
5.2	Note 2	—	—	—	—	—	—	—	—	—	—
8	Note 2	—	—	—	—	—	x	—	—	—	—
9 see 2.2.1.2	Note 2	x	—	x	x	—	—	x	—	—	—

An “x” at the intersection of a row and column indicates that packages containing these classes of dangerous goods may not be stowed next to or in contact with each other, or in a position which would allow interaction in the event of leakage of the contents. Thus, a package containing Class 3 dangerous goods may not be stowed next to or in contact with a package containing Division 5.1 dangerous goods.

Note 1.— See 2.2.2.2 through ~~2.2.2.5~~2.2.2.4.

Note 2.— This class or division must not be stowed together with explosives other than those in Division 1.4, Compatibility Group S.

Note 3. — Packages containing dangerous goods with multiple hazards in the class or divisions which require segregation in accordance with Table 7-1 need not be segregated from other packages bearing the same UN number.

*Note 4. — UN 3528, **Engines, internal combustion, flammable liquid powered**, **Engines, fuel cell, flammable liquid powered**, **Machinery internal combustion, flammable liquid powered** and **Machinery, fuel cell, flammable liquid powered** need not be segregated from packages containing dangerous goods in Division 5.1.*

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Chapter 4

PROVISION OF INFORMATION

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4.1 INFORMATION TO THE PILOT-IN-COMMAND

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DGP/26 (see paragraph 6.3.2 of this report):

4.1.3 For UN 3480 (**Lithium ion batteries**) and UN 3090 (**Lithium metal batteries**), the information required by 4.1.1 may be replaced by the UN number, proper shipping name, class, total quantity at each specific loading location, the aerodrome at which the package(s) is to be unloaded and whether the package must be carried on cargo aircraft only. UN 3480 (**Lithium ion batteries**) and UN 3090 (**Lithium metal batteries**) carried under a State exemption must meet all of the requirements of 4.1.

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Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

Chapter 1

PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

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

Table 8-1 was restructured under Agenda Item 2 of this report (see paragraph 2.8.2). Amendments to lithium battery provisions in Table 8-1 proposed below are incorporated in the new format

Replace Table 8-1 with the following:

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
Batteries				
1) Lithium batteries (including portable electronic devices)	Yes (except for g)	Yes	(see c) and d))	a) each 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; b) each battery must not exceed the following: — for lithium metal batteries, a lithium content of 2 grams; or — for lithium ion batteries, a Watt-hour rating of 100 Wh; c) each battery may exceed 100 Wh but not exceed 160 Wh Watt-hour rating for lithium ion with the approval of the operator; d) each battery may exceed 2 grams but not exceed 8 grams lithium content for lithium metal for portable medical electronic devices with the approval of the operator; e) batteries contained in portable electronic devices should be carried as carry-on baggage; however, if carried as checked baggage: — measures must be taken to prevent unintentional activation and to protect the devices from damage; and — the devices must be completely switched off (not in sleep or hibernation mode); f) batteries and heating elements must be isolated in portable electronic devices capable of generating extreme heat, which could cause a fire if activated, by removal of the heating element, battery or other components;

Dangerous Goods	*Location*		*Approval of the operator(s) is required*	*Restrictions*
	Checked baggage	*Carry-on baggage*		
				g) spare batteries, including power banks: — must be carried as carry-on baggage; and — 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); DGP/26 (see paragraph 6.3.5 of this report): h) baggage equipped with a lithium battery(ies) must be carried as carry-on baggage unless the battery(ies) is removed from the baggage, in which case the battery(ies) must be carried in accordance with g); i) no more than two spare batteries meeting the requirements of c) or d) may be carried per person.

. . .

3) Battery-powered portable electronic smoking devices (e.g. e-cigarettes, e-cigs, ecigars, e-pipes, personal vaporizers, electronic nicotine delivery systems)	No	Yes	No	a) if powered by lithium batteries, each battery must comply with restrictions of 1) a), b) and g); b) the devices and/or batteries must not be recharged on board the aircraft; and DGP/26 (see paragraph 6.3.7 of this report): c) measures must be taken to prevent unintentional activation of the heating element while on board the aircraft.

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Flame and fuel sources				
DGP-WG/17 (see paragraph 3.5.3.6 of DGP/26-W/3):				
5) Cigarette lighter Small packet of safety matches	No	(see b))	No	a) no more than one per person; b) must be carried on the person; c) must not contain unabsorbed liquid fuel (other than liquefied gas); and d) if cigarette lighter is powered by lithium batteries, each battery must comply with restrictions of 1) a), b) and g) and 3) b) and c).

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APPENDIX B

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

Part S-1

GENERAL

(ADDITIONAL INFORMATION FOR PART 1 OF THE TECHNICAL INSTRUCTIONS)

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Chapter 4

GUIDANCE TO STATES ON THE TRANSPORT OF LITHIUM BATTERIES AS CARGO

4.1 INTRODUCTION

4.1.1 Lithium batteries have the potential to create thermal runaway, a chain reaction which leads to repeated self-heating and the release of a battery's stored energy. Once one battery experiences thermal runaway, it can generate enough heat to trigger thermal runaway in adjacent batteries. Thermal runaway can occur for a number of reasons, including poor cell design, cell manufacturing flaws and external abuse. It has been demonstrated through testing that thermal runaway can result in fire and/or explosion.

4.1.2 A prohibition on the transport of UN 3090 — **Lithium metal batteries** as cargo on passenger aircraft was introduced into the 2015-2016 Edition of the Technical Instructions with the knowledge that aircraft cargo fire protection systems could not control a lithium metal fire. More recent test results demonstrate that a fire involving high-density packages of UN 3480 — **Lithium ion batteries** may exceed the capability of aircraft cargo fire protection systems. High-density packages of lithium ion batteries may consist of any number of batteries or cells having the potential to overwhelm cargo compartment fire protection features. The potential is dependent on a number of variables including the battery or cell chemistry, size, design type, quantities and the cargo compartment configuration. The inability to determine an absolute safe quantity limit for lithium ion batteries and the absence of a packaging standard to mitigate the risks has led to the decision to introduce a prohibition on the transport of UN 3480 — **Lithium ion batteries** as cargo on passenger aircraft.

4.1.3 Development of a performance-based packaging standard for lithium ion batteries is currently under way. It is anticipated that once this standard is completed and any additional controls necessary to mitigate risks are established, an amendment to the Technical Instructions will be made to allow for their transport as cargo on passenger aircraft.

DGP/26 (see paragraph 6.3.8 of this report)

4.1.4 At a minimum, the following criteria should be identified as part of a safety risk assessment when considering whether or not to grant an approval or an exemption to transport UN 3480 — **Lithium ion batteries** or UN 3090 — **Lithium metal batteries** as cargo on passenger aircraft under Special Provision A201:

a) capabilities of the operator;

b) overall capability of the aircraft and its systems;

c) packing and packaging;

d) quantity of batteries and cells;

e) containment characteristics of unit load devices;

f) specific hazards and safety risks associated with each battery and cell type to be carried alone or in combination; and

g) chemical composition of the batteries and cells.

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Part S-3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND QUANTITY LIMITATIONS

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Chapter 4

SUPPLEMENTARY DANGEROUS GOODS LIST

Classes 3 to 9

Table S-3-1. Supplementary Dangerous Goods List (Classes 3 to 9)

DGP/26 (see paragraph 6.3.8 of this report)

Name	*UN No.*	*Class or division*	*Subsidiary hazard*	*Labels*	*State variations*	*Special provisions*	*UN packing group*	*Excepted quantity*	*Passenger aircraft*		*Cargo aircraft*	
									Packing instruction	*Max. net quantity per package*	*Packing instruction*	*Max. net quantity per package*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
. . .												
Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium batteries	US 3	A88 A99 A154 A164 A183 A201 A206 A331 A334		E0	FORBIDDEN		See 965	
Lithium metal batteries (including lithium alloy batteries) †	3090	9		Miscellaneous — Lithium batteries	US 2 US 3	A88 A99 A154 A164 A183 A201 A206 A334		E0	FORBIDDEN		See 965	
. . .												

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Chapter 6

SPECIAL PROVISIONS

Against the entries in the Supplementary Dangerous Goods List (Table S-3-1), column 7 shows any special provisions that are applicable. Where these special provisions have not been listed in Table 3-2 of the Technical Instructions, they are listed in Table S-3-4 below.

Table S-3-4. Special Provisions

Supplementary special provisions

DGP/26 (see paragraph 6.3.8 of this report)	
A334	a) In instances where other forms of transport (including cargo aircraft) is impracticable, lithium cells or batteries may be transported on passenger aircraft with the prior approval of the authority of the State of Origin, the State of the Operator and the State of Destination under the written conditions established by those authorities, provided that the following types and quantities are met: 1) quantities of lithium metal cells or batteries (UN 3090) are limited to the allowance permitted in Table 968-II of Packing Instruction 968; and 2) quantities of lithium ion cells or batteries (UN 3480) are limited to the allowance permitted in Table 965-II of Packing Instruction 965. b) 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: 1) no amount of flame is allowed outside the package; 2) 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; 3) no fragments can exit the package and the package must maintain structural integrity; 4) 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; and 5) when the package or overpack is exposed to an external fire (e.g. five-minute oil burner flame penetration resistance test) or elevated temperature environment (e.g. oven thermal resistance test), any hazardous effects caused by thermal runaway of the lithium cell or battery must be contained within the package. Adequate information and documentation on the above criteria (b)1) through 5)) must be provided to the appropriate authority of the State issuing the approval upon request.

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APPENDIX C

DRAFT JOB CARD FOR BATTERIES AND ELECTRONIC DEVICES CARRIED BY PASSENGERS, CREW AND THE OPERATOR

Title	Lithium battery-powered portable electronic devices and spare lithium batteries carried and/or used by passengers and crew [and the operator]	Reference:	DGP.008.01
Source	DGP/26, ANC		
Problem Statement	Current measures to [mitigate the risks] posed by portable electronic devices and spare lithium batteries (including power banks) carried by passengers, crew [and the operator] may not be effective or feasible to implement		
Specific Details (including impact statements)	Measures to [mitigate against the risks] posed by lithium batteries carried and/or used by passengers and crew include requirements that may not be clear or realistic for operators and passengers to implement. These include: a) requirements for the batteries to have been tested in accordance with the UN *Manual of Tests and Criteria;* b) limits on the energy density (i.e. Watt hour rating for lithium ion and lithium content for lithium metal); c) requirements for batteries to be protected so as to prevent short circuits; d) lack of specification as to what is meant by operator approval; d) requirements for heating elements to be isolated in portable electronic devices capable of generating extreme heat; and e) requirements for the carriage of battery-powered mobility aids, which could conflict rights of passengers with restricted mobility . These measures also had an impact on the operator's use of electronic devices during flight, which are excepted from the Technical Instructions provided they comply with the provisions for passengers and crew to carry them. The ANC, during its review of a proposed amendment related to power banks which was later withdrawn because it conflicted with these operator exceptions, tasked the panel with: a) developing meaningful criteria that passengers and staff could realistically apply when carrying PEDs; a) clarifying language used with respect to exceptions for dangerous goods of the operator in Part 1;2.2 to avoid misinterpretation and unintended consequences; b) considering the effects of power bank provisions on operators providing them for use by passengers during flight; c) considering manufacturing requirements and the feasibility of requiring batteries carried by passengers or crew to be subject to UN testing requirements; and d) developing meaningful guidance for States, operational staff and passengers on criteria for carriage of devices on board an aircraft. The Commission further emphasized that the panel should consider that devices be: a) professionally manufactured, preferably indicating a trademark and model number; b) in good repair and free from damage; c) used in accordance with manufacturer's instructions when carried on the aircraft; d) switched off completely if carried but not in use (not hibernation); and		

	e) meaningfully labelled with information on watt and amp hours.	
Expected Benefit	Effective safety measures to mitigate against the risks posed by portable electronic devices spare and lithium batteries (including power banks) carried by passengers, crew and the operator which are realistic for operators and passengers to implement	
Reference Documents	DGP/26 Report (paragraphs 6.3.4, 2.8.3), ANC 205-3, 205-4, 205-5 Technical Instructions (Part 1;2.2 and Part 8)	Attachments
Primary Expert Group:	DGP, FLTOPSP, ARIP	

WPE No.	Document affected	Description of Amendment proposal or Action	Supporting Expert Group	Expected dates:		
				Expert Group	Effective	Applicability
	Technical Instructions	Amendment to passenger provisions	FLTOPSP			
	Technical Instructions	Amendment to exceptions for dangerous goods of the operator	AIRP			
	Annex 6?					
	Annex 8?					
	Annex 18?					
Initial Issue Date:		Date approved by ANC:	Session/Meeting:			

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APPENDIX D

RESTRICTIONS ON THE CARRIAGE OF LARGE PEDS BY PASSENGERS AND CREW

OPERATIONAL OBSTACLES AND/OR ARGUMENTS AGAINST PROHIBITING LARGE PEDS IN CHECKED BAGGAGE

— Probability of occurrence needs to be taken into account, no evidence of significant risk

— No indication of serious incidents involving PEDs in checked baggage

— Need more data on accidents and incidents before a decision can be reached

— Difficult if not impossible to obtain data that is valid and reliable within a short time frame

— Large batteries were specifically targeted for the security measures because of the potential for IEDs to be placed in large PEDs. Applying safety measures targeting large PEDs only is not rationale because smaller PEDs could contain higher density batteries

— “Large” PED open to interpretation

— Security measures requiring passengers to place PEDs in checked baggage was feasible. Requesting passengers to remove PEDs from checked to carry-on not always feasible

— No standard approach to ensuring compliance, so status quo would often be the case

— Proposed amendment refers to operator approval, but does not make it clear if this is a blanket approval for all passengers by a single operator or if it is on a per-passenger basis and what is expected of the operator? If a per-passenger basis, may be impossible for operators to deal with depending on the numbers seeking approval

— FAA testing targeted laptops. Any device that could go into thermal runaway has some fire potential. Laptops normally are carried in cabin, lots of others in checked (e.g. portable speakers, razers, power tools). Risk is battery, regardless of what it is contained in

— Passengers may intend to carry on then be asked to check in when arrive at gate

— Certain PEDs are forbidden in cabin for security risk (e.g. power tools)

— Some large lithium battery-powered equipment too large for cabin, e.g. drones, professional camera equipment

— Requiring a reduced state of charge should be considered

— Complications related to interlining

— Does not address risk operator staff putting baggage in cargo hold on cargo aircraft

— Definition for PED unnecessary, it’s defined in the Technical Instructions

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ARGUMENTS IN SUPPORT OF PROHIBITING LARGE PEDS IN CHECKED BAGGAGE

— Testing shows the potential for a catastrophic event, cannot maintain status quo

— Data that is available shows there is risk

— Safety risk probability may be remote, but the safety risk severity may be catastrophic

— Safety management principles require action be taken

— Operational difficulties can be overcome through guidance (including emergency response procedures and capabilities in the cabin)

— CSG recommendation was reached through consensus, need to take action, address operational issues

— Number of incidents is under reported

— Simple ban on PEDs in checked baggage is easy to understand. Already a recommendation. Other methods are more complicated making non-compliance more likely

— “Small” PEDs can contain higher density batteries, but difficult for passengers to understand. There is generally a correlation between size and risk. Establishing a size such as larger than a smart phone is easy for passengers to understand, can be realistically implemented.

— Cargo Safety Group recommended that a definition for PEDs be developed. This could address concerns related to battery size and energy density

— Should not maintain status quo based on an assumption that passengers carry laptops in the cabin, need to consider all possibilities

— Technical requirements such as reduced state of charge cannot be realistically implemented

— Action needs to be taken even if not a prohibition from checked baggage. Informing States/operators/passengers of risk and guidance on how it can be mitigated

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Agenda Item 7: Other business

7.1 APPROVAL OF WORKING GROUP REPORTS (DGP/26-WP/2 AND DGP/26-WP/3)

7.1.1 The meeting reviewed the narrative parts of the reports of the meetings of the 2016 and 2017 DGP Working Group Meetings, DGP-WG/16 (Montréal, 17 to 21 October 2016) and DGP-WG/17 (Montréal, 24 to 28 April 2017). The narratives were approved without comment. The amendments proposed by the working groups were reviewed under DGP/25-WPs/10 (see Report on Agenda Item 1), 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 CONCERNS RAISED BY MEMBERS WITH RESPECT TO THE NEED FOR CONSENSUS

7.2.1 A question was posed to the Secretary with respect to the need for consensus. While recognizing that consensus should be the goal for broader issues, the DGP was a technical panel which involved discussions on very detailed provisions in the Technical Instructions. Some of these details were often minor but necessary technical issues. There was concern that if the need for consensus was strictly adhered to, there would be a reduction in efficiency. It was suggested that the panel had used the "voting" approach for decisions in the past without any detrimental effects. It was questioned whether strict adherence to the need for consensus was what was expected by the ANC.

7.2.2 The Secretary acknowledged that achieving consensus was often difficult and agreed that "voting" on minor technical issues was acceptable, preferably if a clear majority was achieved. She noted that the ANC's emphasis on the need for consensus had grown after DGP/25 when decisions related to lithium batteries were reached without consensus. The ANC had accepted the panel's recommendation not to prohibit the transport of lithium ion batteries on passenger aircraft but later had to rescind its decision based on feedback from other panels which had reached consensus.

7.2.3 The ANC had stressed that safe and stable provisions were dependent on all concerns being addressed. The Secretary referred to the panel making decisions through a "vote" as an approach to solving a problem. She suggested that the panel needed to become more accustomed to considering modified or alternate approaches to reach a greater consensus. She noted that the issue of consensus could be raised during the debriefing that would be given to the ANC towards the end of the panel meeting.

7.3 PRESENTATIONS

7.3.1 Flight Operations Panel (FLTOPSP) Cargo Safety Sub-Group (CSSG)

7.3.1.1 The Secretary of the Flight Operations Panel (FLTOPSP) Cargo Safety Sub-Group (CSSG) briefed the panel on the status of ANC Job Card FLTOPSP.043.01 — Mitigating risks posed by the carriage of cargo by air. The CSSG had been tasked with developing provisions and guidance material for operators to conduct safety risk assessments on the carriage of cargo by air. The group was comprised of eighteen members from FLTOPSP, DGP, and the Airworthiness Panel (AIRP). The group has worked

through correspondence and regularly-scheduled virtual meetings. Its focus had been the development of high-level Standards for safety risk assessments provisions for the carriage of cargo for inclusion in Annex 6 and had recently begun developing the supporting guidance material. The target applicability date was November 2020.

7.3.2 **AIRP/DGP-related job cards**

7.3.2.1 The Secretary of AIRP briefed the panel on the status of ANC Job Cards AIRP.011.01 — Cargo compartment fire suppression provisions and AIRP.012.01 — Control of electromagnetic radiation risks posed by the carriage of battery-powered devices in baggage, cargo and mail that are active when inside the aircraft cargo compartment. She noted that the fifth meeting of the Airworthiness Panel (AIRP/5) would convene from 6 to 10 November 2017.

ANC Job Card AIRP.011.01 — Cargo compartment fire suppression provisions

7.3.2.2 Discussions related to lithium batteries had prompted the need to consider the capabilities of cargo compartment fire suppression systems as they related to dangerous goods. Annex 8 — *Airworthiness of Aircraft* required the effects of an explosive or incendiary device or dangerous goods to be taken into account in the design of cargo compartment fire suppression systems in large aeroplanes. Upon further review, AIRP agreed that this Standard was impossible to fully comply with since there were many unknown variables during the aircraft design phase which could not be quantified. Current design codes had clearly addressed the threat from a well-defined explosive or incendiary device but did not explicitly consider the threat from dangerous goods as cargo. AIRP concluded that a multidisciplinary approach involving airworthiness, flight operations and dangerous goods experts was needed to identify limitations between minimum performance design standards, operations, and risks posed by dangerous goods.

AIRP.012.01 — Control of electromagnetic radiation risks posed by the carriage of battery-powered devices in baggage, cargo and mail that are active when inside the aircraft cargo compartment.

7.3.2.3 A member of the DGP had prompted the need to analyse the control of potential electromagnetic interference with aircraft systems from electronic devices attached to or contained in cargo and unit load devices (see paragraph 2.8.1.2 under Agenda Item 2 of this report). The carriage and use of portable electronic devices (PED) on board aircraft during flight by passengers had been well addressed by regulatory authorities and through comprehensive guidance provided by ICAO through the *Guidelines for the Expanded Use of Portable Electronic Devices* (Cir. 340, AN/198). However, the significant increase in the number of PEDs contained in or attached to items of cargo as well as attached to aircraft unit load devices (ULD) resulted in the need to analyse the control of such interference risks and to develop provisions where necessary.

7.3.2.4 Work on the AIRP/DGP-related job cards would begin AIRP/5 which would convene from 6 to 10 November 2017. The Secretariat would inform the DGP of the outcome.

7.4 STATUS OF SAE G-27 LITHIUM BATTERY PACKAGING PERFORMANCE COMMITTEE

7.4.1 The co-chairman of the SAE G-27 Lithium Battery Packaging Performance Committee presented an update on the status of the standard. A fourth draft standard would be reviewed at a face-to-face meeting of the G-27 committee from 13 to 17 November 2017. A final version of the standard was expected to be completed by the end of 2017 and the formal approval process (balloting) was expected to begin in 2018. The panel was provided with an overview of the content of the draft standard. The draft did not address the threat of an external fire on packages of lithium batteries. A sub-group had been established to consider the threat. There were mixed views on both the full G27 and the sub-group as to whether or not the threat needed to be taken into account. One view was that the package standard provided additional protection and the likelihood of lithium batteries being involved in an external fire was so low, it did not need to be taken into account. The other view was that safety management principles with respect to aviation required hazards to be mitigated if the outcome of an event could be catastrophic, even if the probability of occurrence was remote. A report from the external fire group would be presented to the full G27 Committee. The Committee would be asked to consider including performance requirements within the standard or creating a separate document.

7.4.2 Coordinating with several different stakeholders and achieving consensus within a large group was a difficult process. An optimistic timeline was completion of the standard during the second quarter of 2018.

7.5 PRELIMINARY TESTING TO SAE G-27 PACKAGING STANDARD

7.5.1 A representative of PRBA – The Rechargeable Battery Association presented the meeting with an overview of preliminary testing conducted in accordance with the G-27 packaging standard. He provided an overview of packaging developments.

7.6 SAFE TRANSPORT OF PEDS ON PASSENGER AIRCRAFT

7.6.1 A representative from the Fire Safety Branch of the Federal Aviation Administration provided a summary of findings from previous tests conducted on portable electronic devices powered by lithium batteries in baggage. These tests were described during discussion on a proposal to prohibit large PEDs from checked baggage (see paragraph 6.3.6 under Agenda Item 6 of this report).

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