



International Civil Aviation Organization

DANGEROUS GOODS PANEL (DGP)

TWENTY-NINTH MEETING

Montréal, 13 – 17 November 2023

REPORT FOLDER

The material in this report has not been considered by the Air Navigation Commission. The views expressed therein should be taken as advice of a panel of experts to the Air Navigation Commission but not as representing the views of the Organization. After the Air Navigation Commission has reviewed this report, a supplement setting forth the action taken by the Air Navigation Commission thereon will be issued to this report.

**TWENTY-NINTH MEETING OF THE
DANGEROUS GOODS PANEL (DGP) (2023)**

LETTER OF TRANSMITTAL

To: President, Air Navigation Commission

From: Chairperson, Dangerous Goods Panel (DGP) (2023)

I have the honour to submit the report of the twenty-ninth meeting of the Dangerous Goods Panel (DGP) which was held in Montréal, from 13 to 17 November 2023.



Teun Muller
Chairperson

Montréal, 17 November 2023

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DANGEROUS GOODS PANEL (DGP)**TWENTY-NINTH MEETING****Montréal, 13 to 17 November 2023****HISTORY OF THE MEETING****1. DURATION**

1.1 The twenty-ninth meeting of the Dangerous Goods Panel (DGP) was opened by Mr. Junrong Liang, First Vice-President of the Air Navigation Commission in Montréal, at 1000 hours on 13 November 2023. The meeting ended on 17 November 2023.

2. ATTENDANCE

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

Members	Advisers	Nominated By
S. Bitossi		Australia
L. Cascardo		Brazil
D. Sylvestre	D. Bolton	Canada
P. Guo	Q. Yang L.A. Yiu Wing	China
P. Tatin	T. Chrupek	France
S. Weizenhoefer		Germany
A. Oheneba-Asare		Ghana
P. Privitera	C. Carboni	Italy
T. Tabata	Y. Funai Y. Hara K. Nakano T. Okamoto A. Uchizawa	Japan
T. Muller	E. Boon R. Dardenne T. Groffen H. Strijbosch K. Vermeersch	Netherlands

E. Gillett	M. Cowlshaw W. Herath	Qatar
S. Kang		Republic of Korea
M. A. de Castro		Spain
G. Kiliç		Turkey
H. Almheiri	K. Al Hosani M. Ebrahim T. Howard A. Wagih	United Arab Emirates
M. Ranito		United Kingdom
D. Pfund	M. Givens K. Ranck K. Leary	United States
D. Brennan	P. Jala	International Air Transport Association (IATA)
D. Ferguson		International Coordinating Council of Aerospace Industries Associations (ICCAIA)
S. Schwartz	M. Phaneuf D. Schlichting	International Federation of Air Line Pilots' Associations (IFALPA)
Advisers		
A. Altemos G. Leach		Dangerous Goods Advisory Council (DGAC)
Observers		
J. Wiren Bengtsson		Denmark
S. Hakola		Finland
D. Kanlybayev T. Orimbekov		Kazakhstan
I. Alsayer		Saudi Arabia
L. Calleja Barcena		European Aviation Safety Agency (EASA)
A. McCulloch T. Rogers		Global Express Association (GEA)
E. Remy C. Litus-Koza		North Atlantic Treaty Organization (NATO)

3. OFFICERS AND SECRETARIAT

3.1 Mr. Teun Muller (Netherlands) was elected Chairman of the meeting and Mr. Leonardo Cascardo (Brazil) was elected Vice-Chairperson.

3.2 The Secretary of the meeting was Ms. Lynn McGuigan, Technical Officer, Cargo Safety Section, who was assisted by Mr. Virgilio Alegría, Associate Technical Officer 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 4 May 2023.

- Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods (*Ref: REC-A-DGS-2025*)
- 1.1: Develop proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*
 - 1.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition
 - 1.3: Develop proposals, if necessary, for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2025-2026 Edition
- Agenda Item 2: Managing air-specific safety risks and identifying anomalies (*Ref: REC A DGS 2025*)
- 2.1: Develop proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air*
 - 2.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition
 - 2.3: Develop proposals, if necessary, for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2025-2026 Edition
 - 2.4: Development of proposals, if necessary, for amendments to the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) for incorporation in the 2025-2026 Edition
- Agenda Item 3: Facilitating safe transport of dangerous goods by air (*Ref: REC-A-DGS-2025*)
- Agenda Item 4: Managing safety risks posed by the carriage of lithium batteries by air (*Ref: Job Card DGP.003.04*)

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- Agenda Item 5: Clarifying State oversight responsibilities in Annex 18 (*Ref: Job Card DGP.005.04*)
- Agenda Item 6: Dangerous goods provisions to support RPAS operations (*Ref: Job Card DGP.007.01*)
- Agenda Item 7: Review of Annex 6 provisions having an impact on dangerous goods (REC-A-DGS-2025)
- Agenda Item 8: Aviation Security/Dangerous Goods Coordination (REC-A-DGS-2025)
- Agenda Item 9: Coordination with other panels
 9.1: Flight Operations Panels (FLTOPSP)
 9.2: Airworthiness Panel (AIRP)
 9.3: Safety Management Panel (SMP)
 9.4: Remotely Piloted Aircraft Systems Panel (RPASP)
 9.5: Any other panels
- Agenda Item 10: 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 11: 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 narrative part of the report was issued in Arabic, Chinese, English, French, Russian and Spanish. Amendments to *Technical Instructions for the Safe Transport of Dangerous Goods by Air* and its *Supplement* (Doc 9284SU) were issued in Chinese, English, French, Russian and Spanish.

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

6.1 Good morning, ladies and gentlemen. I am Junrong Liang, the First Vice-President of the Air Navigation Commission. It is my pleasure to welcome you to Montréal and to ICAO Headquarters for this the twenty-ninth meeting of the Dangerous Goods Panel.

6.2 The last Dangerous Goods Panel meeting was held virtually on account of the COVID 19 pandemic in November 2021. We are so pleased to have you back at Headquarters while also grateful for the efforts you took to successfully progress your work at DGP/28 virtually. The Commission reviewed the DGP/28 report and recommended that the Council approve your proposed amendments to the

Technical Instructions and its Supplement. They were incorporated in the 2023-2024 Editions of the documents. The Council also approved an addendum to the 2023-2024 Edition of the Technical Instructions in March of this year, based on your recommendation to permit passengers and crew to carry active devices powered by small lithium batteries in checked baggage. Thank you for your dedicated efforts to ensure the Technical Instructions provide a mechanism for dangerous goods to be transported by air safely while taking real-world practicalities into account.

6.3 The Commission has approved a number of changes in membership to the DGP since the twenty-eighth meeting, including the addition of five new members:

- Ms. Natalia Jimena Luro, nominated by Argentina;
- Mrs. Alice Oheneba-Asare, nominated by Ghana;
- Mr. Neeraj Kumar, nominated by India;
- Dr. Göğem Kiliç, nominated by Turkey; and
- Most recently, Mr Jim Finlayson, nominated by New Zealand.

The Commission also approved nominations to replace outgoing members Mr. Masaomi Araya, Ms. Jacky Hanafin, Mrs. Cara Ruzicka (who replaced Ms. Hanafin) and Ms. Sarah Cumberbirch. They have been replaced by Mr. Tsutomu Tabata nominated by Japan, Mr. Mario Ranito nominated by the United Kingdom and Mr. Daniel Sylvestre nominated by Canada. The membership changes result in the panel being composed of twenty-five members nominated by twenty-two States and three international organizations.

6.4 I am sure the point I am about to make has been made by every Air Navigation Commission president at the opening of your panel meetings. It is an important one that bears repeating. Please remember that you are participating in your personal, expert capacity and not acting as representatives of your nominators. Members should therefore express their professional opinions and not established policies or points of view of a State or an international organization. I've quoted this directly from the Directives for Panels of the Air Navigation Commission. All members should have been provided a copy of this document when their membership was approved. It is an important document that should be read from time to time to refresh your knowledge on the broad directives and guidance established for the conduct of panel business. The Secretariat can arrange to provide you with a copy if you no longer have it.

6.5 The Commission is very grateful for the contributions of each of the outgoing members and welcomes the new members. The work of all members is highly appreciated, but I would particularly like to thank the leaders of each your specialized working groups. A special thank you to Mr. Hamad Almheiri and Mr. Ahmed Wagih for leading the work on clarifying State's responsibilities in Annex 18; Mr. Duane Pfund and Mr. Kevin Leary for leading the work on the lithium battery safety risk assessment; and Mr. Dave Brennan for leading the work on harmonizing the Technical Instructions and associated dangerous goods documents with the UN Model Regulations. I trust that your work will greatly facilitate the panel's deliberations this week. The Commission looks forward to hearing the panel's recommendations on these issues. A special thank you also to Mr. Teun Muller, who was elected as your chairman at DGP/28. I know he has played an important role in ensuring the DGP deliberates all discussion points in an orderly and thorough manner with the aim of achieving consensus agreements. The Commission is confident that you will maintain the high standards you have shown at previous meetings.

6.6 I would also like to mention the second panel chair round table that took place on 1 September of this year. The meeting discussed panel working methods, strategy, and thematic topics. A small informal group of the Air Navigation Commission has analysed the outcome of the meeting and proposed actions to address issues related to the panel report, job card approval, and inter-panel coordination. The Commission has agreed to integrate the relevant items in the future work of its Working Group of the Whole for Procedural Matters. The Commission also sees the need to improve engagement between the Global Air Navigation Plan Study Group and other panels. Should you require any assistance in your work, I trust your chairman will not hesitate to call upon the Secretariat or myself.

6.7 The Commissioners and I look forward to listening to you on your achievements in a debriefing at the end of your panel meeting.

6.8 With that, it remains for me to declare open the twenty-ninth meeting of the Dangerous Goods Panel and to wish you every success in your work and a pleasant stay in Montréal.

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- Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods (Ref: REC-A-DGS-2025)**
- 1.1: Develop proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air***

The panel did not identify any amendments to Annex 18 necessary to maintain alignment with the UN Recommendations on the Transport of Dangerous Goods.

- Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods (Ref: REC-A-DGS-2025)**
- 1.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition**

1.2.1 DRAFT AMENDMENTS TO THE TECHNICAL INSTRUCTIONS TO ALIGN WITH THE UN RECOMMENDATIONS

Background

The meeting reviewed amendments to 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 eleventh session (Geneva, 9 December 2022). The amendments were developed by the DGP Working Group on UN Harmonization (DGP-WG/UN Harmonization) and initially reviewed at the Dangerous Goods Panel Working Group Meeting in 2023 (DGP-WG/23, 15 to 19 May 2023, Rio de Janeiro, Brazil) (see paragraph 4.1.2.1 of the DGP-WG/23 Report). DGP-WG/UN Harmonization continued its review after DGP-WG/23 and recommended additional revisions. These are described in the report of the DGP/29 discussions below.

1.2.1.1 Part 1 (DGP/29-WP/11)

1.2.1.1.1 The amendments to Part 1 presented to DGP-WG/23 were agreed, subject to an editorial amendment that removed redundant text in a new exception for data loggers and cargo tracking devices in Part 1;1.1.5.1 i).

1.2.1.2 Part 2 (DGP/29-WP/12 and Addendum to DGP/29-WP/12)

1.2.1.2.1 The amendments to Part 2 presented to DGP-WG/23 were agreed, subject to:

- a) Notes clarifying the intent of “make available the test summary” under 2;2.9.3 g) for lithium ion batteries and 2;2.9.4 for sodium ion batteries were simplified by removing superfluous references to “for lithium cells or batteries or equipment with installed lithium cells or batteries” and “sodium ion cells or batteries or equipment with installed sodium ion cells or batteries”.
- b) The existing note under 2;9.3 a) for lithium batteries clarifying that batteries must meet the testing requirements from Part III, subsection 38.3 of the *UN Manual of Tests and Criteria* even if the cells which they are composed have passed the test was copied under the new provisions for sodium ion batteries in 2;9.4 a).
- c) correction of typographic errors in Table 2-7 to ensure alignment with UN Model Regulations;
- d) the addition of a footnote under the indicative examples of infectious substances included in Category A stating that Monkeypox virus was renamed “Mpox” by the

World Health Organization (WHO). There was some discussion on whether this was necessary, given that the 23rd revised edition of the UN Model Regulations referred only to Monkeypox. The panel ultimately concluded that adding a reference to Mpox was helpful as the term would become more predominantly used and would not have any negative effective given that it was synonymous to Monkeypox.

1.2.1.3 Part 3 (DGP/29-WP/13 and Addendum to DGP/29-WP/13)

1.2.1.3.1 The amendments to Part 3 presented to DGP-WG/23 were agreed, subject to the incorporation of the following additional amendments:

- a) Revisions to remove inconsistencies with respect to references to “lithium ion”, “lithium metal”, “sodium ion” and “batteries or cells”;
- b) Revision to Special Provision A214 to add a missing reference to a proper shipping name for UN 3171.
- c) DGP-WG/23 had discussed potential issues related to a new special provision added to the 23rd revised edition of the UN Model Regulations (SP400) that was assigned to UN 3551 — **Sodium ion batteries**, UN 3552 — **Sodium ion batteries contained in equipment** and UN 3552 — **Sodium ion batteries packed with equipment**. The provision made sodium ion cells and batteries not subject to regulation provided certain criteria were met. One of the criteria was a requirement for the cell or battery to be short-circuited in a way that there was no electrical energy contained in the cell or battery. DGP-WG/23 raised the following issues:
 - 1) The implication that the risk was low enough to make these batteries not subject to regulation appeared to contradict the need for the other conditions in the special provision, including the application of the lithium battery mark. The application of the lithium battery mark could lead to disruptions in the acceptance process, which negated the intent of the special provision. The Secretariat submitted a working paper to the Sixty-third session of the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods (subsequently referred to, for the sake of brevity, as the UN Sub-Committee) (Geneva, 27 November to 6 December 2023) proposing to remove the requirement for the mark in SP 400; and
 - 2) The special provision limited the type and quantity of dangerous goods contained in each cell, including those that are a component of a battery, to those permitted to be transported in accordance with the limited quantity provisions, including the quantity limitations established in the dangerous goods list. DGP-WG/23 questioned how anyone other than the cell manufacturer would know the types and quantities of dangerous goods contained in the cell. It would be challenging to implement quantity limitations based on the limited quantity provisions, as they were lower for the air mode than for other modes of transport.

The panel agreed that the special provision should not be included in the Technical Instructions. It concluded that a conservative approach was the best way forward, at least until more experience was gained and more data was collected. Relief from regulation could be considered in the future should the issues identified be addressed.

1.2.1.4 Part 4 (DGP/29-WP/14 and Addendum to DGP/29-WP/14)

1.2.1.4.1 The amendments to Part 4 presented to DGP-WG/23 were agreed, subject to the incorporation of the following additional amendments:

- a) A revision to Packing Instruction 950 was made to include a reference to metallic sodium or sodium alloy batteries to align with similar amendments to Packing Instruction 952;
- b) Editorial revisions were made to remove inconsistencies between the packing for lithium ion, lithium metal, and sodium ion batteries in Packing Instructions 952, 965 to 970 and 976 to 978).
- c) Revisions were made to ensure consistency between Special Provision A214 and Packing Instruction 952;
- d) DGP-WG/23 had discussed the structure of the sodium ion battery packing instructions and whether they should be incorporated into the existing packing instructions for lithium ion batteries (Packing Instructions 965, 966 and 967), included in one new packing instruction covering UN 3551 — **Sodium ion batteries**, UN 3552 — **Sodium ion batteries contained in equipment** and UN 3552 — **Sodium ion batteries packed with equipment** or included in three new separate packing instructions for each. It was agreed to include the provisions in three separate packing instructions for the sake of consistency with how it was done for lithium ion and lithium metal batteries.
- e) References to the lithium battery mark and the sodium ion mark were replaced with battery mark (see paragraph 1.2.1.5 b)).
- f) A revision to Packing Instruction 869 was made to include a missing reference to gallium;

1.2.1.5 Part 5 (DGP/29-WP/15 and Addendum to DGP/29-WP/15)

1.2.1.5.1 The amendments to Part 5 presented to DGP-WG/23 were agreed, subject to the incorporation of the following additional amendments:

- a) Editorial revisions were made to remove inconsistencies between references to lithium ion, lithium metal, and sodium ion and batteries or cells;
- b) References to the “lithium or sodium ion battery mark” were replaced with “battery mark”. The meeting considered the longer name cumbersome and unnecessary. It considered not making any changes unless changes were made to the Model Regulations but concluded that there would be no consequences in renaming it in the Technical Instructions, since the name was not required to be referred to on any documentation. Modifying the name therefore had no regulatory impact.

1.2.1.6 Part 6 (DGP/29-WP/16 and Addendum to DGP/29-WP/16)

1.2.1.6.1 The amendments to Part 6 presented to DGP-WG/23 were agreed, subject to editorial revisions to ISO references to align with the UN Model Regulations. An inconsistency between the English and French version was identified in the note under 6;5.2.11.2 whereby the English version stated “which are not marked in accordance with ...” and the French version stated “which are marked in accordance with ...”. The text in the French version of DGP/29-WP/16 was aligned with the English version. The Secretariat would inform the UN Sub-Committee of the inconsistency in the UN Model Regulations.

1.2.1.7 Amendments to Attachment 2 of the Technical Instructions Developed by DGP-WG/23 (DGP/29-WP/20)

1.2.1.7.1 The amendments to Attachment 2 presented to DGP-WG/23 were agreed.

1.2.1.8 Editorial Amendment to Correct Incomplete References to Proper Shipping Names for UN 3363 (DGP/29-WP/34)

1.2.1.8.1 An editorial amendment to correct incomplete references to proper shipping names for UN 3363 was agreed. UN 3363 was assigned three proper shipping names, one of them being added to the 2021-2022 Edition of the Technical Instructions (UN 3363 — **Dangerous goods in articles**). The amendment added this proper shipping to two references to UN 3363 that were missing it, 2;6.0 and a record cross-referencing UN 3363 in Table 3-1 (“Fuel cell components”).

1.2.2 RECOMMENDATION

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

Recommendation 1/1 — Amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) proposed for the sake of alignment with the UN Recommendations on the Transport of Dangerous Goods for incorporation in the 2025-2026 Edition

That the amendments identified as “UN harmonization amendments” in Appendix A to the report be incorporated in the Technical Instructions.

- Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods (Ref: REC-A-DGS-2025)**
- 1.3: Develop proposals, if necessary, for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2025-2026 Edition**

1.3.1 AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS DEVELOPED BY DGP WG/22 AND DGP-WG/23 (DGP/29-WP/19 AND ADDENDUM TO DGP/29-WP/19)

1.3.1.1 Draft amendments to the Supplement to the Technical Instructions were developed by DGP-WG/UN Harmonization to reflect the decisions taken by the UNCOE. The output from DGP-WG/UN Harmonization was initially reviewed at DGP-WG/23. DGP-WG/UN Harmonization continued its review after DGP-WG/23 and recommended:

- a) the assignment of Special Provisions A331 (provision for an approval to ship lithium ion and sodium ion batteries at a higher state of charge on cargo aircraft) and A334 (criteria for shipping lithium and sodium ion batteries on passenger aircraft through an approval) to UN 3551 — **Sodium ion batteries** and amendments to the special provisions to incorporate references to sodium ion cells or batteries; and
- b) incorporation of references to UN 3551 and UN 3552 — **Sodium ion batteries contained in equipment** and **Sodium ion batteries packed with equipment** in Packing Instruction 974 for cells and batteries having a mass exceeding 35 kg shipped through an approval;

1.3.1.2 The panel decided not to include references to a packing instruction and maximum net quantity per package limits for UN 3553 — **Disilane** or UN 3555 — **Trifluoromethyltetrazole sodium salt in acetone** in Table S-3-1 because it did not have sufficient information to be able to provide guidance to States considering the granting of exemptions to ship them. It marked the substances as forbidden for transport on both passenger and cargo aircraft.

1.3.2 RECOMMENDATION

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

Recommendation 1/2 — Amendment to the *Supplement to Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) proposed for the sake of alignment with the UN Recommendations on the Transport of Dangerous Goods for incorporation in the 2025-2026 Edition

That the amendments identified as “UN harmonization amendments” in Appendix B to the report be incorporated in the Supplement to the Technical Instructions.

- Agenda Item 2: Managing air-specific safety risks and identifying anomalies (Ref: REC A DGS 2025)**
- 2.1: Develop proposals, if necessary, for amendments to Annex 18 — *The Safe Transport of Dangerous Goods by Air***

2.1.1 AMENDMENT TO THE DEFINITION FOR UNIT LOAD DEVICE

2.1.1.1 The meeting agreed to an amendment to the definition for unit load device (ULD) in Annex 18 and the Technical Instructions which removed references to outdated technology such as “igloos”. The amendment also removed a reference to “any type of freight container” as the meeting considered it made the scope for what was considered a ULD too broad. There was a separate definition for “Freight container” that applied only to radioactive material transport included in Part 2;7.1.3, and referring to the term in the definition for ULDs had caused confusion in States and industry.

2.1.1.2 The amendment was first discussed at DGP-WG/23, along with the same amendment to the Technical Instructions (see paragraph 4.2.2.6 of the DGP-WG/23 Report). A consequential amendment to the definition for freight container in the Technical Instructions was also proposed to DGP-WG/23. Although there were no strong objections at that time, members wanted more time to gather information around the assumptions made to ensure they were valid and to ensure that the amendment would not have any unintended consequences. DGP/29 agreed to the amendment to Annex 18 proposed at DGP-WG/23, subject to the removal of “aircraft” before “unit load device”. Including “aircraft” was considered redundant based on the way it was defined and would result in the unnecessary need to modify every reference to unit load device in Annex 18 and the Technical Instructions. The amendments to the definitions for unit load device and freight container would not be incorporated in the Technical Instructions until the amendment to Annex 18 was adopted.

RSPP Recommendation 2/1 — Amendment to the definition for unit load device (ULD) in Annex 18

That comments from States be sought on a proposed amendment to the definition for “unit load device” contained in Annex 18 as presented in the appendix to the report on this agenda item.

- Agenda Item 2: Managing air-specific safety risks and identifying anomalies (Ref: REC A DGS 2025)**
- 2.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition**

2.2.1 DRAFT AMENDMENTS TO PART 8 OF THE TECHNICAL INSTRUCTIONS AGREED AT DGP-WG/23 (DGP/29-WP/18)

2.2.1.1 The meeting reviewed amendments to the Technical Instructions to facilitate the carriage of dangerous goods carried by passengers and crew that were agreed at DGP-WG/22 and DGP WG/23. One was an editorial amendment to address an inconsistency between the definition for cargo, which referred to “mishandled baggage”, and the passenger provisions which did not refer to this term at all. The meeting agreed to an amendment proposed at DGP-WG/22 to incorporate the term in the passenger provisions. A second was to add a note clarifying that there was no Watt-hour limit for lithium battery(ies) that remained installed in a mobility aid. A third related to a provision for passengers and crew to carry devices powered by small lithium batteries to remain active. This amendment was incorporated in the 2023-2024 Edition through an addendum approved by Council based on a proposal from DGP-WG/22. The approved addendum was a modified version of what was agreed at DGP/WG/22. The original amendment extended a requirement for all devices to be protected from damage and inadvertent activation when in checked baggage to devices carried in the cabin. However, the working group had overlooked this additional requirement and had not discussed it at DGP-WG/22. The impact on States and industry had not been considered, so the working group decided to remove it from the proposed amendment and to give it future consideration. Panel members had given it further consideration since that time and agreed to add a requirement for devices containing lithium batteries carried in the cabin to be protected from damage and inadvertent activation.

2.2.1.2 Inconsistencies between references to “dangerous goods carried by passengers *or* crew” and “dangerous goods carried by passengers *and* crew” in the title of Part 8 versus the heading of paragraph 8;1.1 and the title of Table 8-1 were identified during the work on clarifying State oversight responsibilities in Annex 18 (see report on Agenda Item 5). The panel considered it more appropriate to refer to “passengers *and* crew” and agreed to amend the heading of 8;1.1 and title of Table 8-1 accordingly.

2.2.2 RETENTION OF DOCUMENTS BY THE SHIPPER (DGP/29-WP/22)

2.2.2.1 Information used to justify the hazard classes assigned to specific dangerous good offered for transport by air could be important for accident or incident investigations but was often no longer available. The Technical Instructions required retaining certain documentation such as the dangerous goods transport document, but not classification-related documentation. An amendment to the introductory chapter of the classification provisions in Part 2 was proposed at DGP-WG/23 to require that the shipper retain information or documentation demonstrating the basis of the classification assigned to dangerous goods they offered for transport by air. An amendment to the retention of dangerous goods transport information provisions in Part 5;4.4 was also proposed to require that it be made available to the appropriate national authority upon request (see paragraph 4.2.2.3 of the DGP-WG/23 Report). There was

sympathy for the objective of the proposal at DGP-WG/23, but little support for the amendment to Part 2. There were several objections to the types of information identified that could be used to demonstrate the basis for classification proposed for inclusion as examples in a note under Part 2;0.1, particularly a reference to safety data sheets. Members suggested that these were not intended for transport purposes and were ineffective for classification purposes. Other concerns were that an explicit requirement to retain documentation would impose an undue burden on shippers and that the proposal would have multimodal implications. Some thought guidance material would be a better way to achieve the intent.

2.2.2.2 A revised amendment was presented to DGP/29 with the intent of relieving the burden on shippers by requiring information used by the shipper to assign a classification be made available to the appropriate national authority upon request instead of an explicit requirement to retain documentation. The proposer did not consider the other concerns expressed at DGP-WG/23 to be justified. He suggested that the concerns related to the reference to safety data sheets were unfounded as the amendment simply referred to them as an example and did not impose any requirement to use them. He believed they could be useful noting that there were standards for the structure and content of them. He did not think concerns related to multimodal implications were justified, due to the explicit obligation for States by Annex 18 to conduct safety investigations of dangerous goods accidents, incidents and undeclared/misdeclared dangerous goods. Finally, he did not believe guidance material would be effective in achieving the objective. He therefore invited the panel to consider the revised proposal.

2.2.2.3 There were some who considered the amendment unnecessary, and some feared it could result in States unreasonably requesting information. Those considering it unnecessary noted that the shipper was obligated to provide evidence during a compliance inspection or an investigation. Adding a requirement was therefore superfluous. Others noted difficulties obtaining the information in their States and believed the proposed amendment would help. There were no objections to the proposal, but many felt a time limit on how long the shipper would be expected to provide information should be established. The amendment was agreed, subject to the addition of a three-month time period during which the shipper would be required to provide information if requested and an editorial amendment to the note.

2.2.2.4 A point for future discussion was raised during the discussion with respect to the risk of improper classification when the shipper was not the original manufacturer. This risk had increased in recent years due to the complexities of the supply chain. The shipper might not know much about the hazards associated with what they were shipping unless they were the original manufacturer. They often depended on material safety data sheets, which were not dependable for classification purposes. Measures needed to be taken to make it clear that the shipper was responsible for correctly classifying the goods, no matter their position in the supply chain.

2.2.3 DELETION OF THE CONDITION OF “DANGEROUS EVOLUTION OF HEAT” FROM SPECIAL PROVISIONS A67, A123 AND A199 (DGP/29-WP/27)

2.2.3.1 Special Provisions A67, A123 and A199 required specific articles assigned to them that had potential of dangerous evolution of heat to be prepared for transport to prevent a short circuit and unintentional activation. The meeting agreed to remove reference to “having the potential of a dangerous evolution of heat” because *all* batteries needed to be protected from short circuit and from unintentional activation even if they did not have potential of a dangerous evolution of heat. Removing it would also prevent shippers from incorrectly interpreting the text to mean that the articles were not subject to any other part of the special provisions if they did not have potential of a dangerous evolution of heat. It was

reported that some shippers were interpreting it that way. The subject was first discussed at DGP-WG/23 (see paragraph 4.2.2.1 of the DGP-WG/23 Report (DGP/29-WP/3)).

2.2.4 LIMITS FOR NON-REFILLABLE CYLINDERS CONTAINING FLAMMABLE GAS (DGP/29-WP/30)

2.2.4.1 A requirement for non-refillable pressure receptacles to be of a water capacity less than or equal to 1.25 litres when filled with flammable gas was included in the UN Model Regulations but not in the associated requirements for non-refillable cylinders and closed cryogenic receptacles in 4;4.1.1.9 of the Technical Instructions. The meeting agreed to add it to the Technical Instructions.

2.2.5 ADDITION OF THE DIMENSION OF PACKAGES CONTAINING RADIOACTIVE MATERIALS ON THE DANGEROUS GOODS TRANSPORT DOCUMENT (DGP/29-WP/36)

2.2.5.1 The meeting agreed to an amendment requiring the dimension of packages containing radioactive materials to be on the dangerous goods transport document. Panel members considered it a helpful addition as it facilitated loading procedures. It was already an industry practice, so would not add any undue burden to industry.

2.2.6 REORGANIZATION OF REPORTING OF UNDECLARED OR MISDECLARED DANGEROUS GOODS (DGP/29-WP/37)

2.2.6.1 An editorial amendment to the reporting requirements was proposed to clearly distinguish between the requirements for reporting of undeclared or misdeclared dangerous goods discovered in cargo or mail versus reporting of those discovered in passenger or crew baggage or on the person. While both were required to be reported to the State in which the discovery occurred, undeclared or misdeclared dangerous goods discovered in cargo or mail were also required to be reported to the State of the Operator. However, operators and State personnel were reported to have misinterpreted the requirements. The amendment was agreed, subject to an additional amendment to remove a redundant word.

2.2.7 PROPOSED DELETION OF SPECIAL PROVISION A164 IN TABLE 8-1 (DGP/29-WP/40)

2.2.7.1 The meeting agreed to remove Special Provision A164 from the articles it was assigned to and to replace the text of the special provision with “not used”. The special provision required that batteries, battery powered equipment and battery powered vehicles be prepared for transport in a manner that protected the battery from short circuit and prevented unintentional activation of the equipment and vehicles. The special provision was considered redundant for most of the articles it was assigned to, because the requirements were already contained in either the packing instructions or another special provision assigned to them. The one exception was UN 3171 — **Battery powered equipment and Battery powered vehicle**. The packing instruction assigned to it, Packing Instruction 952, did not contain

any provisions requiring the equipment and vehicles to be prevented from unintentional activation. A proposal to add the requirement to the packing instruction was also agreed.

2.2.8 RECOMMENDATION

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

Recommendation 2/2 — Amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) to address air-specific safety risks and identified anomalies for incorporation in the 2025-2026 Edition

That the amendments identified as “Amendments to manage aviation specific risks” in Appendix A to the report be incorporated in the Technical Instructions.

- Agenda Item 2: Managing air-specific safety risks and identifying anomalies (Ref: REC A DGS 2025)**
- 2.3: Develop proposals, if necessary, for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2025-2026 Edition**

The panel did not identify any amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) that were necessary under this agenda sub-item.

- Agenda Item 2: Managing air-specific safety risks and identifying anomalies (Ref: REC A DGS 2025)**
- 2.4: Development of proposals, if necessary, for amendments to the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) for incorporation in the 2025-2026 Edition}**

2.4.1 AMENDMENTS TO THE DRILL CODES IN THE EMERGENCY RESPONSE GUIDANCE DEVELOPED BY DGP-WG/23 (DGP/29-WP21)

2.4.1.1 The meeting reviewed amendments to the drill codes in the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481) consequential to the decisions taken by UNCOE. The need to differentiate between the entry for UN 1835 — **Tetramethylammonium hydroxide aqueous solution** with no subsidiary hazard and UN 1835 — **Tetramethylammonium hydroxide aqueous solution** with a toxic subsidiary hazard was identified. The amendments, subject to a revision to make this distinction, were agreed.

2.4.2 RECOMMENDATIONS

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

Recommendation 2/3 — Amendment to the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) to address air-specific safety risks and identified anomalies for incorporation in the 2025-2026 Edition

That the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) be amended as indicated in Appendix C to the report.

**APPENDIX TO THE REPORT ON AGENDA ITEM 2
(English only)**

PROPOSED AMENDMENT TO ANNEX 18

**INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES**

CHAPTER 1. DEFINITIONS

...

Unit load device (ULD). ~~Any type of freight container.~~ A device for grouping and restraining cargo, mail and baggage for air transport. It is either an aircraft container, or a combination of an aircraft pallet with a and an aircraft pallet net, or aircraft pallet with a net over an igloo. An aircraft ULD is designed to be directly restrained by the aircraft cargo loading system.

Note 1.— An overpack is not included in this definition.

Note 2.— A freight container for radioactive material is not included in this definition (see Part 2, paragraph 7.1.3 of the Technical Instructions).

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Agenda Item 3: Facilitating safe transport of dangerous goods by air (Ref: REC-A-DGS-2025)**3.1 DRAFT AMENDMENTS TO PART 7 OF THE
TECHNICAL INSTRUCTIONS AGREED AT DGP-WG/23
(DGP/29-WP/17)**

3.1.1.1 The meeting reviewed an amendment to the Technical Instructions aimed at facilitating the carriage of mobility aids powered by lithium ion batteries that was agreed at DGP WG/23. The amendment introduced a note clarifying that there was no Watt-hour limit for lithium battery(ies) that remained installed in the mobility aid. The amendment was agreed.

**3.2 EXTENSION OF THE CONCEPT OF “EXCLUSIVE USE”
TO AIRCRAFT CONTAINERS (ULDS) (DGP/29-WP/35)**

3.2.1 The meeting agreed to add a note under the definition for “exclusive use” to clarify that a large freight container was not required to be approved in accordance with the International Convention for Safe Containers. The amendment was made to facilitate the transport of exclusive use shipments of radioactive material by air. The definition for “exclusive use” limited transport to the sole use of an aircraft or of a large freight container. A freight container for radioactive material was normally a certified multimodal freight container of such a large size that it could not be carried on most aircraft. The cost of using an aircraft solely to transport these materials by air made it practically impossible.

3.2.2 The issue was first raised at DGP-WG/22, and an amendment allowing the use of aircraft containers was proposed to address it. The working group did not support the amendment for several reasons, one of them being that an aircraft container might not be sufficient for some radioactive material that had very high dose rates. The working group believed a more targeted amendment was needed. The original amendment presented to DGP/29 was more targeted, but the panel could not support it because it provided an option not to ship very small quantities of fissile nuclides under exclusive use, which strayed from the IAEA regulations and what was permitted using other modes of transport. However, it was recognized during the discussion that the real issue was the belief that a freight container needed to be approved in accordance with the International Convention for Safe Containers for transport by air, which required the use of 20 ft or 40 ft multi-modal containers. While the UN Model Regulations included this in their definition for freight container, the Technical Instructions did not. There was nothing precluding the use of a smaller container for transport by air. The panel considered the addition of a note clarifying that a large freight container did not need to be approved by the Convention to be a simpler and more straightforward way to address the issue. It would not have an impact on the IAEA Regulations or the UN Model Regulations since it was specific to the air mode. Nevertheless, both bodies would be advised of the amendment.

**3.3 EXCEPTIONS FOR DANGEROUS GOODS CARRIED BY
PASSENGERS AND CREW (DGP/29-WP/23)**

3.3.1 The meeting considered a proposal to add dangerous goods that would be excepted from the Technical Instructions through a special provision to the provisions for dangerous goods carried by passengers and crew in Table 8.1. It was suggested that passengers and crew should be permitted to carry these dangerous goods provided the exception did not apply solely to dangerous goods transported as cargo

only. However, they were often denied carriage because they were not listed in Table 8-1. Note 2 under Table 8-1 specified that exceptions found in the Technical Instructions were not reproduced in Table 8-1 and listed two specific items that met this condition. It was suggested that not listing other exceptions led to them being denied for carriage.

3.3.2 The amendment was not supported. Members saw the addition of the entries to Table 8-1 as a contradiction to the panel's decision to keep the table simple and less specific. Some of the items had been included in the table in the past, and the panel had decided to remove them. There was sympathy for the intent, but members believed it would be more appropriate to address the issues raised through guidance material or in the *Guidance Material for the Dangerous Goods Panel (DGP) to aid in the preparation of the Technical Instructions and Supporting Documents*.

3.3.3 An editorial amendment included in the proposal was agreed. The amendment moved Notes 1 and 2 from below 8;1.1.10 to below 8;1.1.1. Note 1 listed certain dangerous goods that might be carried by passengers on other modes of transport but were prohibited to be carried by air, and Note 2 highlighted that States could implement additional restrictions in the interest of aviation security. The panel considered the notes to be more applicable to the provisions in 8;1.1.1 than to 8;1.1.10.

3.4 **REMOVAL OF THE NEED FOR THE NAME OF THE SHIPPER AND CONSIGNEE ON PACKAGES PREPARED IN ACCORDANCE WITH PACKING INSTRUCTION 650 (DGP/29-WP/29)**

3.4.1 Marks identifying the name and address of the shipper and consignee were required on packages prepared in accordance with Packing Instruction 650, which was assigned to UN 3373 — **Biological substance, Category B**. The use of machine-readable codes to store data, including customer and patient information, was increasing and becoming essential in cases where there was a need for patient confidentiality. An amendment to Packing Instruction 650 was therefore proposed allowing for the name and address of the shipper and consignee to be provided through machine-readable codes such as a barcode or QR code. While there were no objections to the proposal, it was noted that the same provision was not proposed with respect to the requirement to provide the name and telephone number of a person responsible on a written document or on the package. This seemed inconsistent in that it could also impact patient confidentiality given that the person responsible could be the same as the shipper or consignee. However, it was pointed out that the person responsible was not normally the patient. Patient confidentiality was therefore not a concern. It was further questioned whether there was a need for any of the information to be provided, given there was no corresponding requirement in the UN Model Regulations. There was some support for deleting the requirements, but this would be given more thought over the next biennium. For packages containing dry ice, care would need to be taken to ensure that removing the requirement from Packing Instruction 650 was not interpreted to mean that the information was not required when UN 3373 was packed with dry ice. Packages containing dry ice were subject to all applicable requirements of the Technical Instructions, including the requirement for the name and address of the shipper and consignee to be marked on the package.

3.4.2 The amendment was agreed.

3.5 **CLARIFICATION OF THE EXCEPTIONS FOR CARRIAGE OF MEDICAL DEVICES AND BATTERIES FOR PERSONAL USE IN TABLE 8-1 (DGP/29-IP/6)**

3.5.1 The passenger provisions prohibited carriage of dangerous goods unless they were permitted in accordance with Table 8-1 and they were for personal use. The meeting was asked to consider an exception from the requirement for personal use for medical specialists carrying portable electronic medical devices containing lithium metal or lithium ion cells and batteries and spare batteries when required for imminent patient care. Life-saving medical devices sometimes needed to get to a patient urgently, and hand carrying was sometimes necessary to ensure the device did not get damaged during cargo transport. There was a concern that the term “personal use” might not be interpreted consistently among operators, and some operators might not permit carriage of such devices. An exception could prevent this from happening.

3.5.2 While there was sympathy for the intent, there were concerns such a provision would be misused and that multiple goods might be carried by individual passengers for commercial purposes. Requiring that the goods be for personal use was to prevent this from happening. The request to the panel was made in response to a specific incident involving a medical device that needed to be hand carried. Some panel members were reluctant to create new international regulations based on one incident. Others emphasized the need to base what was permitted in accordance with the passenger provisions on safety and not end use. Members believed the issue could be addressed through an operator approval, but the author of the paper noted that some operators were reluctant to go against what was in the Instructions out of fear that the State would see it as non-compliance.

3.5.3 There was no formal proposal presented. Panel members were open to discussing the issue over the next biennium.

3.6 **RECOMMENDATION**

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

Recommendation 3/1 — Amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284)* to facilitate transport for incorporation in the 2025-2026 Edition

That the amendments identified as “Amendments to facilitate transport” in Appendix A to the report be incorporated in the Technical Instructions.

Agenda Item 4: Managing safety risks posed by the carriage of lithium batteries by air (Ref: Job Card DGP.003.04)

4.1 CONSIDERATION OF AMENDMENTS PROPOSED AT DGP/28 RELATED TO REDUCED STATE OF CHARGE REQUIREMENTS FOR LITHIUM ION BATTERIES (DGP/29-WP/6), REPORT OF THE DANGEROUS GOODS PANEL WORKING GROUP ON ENERGY STORAGE DEVICES (DGP-WG/ENERGY STORAGE DEVICES) (DGP/29-WP/41), REPORT OF THE DANGEROUS GOODS PANEL WORKING GROUP ON ENERGY STORAGE DEVICES (DGP-WG/ENERGY STORAGE DEVICES): BOWTIE ANALYSIS (DGP/29-IP/1), REPORT OF THE DANGEROUS GOODS PANEL WORKING GROUP ON ENERGY STORAGE DEVICES (DGP-WG/ENERGY STORAGE DEVICES): SYSTEMS THEORETIC PROCESS ANALYSIS (STPA) (DGP/29-IP/2) AND REPORT OF THE FACE-TO-FACE MEETINGS OF THE DANGEROUS GOODS WORKING GROUP ON ENERGY STORAGE DEVICES CONVENED ON 9 AND 10 NOVEMBER 2023 AND ON 14 NOVEMBER 2023 (DGP/29-IP/9)

4.1.1 A proposal was considered at DGP/28 to extend an existing requirement for UN 3480 — **Lithium ion batteries** to be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity to UN 3481 — **Lithium ion batteries packed with equipment**, UN 3481 — **Lithium ion batteries contained in equipment**, UN 3171 — **Battery-powered equipment** and UN 3171 — **Battery-powered vehicle**. While there was some support for extending the existing state of charge limit, particularly for lithium batteries packed with equipment, the panel could not reach consensus without first conducting a thorough safety risk assessment. However, this was not possible during DGP/28 due to time constraints. The panel agreed that this should be conducted after DGP/28 by DGP-WG/Energy Storage Devices and, given the complexity of the task, with guidance from safety management experts through coordination with the Secretariat. DGP-WG/Energy Storage Devices met with ICAO safety management experts virtually throughout the biennium preceding DGP/29 and face-to-face at DGP-WG/22, DGP-WG/23 and DGP/29. The outcome of its work was presented to DGP/29 as summarized below.

4.1.2 Safety risk assessment

4.1.2.1 DGP-WG/Energy Storage Devices' assessment focused on lithium batteries packed with and contained in equipment because of the similar mitigating measures already in place for them. The panel considered a reduced state of charge requirement for vehicles separately (see paragraph 4.2 of this report).

Bow tie

4.1.2.2 The working group developed bow tie diagrams to visualize the hazard (lithium batteries transported on aircraft), the loss of control of the hazard (thermal runaway), existing requirements contained in the Technical Instructions designed to prevent a thermal runaway event, and measures to mitigate the consequences of a thermal runaway event. The diagrams are presented in Appendix A to this agenda item. The diagrams should be viewed electronically so that they can be magnified.

System theoretic process analysis (STPA)

4.1.2.3 DGP-WG/Energy Storage Devices shifted its focus to a safety risk analysis following its completion of the bow tie diagrams. The traditional approach of assessing risk based on likelihood and severity proved to be challenging because of the complexity of the lithium battery transport system and the limited data available. This made it impossible to predict likelihood with any acceptable level of accuracy. The traditional approach also assumed that observations of past behaviour allowed accurate prediction of future behaviour. However, the fast pace of technological change, new system entrants and an evolving regulatory landscape made predicting future behaviour unreliable. Safety management experts from the Secretariat therefore recommended an alternative risk assessment approach known as system theoretic process analysis (STPA) to evaluate the safety of a system.

4.1.2.4 The STPA approach helped overcome many of the limitations of traditional approaches by focusing on preventing losses rather than probability. The losses the working group identified were loss of aircraft, loss of human life or injury, loss of cargo, loss of confidence in the air transport system and loss of means to effectively transport lithium batteries. Identifying the losses was the first step of four in the STPA process. The next steps were to model the existing lithium battery transport system, to identify unsafe actions that could lead to a loss, and to identify why these actions would occur. Once the working group completed this four-step process, it identified existing and potentially new mitigation measures and ranked the strength of each of them as “mitigation effectiveness scores” from one to four, with four being the most effective. Mitigation measures designed to eliminate risk or to reduce risk through design were ranked higher than those providing only warnings or relying on procedures and training. The details of the working group’s STPA, including the list of mitigation measures and their effectiveness scores, are provided in Appendix B to the report on this agenda item (English only).

Data

4.1.2.5 A summary of data collected between 2017 and 2023 by Underwriters Laboratories Inc. (“UL”) through its voluntary Thermal Runaway Incident Program (TRIP) was reviewed. Twenty-two air operators, mostly American, participated in the programme by voluntarily providing data to the system. The data was based on 715 thermal incidents. It revealed a decline in incidents involving lithium ion batteries packed without equipment since 2017. One hypothesis for this was that the ban on the transport of lithium batteries on passenger aircraft and the requirement for UN 3480 — **Lithium ion batteries** to be offered for transport at 30 per cent state of charge to be transported on cargo aircraft was having a positive effect. Incidents involving lithium ion batteries contained in equipment and lithium ion batteries packed with equipment hit a minimum in 2020-2021 but had been increasing since then. Cargo incident rates had risen in 2022 on a per revenue—tonne-mile basis and per departure due to increased incidents with UN 3481 shipments.

4.1.2.6 Data related to shipment volume of UN 3480, UN 3090 and UN 3481 was reviewed. The data was based on imports and exports to and from the United States that was extracted from trade data from the United States Census Bureau. The data identified shipment value, weight and number of products that cross a United States’ point via air from or to a foreign point. From this data it was estimated that the number of shipments of UN 3481 by air to and from the United States, excluding domestic shipments, increased from 1,853,000 to 3,013,000 between 2015 and 2022.

Analysis of comments on extending a state of charge limit to lithium ion batteries packed with and contained in equipment provided at DGP/28

4.1.2.7 Comments raised at DGP/28 were analyzed with the aim of documenting facts and unknown variables. The detailed analysis is provided in Appendix C to the report on this agenda item (English only).

4.1.3 Outcome of safety risk assessment

4.1.3.1 The panel considered whether risks associated with the air transport of lithium ion batteries packed with equipment and lithium ion batteries contained in equipment were adequately mitigated in light of all of the available information.

Lithium ion batteries packed with equipment

4.1.3.2 The panel concluded that the risk associated with lithium ion batteries packed in equipment meeting the requirements of Section I of Packing Instruction 966 was not adequately mitigated. There were no energy capacity limits in Section I, so the panel concluded that a requirement for the batteries to be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity was warranted for all. Section II of Packing Instruction 966 limited the energy capacity of lithium ion cells to a Watt-hour rating of 20 Wh and of lithium ion batteries to a Watt-hour rating of 100 Wh. Testing had shown that cells and batteries up to 2.7 Wh posed a negligible hazard. The panel therefore concluded that the risk associated with cells and batteries with a Watt-hour rating of not more than 2.7 Wh was adequately mitigated and a requirement for the batteries to be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity was warranted for cells and batteries with a Watt-hour rating exceeding 2.7 Wh.

4.1.3.3 The panel agreed to add a provision allowing for lithium ion batteries packed with equipment to be shipped at higher states of charge with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities. Some expected there would be a high number of requests for approval which might have a high impact on States. This could in turn impact the supply chain and the flow of goods. Industry expressed a need to facilitate the process suggesting an approval from the operator would be sufficient through their own safety risk assessment. However, panel members agreed there needed to be oversight from the State of the Operator and the State of Origin and, although sympathetic to the challenges, wanted to make sure that requests for approvals did not become a normal business practice simply to address commercial needs. States could also obtain valuable information through the approval process. There was an agreement that guidance on issuing approvals specifically for lithium batteries was necessary and that it should be included with the general guidance on issuing approvals and exemptions that was being developed to support the implementation of proposed amendments to Annex 18 (see the report on Agenda Item 5).

4.1.3.4 The panel agreed that a twelve-month transition period should be provided before the provision became mandatory to allow industry time to adjust their processes. The need was questioned, but it was recognized that rushing industry to change their processes could introduce safety risks. Several members preferred a shorter transition period on the basis that there was a safety risk, and a twelve-month transition period was not provided when the state of charge requirement was introduced for UN 3480 — **Lithium ion batteries**. However, it was pointed out that changing processes to implement a reduced state of charge for batteries packed with equipment was much more complex, because there were more entities involved than simply a battery or cell manufacturer as was the case for UN 3480. Although three-months

was standard when transition periods were provided for other provisions, they were to accommodate changes to documentation, marks, and labels. The state of charge limit required changes to manufacturing processes which was much more complex.

4.1.3.5 The panel believed that an understanding of why a state of charge limit was required would increase the likelihood of shippers complying and to potentially offering lithium cells or batteries for transport with a state of charge even lower than 30 per cent of their rated capacity. Text was therefore added to a note referring to guidance on determining the rated capacity indicating that cells and batteries shipped at a reduced state of charge were less prone to thermal runaway. The note was also added to the notes under the existing state of charge requirements in Packing Instruction 965, Sections I and IB.

4.1.3.6 The panel's agreement to amend the packing instructions was reached almost unanimously. One panel member did not support a mandatory requirement for a reduced state of charge. He did not believe there was sufficient data to justify mandating something that would have a large impact on society. He believed that the panel needed to base a decision on the likelihood of an event, and that had not been determined. He believed that advancements in technology in recent years had improved safety and safety could be further assured through alternative mitigating measures.

Lithium-ion batteries contained in equipment

4.1.3.7 The panel agreed to recommend that lithium ion batteries contained in equipment meeting the requirements of either Section I or Section II of Packing Instruction 967 be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity. It agreed to add the same note that was added to Packing Instructions 965 and 966 referring to guidance on determining the rated capacity and an indication that cells and batteries shipped at a reduced state of charge were less prone to thermal runaway (see paragraph 4.1.3.5 above). Some panel members believed the same mandatory mitigation measures agreed for lithium-ion batteries packed in equipment should also apply to lithium ion batteries contained in equipment. The majority could only support a recommendation, as they did not consider the risk high enough to warrant mandating something that would significantly impact industry and impede the shipment by air of certain equipment that needed to be shipped fully charged including life-saving medical devices, large information technology equipment with embedded lithium-ion batteries, and military equipment. They believed batteries contained in equipment posed a lesser risk than batteries packed on their own because of the protection the equipment provided and smaller energy densities. They did not consider the data presented to be relevant or sufficient to justify a requirement. They believed that the incidents were largely due to non-compliant shipments. One member who opposed a mandatory requirement also raised concerns with introducing a recommendation, noting that the word "should" was interpreted as a requirement in some languages. Others did not see this argument as justified given that "should" was clearly specified as the operative verb for Recommended Practices in the Foreword of Annex 18 and all other Annexes. Those who supported a requirement based their support on the outcome of the STPA and the arguments presented at DGP/28. They believed the data was relevant and that waiting for more was a reactive approach. Any fire in an aircraft cargo compartment was a risk, and there was documented evidence of fires involving batteries packed with and contained in equipment catching fire within the air transport system. Determining the likelihood of an event was impossible to do with any degree of accuracy given all the variables involved. It was for this reason that the STPA approach was chosen. However, they saw a recommendation as a step in the right direction. There was unanimous support for continuing to assess the risks associated with lithium batteries, to share information and to adapt decisions of the panel based on new information.

Additional mitigation measures

4.1.3.8 The panel considered potential mitigation measures that were identified during the STPA process additional to limiting the state of charge (see Table 6 in Appendix B to the report on this agenda item). It was agreed to bring several with a multimodal component to the attention of an upcoming meeting of the UN Sub-Committee followed by formal proposals for amendment to the UN Model Regulations the following year if the Sub-Committee deemed this appropriate. Some mitigating measures would involve coordination with the Universal Postal Union (UPU). This could be achieved through the work of the ICAO-UPU Contact Committee. Others involved the development of guidance by the panel that would be included in the material to support implementation of the amendment to Annex 18.

4.1.3.9 One measure additional to a state of charge limit that the panel could introduce in the 2025-2026 Edition of the Technical Instructions was the addition of a requirement for packages that were excepted from UN package performance testing to be capable of withstanding a stack test (i.e. lithium batteries packed with equipment shipped in accordance with Section II of Packing Instructions 966 and 969 and lithium batteries contained in equipment packed in accordance with either Section I or Section II of Packing Instructions 967 and 970). The measure was aimed at ensuring packaging was robust enough to prevent damage to the cells or batteries contained within. The need for this was prompted by an incident involving mobile phones catching fire on a ramp while waiting to be loaded on an aircraft that was discussed at the panel's twenty-eighth meeting (see paragraph 4.2 of the DGP/28 Report). There was no evidence of non-compliance, including from the UN *Manual of Tests and Criteria* design type testing requirements. The mobile phones were stacked approximately two metres high on a pallet, and it was thought that they could have been damaged by the force applied by other packages stacked on top. Requiring a three-metre stack test was consistent to what was required for dangerous goods shipped in limited quantities in accordance with Part 3;5 of the Instructions. One member opposed adding the requirement because of a concern the panel had not given the impact on industry enough thought, but this was largely due to a misinterpretation of how the requirement was expected to be implemented. The requirement was for the package to be *capable* of withstanding a three-metre stack test. "Being capable of withstanding" was used in other provisions, including Packing Instruction 650 applicable to UN 3363 — **Biological substance, Category B**. A note explaining that capability could be demonstrated by testing, assessment or experience was added to Packing Instruction 650 based on extensive discussions by the UN Sub-Committee to clarify that there was no requirement for every package to be tested provided the shipper determined capability either through assessment or experience. The panel agreed to add a requirement for packages to be capable of withstanding a three-metre stack test to the Sections I and II of Packing Instructions 967 and 970 and Section II of Packing Instructions 966 and 969. A note clarifying that capability could be demonstrated by testing, assessment or experience was added under the requirement. It was also added under the existing requirement for packages to be capable of withstanding a three-metre stack test in Section IB of Packing Instructions 965 and 968.

4.1.4 Conclusion

4.1.4.1 The panel expressed its appreciation to the rapporteur of DGP-WG/Energy Storage Devices, his advisor, and the members of the group. The work they had undertaken was extensive. It facilitated the discussions at DGP/29 and would undoubtedly facilitate future discussions of the panel.

4.2 **REDUCED CHARGE FOR VEHICLES POWERED BY LITHIUM ION BATTERIES (DGP/29-WP/26, ADDENDUM)**

4.2.1 The panel agreed to add new entries for UN 3556 — **Vehicle, lithium ion powered**, UN 3557 — **Vehicle, lithium metal battery powered** and UN 3558 — **Vehicle, sodium ion battery powered** to Table 3-1 with Packing Instruction 952 assigned to them through the UN harmonization process under Agenda Item 1. The new entries provided the ability to differentiate between vehicles powered by different battery types and therefore the ability to apply more specific risk mitigation measures. There were no limits on the energy capacity or mass of the batteries used to power the vehicles. The consequence of a thermal runaway event could be significant if shipped at a 100 per cent state of charge. An amendment to Packing Instruction 952 was therefore proposed to require vehicles assigned to these entries to have the battery discharged as far as practical while allowing for a remaining indicated driving range or battery capacity not exceeding 25 per cent. The remaining capacity would allow the vehicle to be moved under its own power for ease of loading and unloading. Twenty-five per cent driving range or battery capacity as indicated on a fuel gauge was considered equivalent to an approximate 30 to 35 per cent state of charge based on information from representatives of large automobile manufacturers.

4.2.2 The amendment was first proposed at DGP-WG/23, albeit only for UN 3556, but it was not agreed because of concerns expressed by some panel members (see paragraph 4.4.1.1 of the DGP-WG/23 Report). These panel members did not think it was justified to implement a reduced charge requirement without conducting a safety risk assessment given that the panel would not agree to a state of charge limit for UN 3481 — **Lithium ion batteries contained in equipment** before conducting one. These panel members considered small vehicles powered by lithium batteries to be equivalent to batteries contained in equipment. Others believed there was ample evidence of the risk posed by vehicles powered by fully charged lithium ion batteries, including at least two uncontrollable fires on board ships that involved lithium ion batteries installed in vehicles, with one ship lost at sea. However, lithium batteries contained in equipment with a Watt-hour rating not exceeding 100 Wh were treated differently than those with a higher Watt-hour rating because the panel considered the former to pose less risk. The smaller ones were excepted from most of the provisions of the Technical Instructions. Several panel members believed an exception from a charge limit was therefore warranted for vehicles powered by these smaller batteries.

4.2.3 A revised proposal was presented to DGP/29 so that the reduced charge requirement would be required only for those batteries with a Watt-hour rating exceeding 100 Wh. The revised amendment applied the requirement also to UN 3557 — **Vehicle, lithium metal battery powered** and UN 3558 — **Vehicle, sodium ion battery powered**. There was general support for the revised amendment, although not all agreed that offering vehicles powered by batteries with a watt-hour rating not exceeding 100 Wh should only be a recommendation. The panel had already supported a recommendation for a reduced state of charge for UN 3481 — **Lithium ion batteries contained in equipment**, but the justification for this was a need that was expressed to ship certain equipment fully charged, including life-saving medical devices, but no such need was expressed for vehicles. Those in favour noted the belief that batteries contained in equipment posed a lesser risk than batteries packed on their own was also part of the justification, and this applied to batteries contained in vehicles as well. They supported making a reduced charge requirement for larger batteries contained in vehicles but not for batteries contained in equipment because there was no limit on the mass of the batteries in vehicles while there was a limit for those contained in equipment.

4.2.4 The panel agreed to the amendment proposed with the following revisions added:

- a) Providing an option to offer vehicles for transport with an indicated battery capacity not exceeding 25 per cent *or* with the battery or batteries at a state of charge not exceeding 30 per cent of their rated capacity. An indicated battery capacity not exceeding 25 per cent was the sole method in the original proposal because it was thought to be more practical to implement, but this was not always the case. The panel therefore concluded that an option was appropriate;
- b) Specifying that the requirement for UN 3557 — **Vehicle, lithium metal battery powered** applied when the battery was rechargeable;
- c) Allowing for vehicles powered by batteries with a Watt-hour rating exceeding 100 Wh to be offered for transport at higher states of charge with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities; and
- d) Allowing for a twelve-month transition period consistent with what was agreed for UN 3481 — **Lithium ion batteries packed with equipment** (see paragraph 4.1 of this report).

4.3 **AMENDMENT TO PACKING INSTRUCTION 952 TO CORRECT PUBLICATION ERROR (DGP/29-WP/32)**

4.3.1 An amendment to the lithium battery provisions contained in the packing instructions for battery-powered vehicles or equipment was agreed at DGP/28 to remove an inconsistency with respect to States involved in the approval process for shipping untested battery types in the vehicles or equipment (see paragraph 4.12 of the DGP/28 Report). The packing instructions in the 2021-2022 Edition of the Technical Instructions required an approval from the appropriate national authority of the State of Origin, while Special Provision A88 required an approval from the State of Origin and the State of the Operator. DGP/28 agreed to amend the packing instructions to align with Special Provision A88. However, the original text was inadvertently not struck out in Packing Instruction 952 in the DGP/28 Report and now appears in the Arabic, Chinese, English and Russian versions of the 2023-2024 Edition. The meeting agreed to an amendment to correct the error.

4.4 **CLARIFICATION OF THE NEW EXCEPTIONS INCORPORATED IN TABLE 8-1 (DGP/29-WP/39)**

4.4.1 The potential for misinterpretation of a new exception in Table 8-1 allowing passengers and crew to carry active devices containing batteries not exceeding a lithium content of 0.3 grams for lithium metal and a Watt-hour rating of 2.7 Wh for lithium-ion batteries was raised at DGP-WG/23 (see paragraph 4.4.1.6 of the DGP-WG/23 Report). One interpretation was that these limits applied to the device and the other that they applied to each battery in the device. Most members agreed that the limits applied to the whole device and not to the individual cells or batteries for active devices. It was proposed that clarification was needed, given the potential for a device with an unlimited number of batteries to be active in a passenger's baggage should the latter be the interpretation. The allowance for devices to remain active was intended to address a specific need for passengers and crew to carry active tracking devices powered

by a small lithium battery in checked baggage. The panel based its decision to allow active devices on data that demonstrated a low consequence from thermal runaway involving a battery under the limits established, and the assessment was based on the total energy capacity.

4.4.2 A note under the provision in Table 8-1 was proposed to clarify that the limits applied to the device and not individually to each battery contained in it. However, there was concern that this would be interpreted to apply to all devices and not just those that remained active. The other provisions for lithium batteries (including portable electronic devices) in Table 8-1 applied to each battery in the device when the device was not active. There were no objections to a revised amendment that incorporated the clarification in the actual provision.

4.4.3 Although there were no objections to the amendment, one position was that applying the limits to the device contradicted the general classification principles provided in the UN Model Regulations for multi-modal transport, which linked the watt-hour rating and lithium metal content to the individual cell or battery. He noted that the DGP-WG/23 Report stated that panel members agreed that the limits applied to the whole device and not to the individual cells or batteries, but this was not his position. He did not oppose the amendment given the majority support for, but wanted this position documented in the report.

4.4.4 The amendment, as revised, was agreed.

4.5 **INFORMATION ON THE STATUS OF THE RESEARCH PROJECTS (EASA) (DGP/29-WP-IP/10)**

4.5.1 The meeting was presented with an update on research activities at the European Aviation Safety Agency (EASA) as summarized below:

- a) Fire risks caused by portable electronic devices on board aircraft which focused on cargo. This included tests conducted with the aim of improving and validating the SAE lithium battery package performance standard, the assessment and identification of additional mitigating measures to prevent involvement of batteries in an external cargo fire, and the development of guidance for operators to perform risk assessments on the transport of lithium batteries as cargo. The final report was publicly available at <https://sabatair.vito.be/en/reports>.
- b) Safe air transport of portable electronic devices in checked baggage. The main objective of this project was to evaluate the effectiveness of cargo fire suppressions systems to deal with thermal runaway events originating from battery-powered devices in checked baggage. The project was kicked off in September 2021 and was expected to be completed during the second quarter of 2024. Information was publicly available at: <https://www.easa.europa.eu/en/research-projects/fire-risks-caused-peds-board-aircraft>
- c) Portable electronic devices — Lithium batteries fire/smoke risks in cabin. The main objective was to make in-flight use of portable electronic devices safer. The project was kicked off in August 2022 and was expected to be completed during the third quarter of 2025. Information was publicly available at: <https://www.easa.europa.eu/en/research-projects/LOKI-ped-lithium-batteries-firesmoke-risks-cabin>; and

- d) Detection of lithium batteries using screening equipment. The main objective of the project was to evaluate the feasibility of using airport security screening equipment and processes to detect lithium batteries in checked baggage. The project was kicked off in December 2022 and was expected to be completed during the second quarter of 2024. Information was publicly available at: <https://www.easa.europa.eu/en/research-projects/detection-lithium-batteries-using-security-screening-equipment>.

4.5.2 A panel member noted another project underway by EASA on the impact of security measures on safety. The main objective was to understand the nature and extent of the interdependencies between safety and security to assess the impact of security measures on safety. Information was publicly available at: <https://www.easa.europa.eu/en/research-projects/impact-security-measures-safety>.

4.5.3 The panel expressed its appreciation for the presentation and the research being undertaken by EASA.

4.6 RECOMMENDATION

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

Recommendation 4/1 — Amendment to lithium battery provisions for incorporation in the 2025-2026 Edition of the *Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284)*

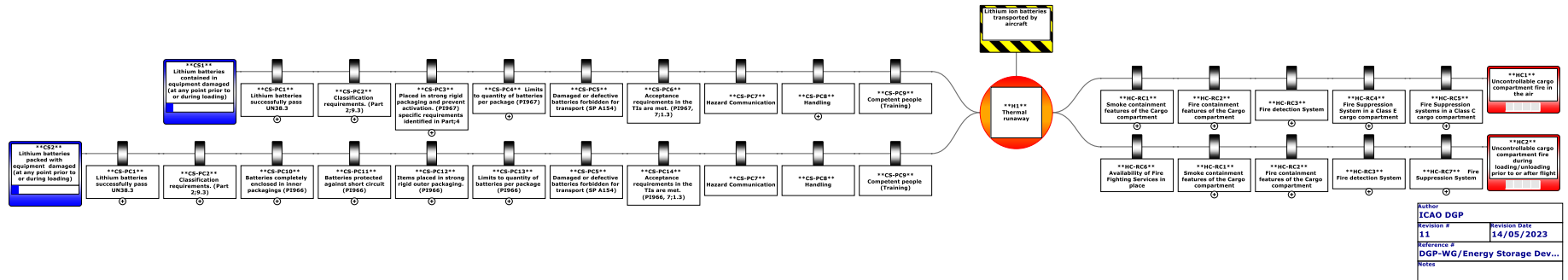
That the amendments identified as “Amendments to lithium battery provisions” in Appendix A to the report be incorporated in the Technical Instructions.

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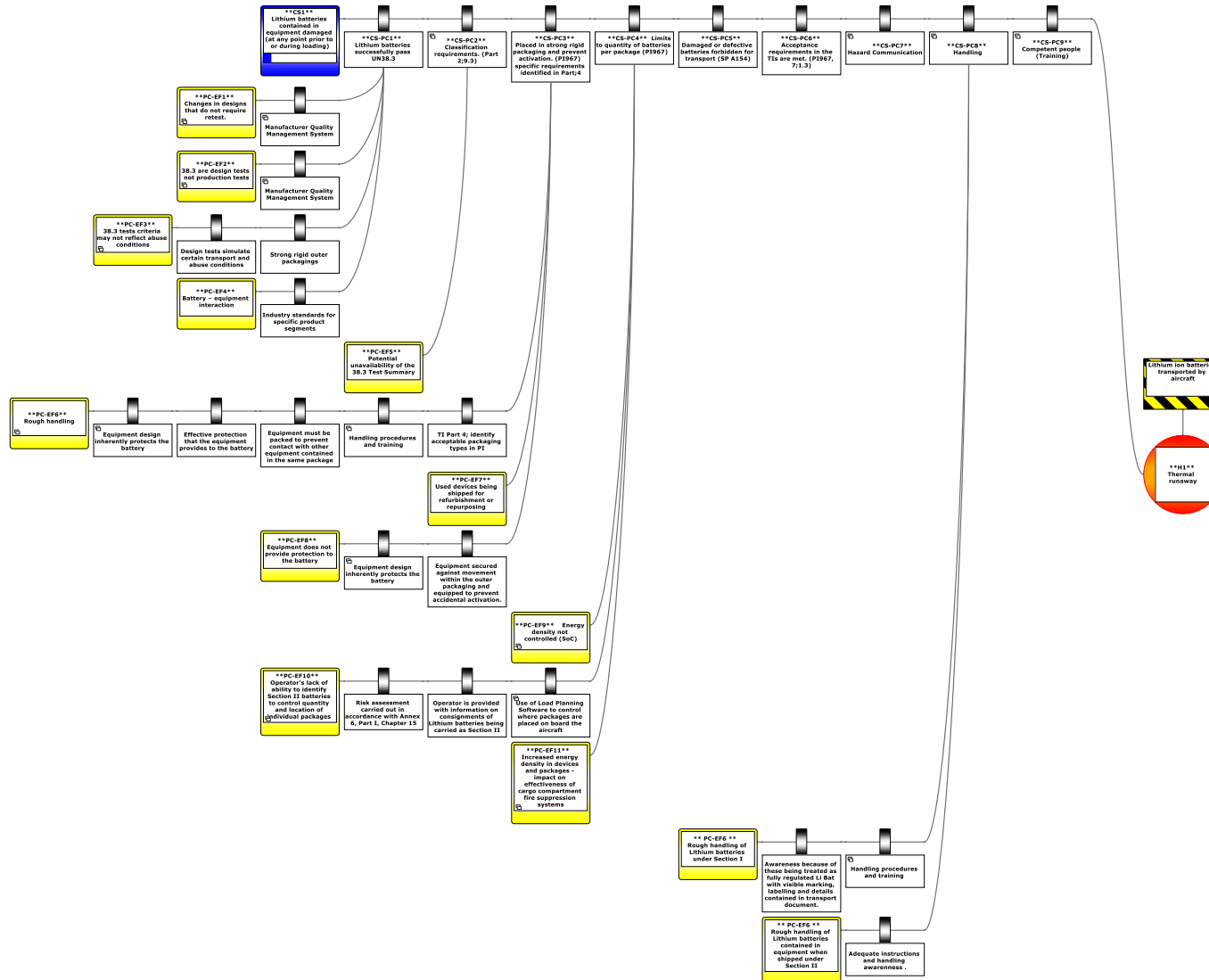
**APPENDIX A TO THE REPORT ON AGENDA ITEM 4
(English only)**

BOW TIE DIAGRAMS

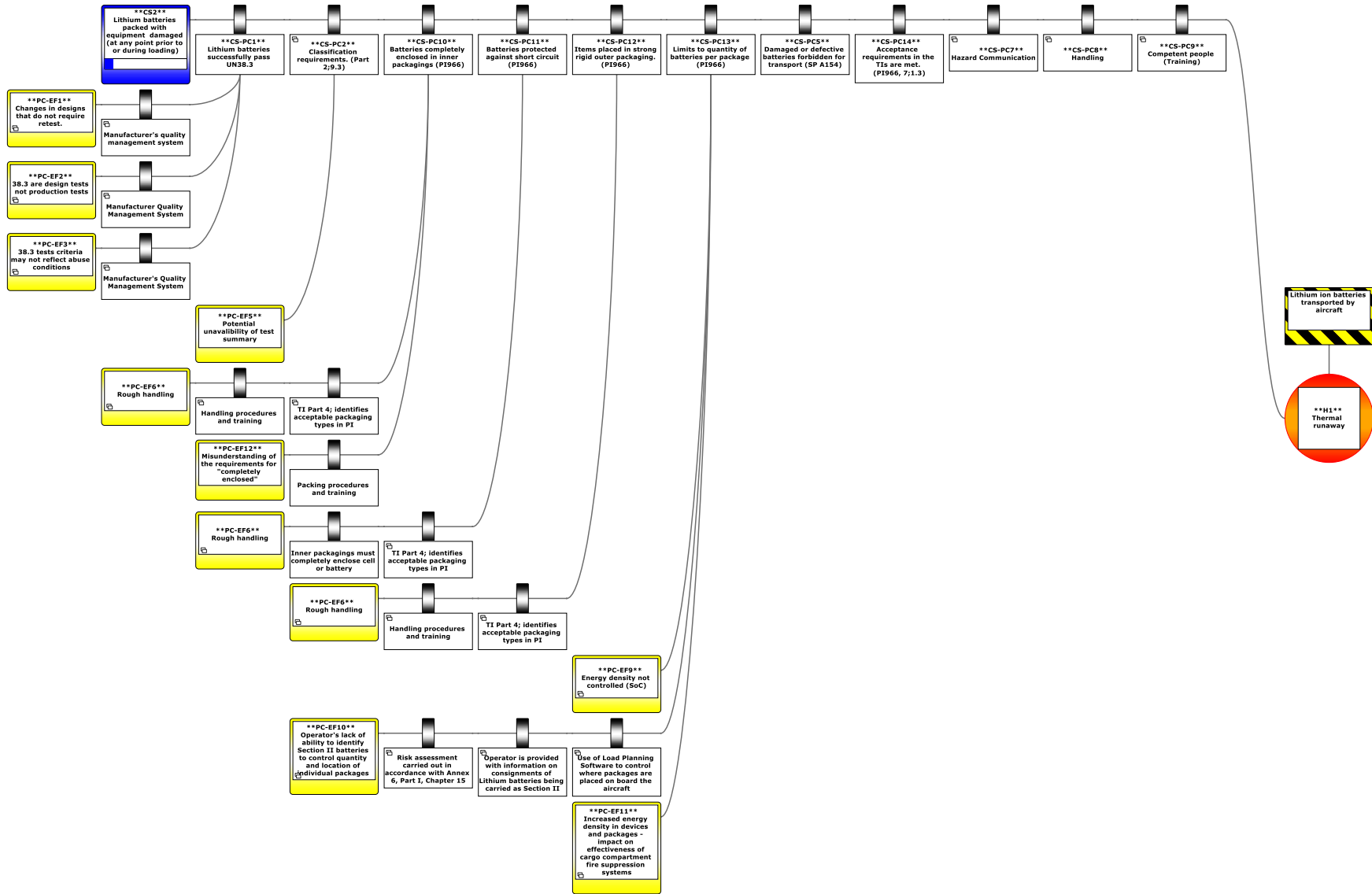
VIEW #1 — BOWTIE CS AND HC



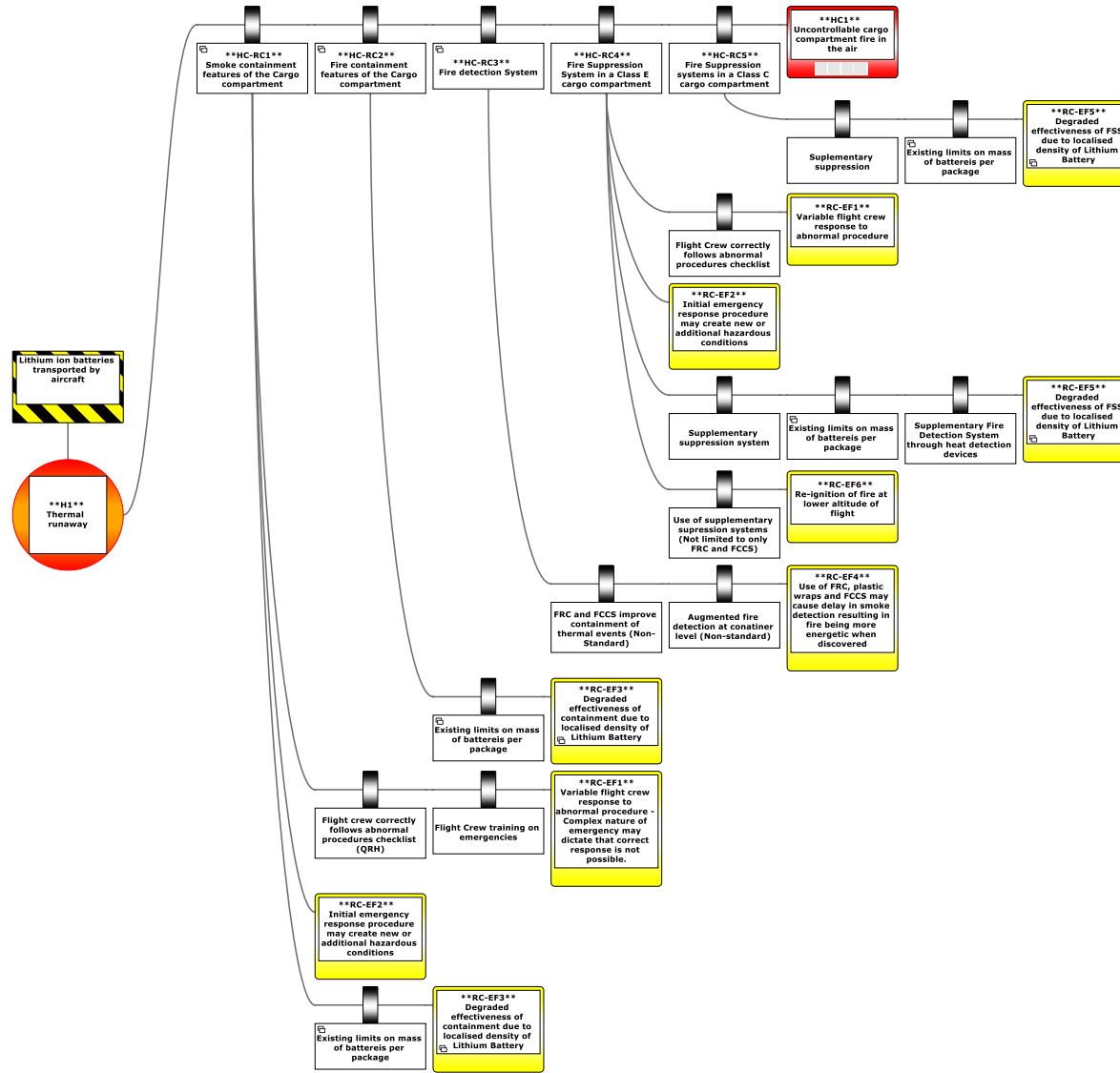
VIEW # 2 — THREATS AND CONTROLS CS1



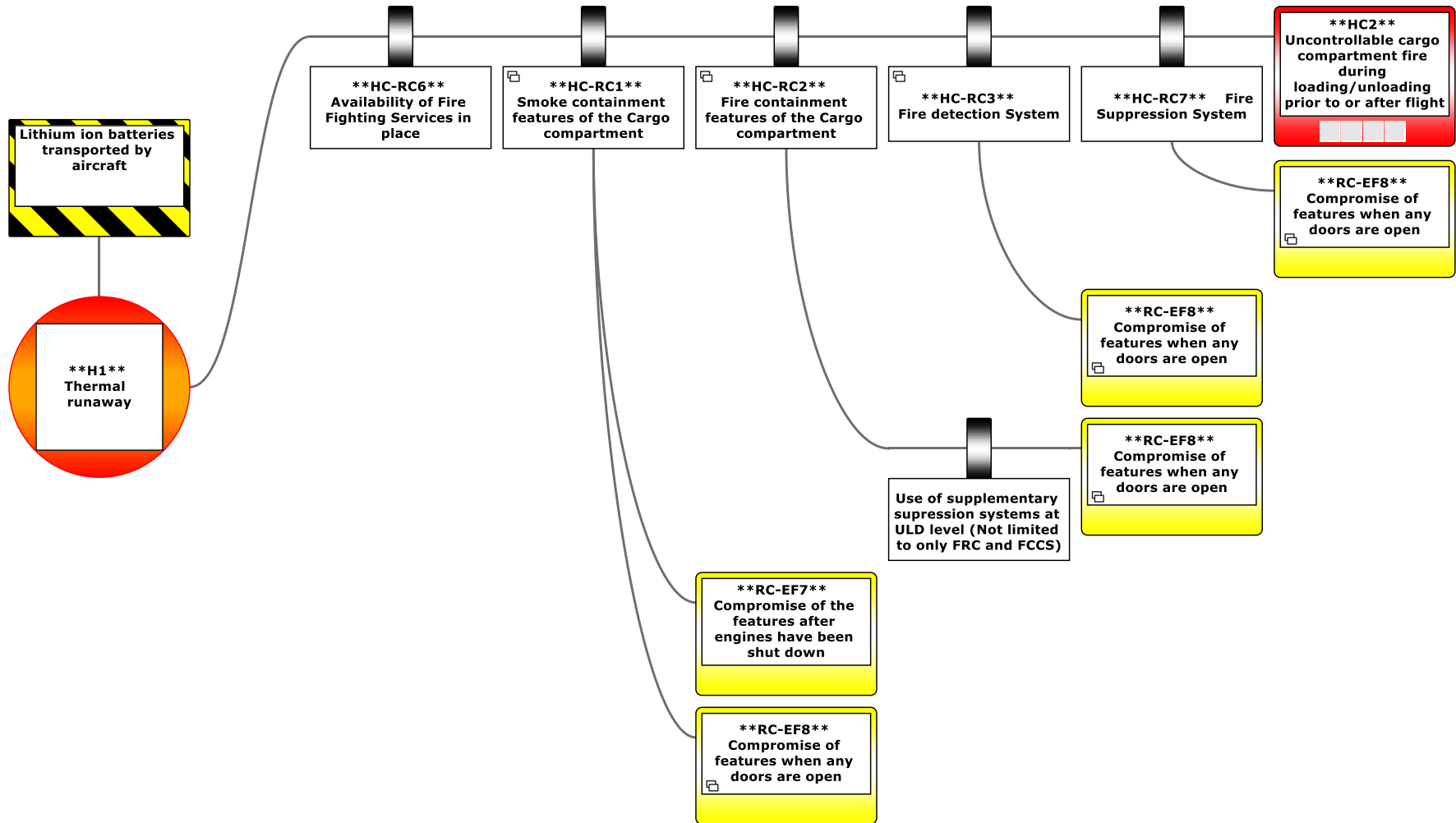
VIEW #2 – THREATS AND CONTROLS CS2



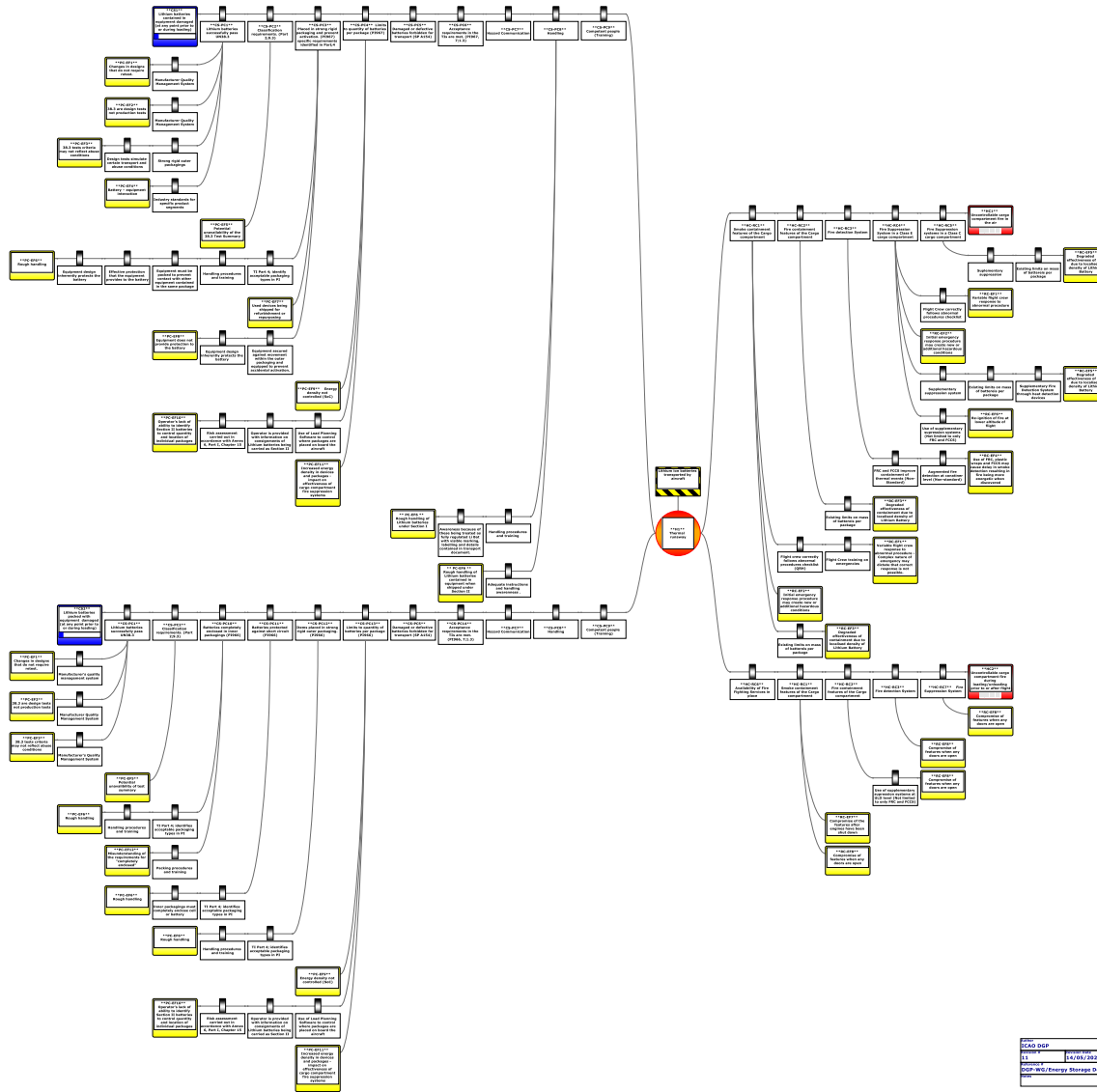
VIEW #3 – CONSEQUENCE HC1



VIEW #4 – CONSEQUENCE HC2



VIEW #5 – FULL BOWTIE



**APPENDIX B TO THE REPORT ON AGENDA ITEM 4
(English only)**

**REPORT OF THE SYSTEMS THEORETIC PROCESS ANALYSIS OF
LITHIUM BATTERY TRANSPORT**

1. INTRODUCTION

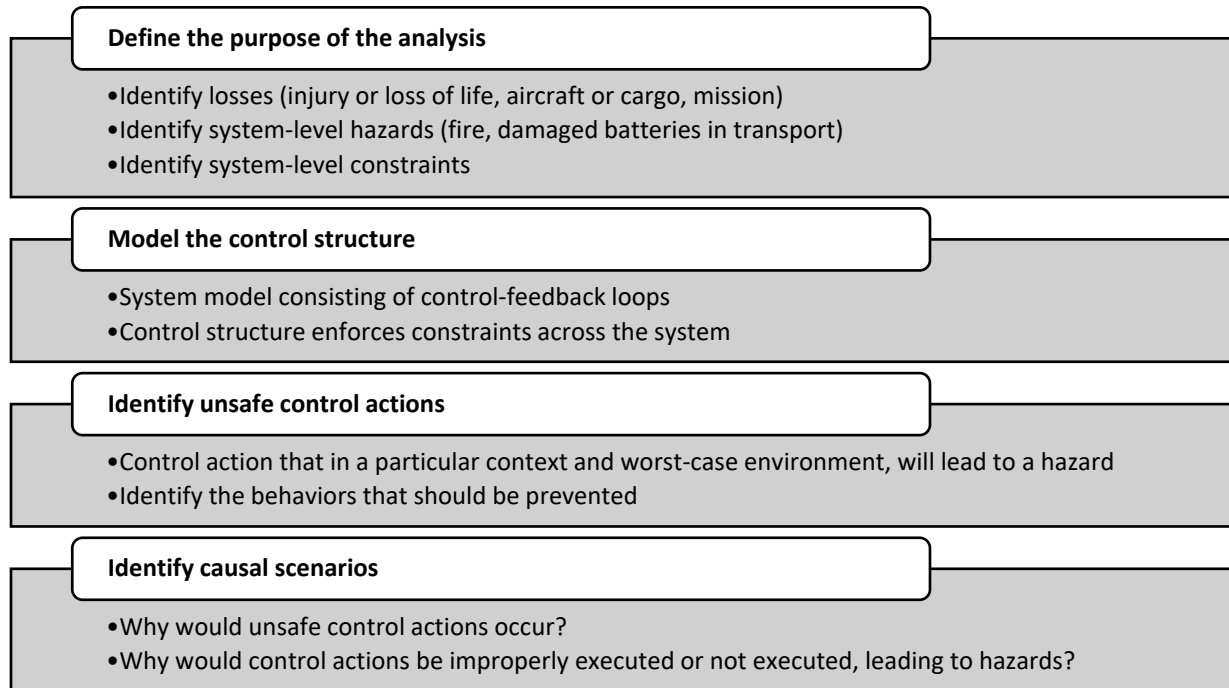
1.1 Overview and organization of the report

This report applies the systems theoretic process analysis (STPA) method to the air transport of lithium ion batteries packed with and contained in equipment. Section 2 explains the basic STPA method and introduces a means to rank the strength of potential mitigations. Sections 3, and 4 apply STPA to explore the safe carriage of lithium ion batteries and lithium ion battery powered equipment by air. Section 5 details analysis conclusions and potential future work. The attachment provides detailed tables that identify controller responsibilities, various unsafe control actions, causal scenarios and definitions of terms used in this report.

2. METHODOLOGY

2.1 STPA

The STPA method starts from a stakeholder prioritized list of system losses, followed by identifying high level hazards (system states) that can lead to those losses. Causal scenarios (including non-failures) that lead to hazards are considered. Identifying causal scenarios that do not involve failures but nevertheless result in hazardous conditions is an important feature of STPA and could encourage healthy scepticism of our knowledge of the system and promote decisions not only on what we know, but what we do not know. The basic STPA method involves (4) four steps.



Following completion of Step 4, mitigation measures can be identified and discussed in view of whether measure(s) prevent, reduce, or mitigate unsafe control actions (UCAs) or the occurrence of causal scenarios that lead to system hazards. In this case the strength of mitigation measures could be ranked based on a hierarchy where controls that prevent the occurrence of a UCA through system design are especially powerful, followed by controls that mitigate UCAs, followed by controls that increase detection of UCAs and controls involving additional procedures and training.

2.2 Mitigation effectiveness

The Technical Instructions identify the acceptability of lithium ion batteries and battery powered devices for transport by air and under what conditions. As such, the Technical Instructions include many requirements intended to prevent and mitigate these causal scenarios. As previously discussed, standard risk assessment methods and risk matrix are not well suited to examining lithium battery transport safety. Leveson, 2019 suggests using STPA and replacing hazards for failures and redefining likelihood based on the strength of potential controls. The relationship between individual failures and incidents is rarely obvious and it is nearly impossible to reliably assess the likelihood of future incidents based on previous experience. To overcome these obstacles the group utilized a mitigation order or precedence scale consistent with MIL-STD-882 and various other safety standards. Mitigations that design for minimum risk or eliminate the risk are ranked higher than those mitigations that provide only warnings or rely on procedures and training.

Table 1. Mitigation level order of precedence

Mitigation level	Mitigation description	Mitigation effectiveness score
Design for minimum risk	The causal factor can be eliminated through design to eliminate risks.	5
Reduction through design	If the identified risks cannot be eliminated, reduce it to an acceptable level through design selection e.g., safety design features or safety devices. The occurrence of the causal factor can then be reduced or controlled through system design (proactive)	4
Provide warning devices	When neither design nor safety devices can eliminate identified risks or reduce risk, devices shall be used to detect the condition and to produce an adequate warning signal. The causal factor can be detected and requires a response to mitigate (reactive).	3
Develop training and procedures	Where it is impractical to eliminate risks through system design, training and procedures are used. Causal factor can be mitigated through additional training and procedures (reactive)	2
None	No possible mitigation exists, or mitigation is never applied	1

Existing mitigations found in the Technical Instructions were identified and assigned a mitigation effectiveness score based on this ranking. Suggested mitigations to the scenarios generated by the STPA and mitigation effectiveness scores are presented later in this report.

Table 2. Existing mitigations

Description	Mitigation effectiveness score
UN 38.3 testing and quality management system	4
UN 38.3 test summary	3
Strong rigid outer packaging. Acceptable package types and performance qualities identified	4
Requirements to protect equipment against short circuits and damage	4
Package/overpack marks, labels, and documentation indicate the presence of lithium batteries in a consignment	3
Initial acceptance check	2
Inspection prior to loading	2
Handling procedures and personnel training	2

3. APPLYING STPA TO SUPPORT THE SAFE CARRIAGE OF LITHIUM BATTERIES BY AIR

3.1 Goals, requirements, and constraints

This analysis supports the evaluation of the continued safe and efficient air transport of lithium batteries packed with and contained in equipment. Consistent with the STPA technique, the ESD working group identified system level losses to prevent. Losses are defined here as anything of value to any stakeholder in the system.

Table 3. System level losses

Loss ID	Loss description
L1	Loss of aircraft
L2	Loss of human life or injury
L3	Loss of cargo
L4	Loss of confidence in the air transport system
L5	Loss of means to effectively transport lithium batteries (mission)

3.2 System-level hazards

Once system level losses are defined, system level hazards can be identified. Hazards are developed by linking losses to a set of conditions that combined with a worst-case environmental condition could lead to a loss. This does not necessarily guarantee that a hazard will always result in a loss. System level hazards here are restricted to those which can be controlled or managed by controllers within the system. The goal of the analysis is to eliminate or mitigate hazards that can lead to losses.

Table 4. System-level hazards

System hazard ID	Hazard description	Loss link
H1	Aircraft cargo compartment containing lithium batteries experiences a fire	L1-L5
H2a	Aircraft cargo compartment contains damaged lithium batteries	L3
H2b	Aircraft cargo compartment contains defective lithium batteries	L3
H2c	Aircraft cargo compartment contains untested lithium batteries	L4, L5
H3	Aircraft cargo compartment contains non-compliant lithium battery consignments	L4, L5

3.2 System-level safety constraints

System level safety constraints identify those conditions or behaviours that must be satisfied to eliminate hazards or minimize losses should a hazard occur. Each safety constraint is linked to a specific loss identified in [square brackets].

Table 5. System level constraints

System constraint ID	System constraint description
SC1	Fire in aircraft cargo compartment must be prevented [H1]
SC2	If fire in aircraft cargo compartment occurs, it must be detected, and appropriate measures taken to prevent loss [H1]
SC3	Damaged lithium batteries must not be transported by air [H2a]
SC4	If lithium batteries are damaged, they must be detected, and appropriate measures taken to prevent transport by air [H2a]
SC5	Defective lithium batteries must not be transported by air [H2b]
SC6	If lithium batteries are defective, they must be detected, and appropriate measures taken to prevent transport by air [H2b]
SC7	If lithium batteries are untested, they must be identified and approved for transport [H2c]
SC8	Shippers must only offer lithium batteries that comply with relevant requirements [H3]
SC9	If lithium batteries are not compliant with relevant requirements, they must be detected, and appropriate measures taken to prevent transport by air [H3]

3.3 Control structures

The group constructed a high-level hierarchical control structure and several detailed control structures of the lithium battery air transport system. The high-level control structure helps identify the various entities responsible for the safe carriage of lithium batteries in air transport. High level controllers include international organizations and national authorities responsible for the development and implementation of basic safety requirements. Lower-level controllers include shippers/packers and battery manufacturers responsible for preparing shipments and testing batteries and equipment. The high-level control structure and each detailed control structure is composed of feedback control loops. Each control structure contains the following elements:

- a) Controllers;
- b) Control actions;
- c) Feedback;
- d) Other inputs to and outputs from components (neither control nor feedback); and
- e) Controlled processes.

In this hierarchical control structure vertical placement is meaningful. The vertical placement of a control structure entity represents control from high-level controllers at the top to the lowest-level entities

(controlled processes) at the bottom. Each entity has control and authority over the entities immediately below it, and each entity is likewise subject to control and authority from the entities immediately above. Control and feedback processes are denoted by downward and upward arrows. Coordination between entities is denoted by two-way arrows and inputs are depicted as one-way horizontal arrows. Note that control does not guarantee obedience. The control and feedback flows in the control structure identified as downward and upward arrows respectively simply indicate that a control or feedback mechanism exists. Just because a controller sends a command, does not mean in practice that it is received or if received that it will be followed. Similarly, just because a feedback path is included in the control structure, does not mean that the feedback will always be sent and if sent that the feedback is accurate. The diagram below is a basic control structure that identifies the major entities responsible for developing and enforcing safety requirements for a consignment of lithium batteries and equipment. A more detailed control structure that includes additional entities including freight forwarders, standards development organizations, and other international entities is included in the attachment to this report.

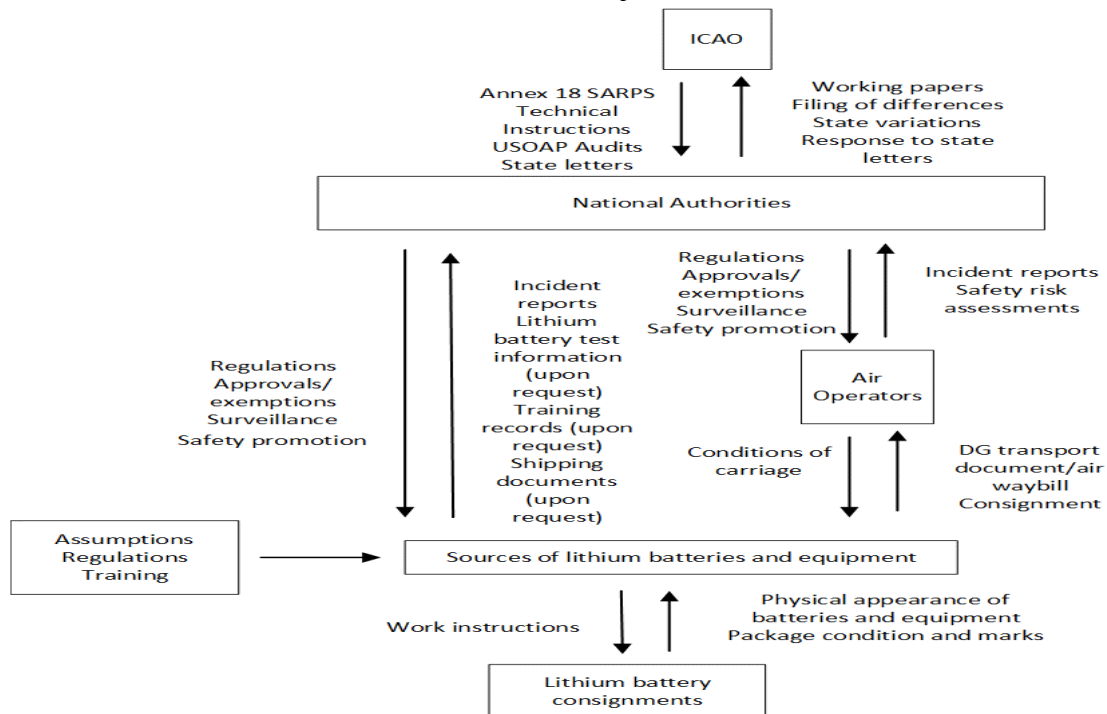


Figure 1. High level control structure

Detailed control structures

The group developed detailed control structures of various components of the high-level control structure that identify the relationships between various entities. Completing several detailed control structures around different parts of the control structure allows for a more complete analysis of the safety control actions designed to help the system enforce constraints and the feedback received. The figures below show detailed control-feedback loops for various controllers. These figures include inputs, decision making processes such as procedures or work instructions and beliefs/mental models of each of these controllers. These additions help identify and develop unsafe control actions and causal scenarios.

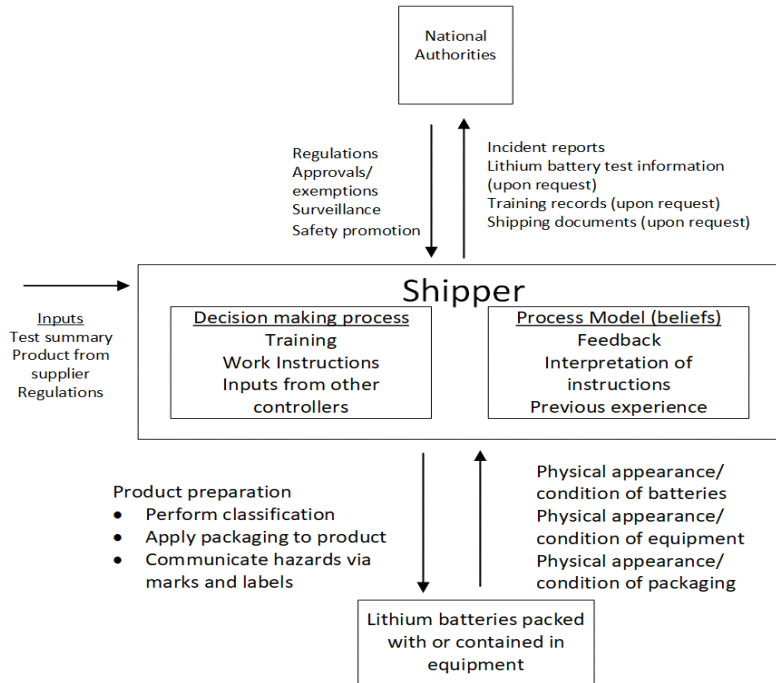


Figure 2. Control-feedback loop for a shipper

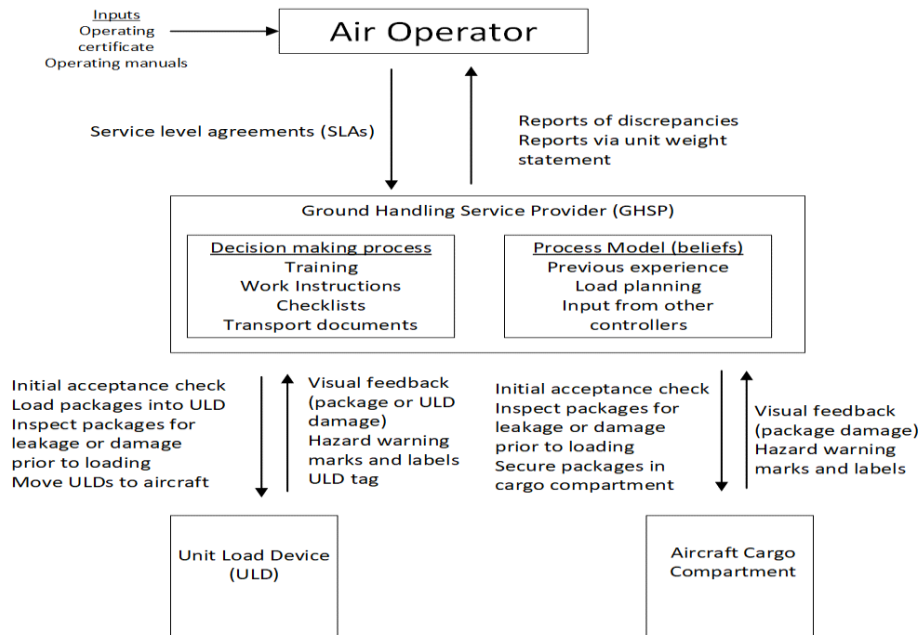


Figure 3. Control feedback loop for a ground handling service provider

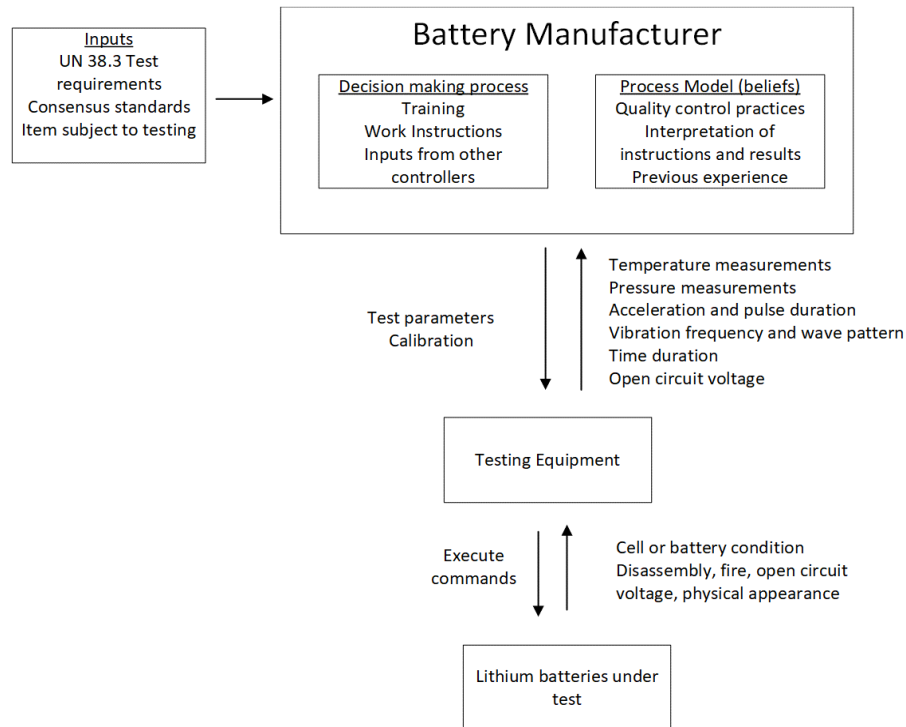


Figure 4. Control-feedback loop for a battery manufacturer

3.4 Identifying unsafe control actions

Each controller in the system has certain responsibilities depicted as downward facing arrows. These responsibilities enforce safety constraints to prevent system level hazards. In this context, an unsafe control action (UCA) is a control action that, in a particular context and worst-case environment, will lead to a system level hazard. STPA identifies four (4) ways that a control action may violate safety constraints:

- Providing the control action leads to a hazard.
- Not providing the control action leads to a hazard.
- Providing a potentially safe control action but too early, too late, or in the wrong order.
- The control action lasts too long or is stopped too soon (for continuous control actions, not discrete actions).

For example, a shipper does not apply appropriate marks, labels, or indicate the presence of lithium batteries in a consignment before offering for transport. [H3]

This action is unsafe because it can lead to H3: Aircraft cargo compartment contains non-compliant lithium battery consignments.

In another example, a shipper prepares a consignment of lithium batteries packed with equipment for transport without consulting applicable regulations [H1, H2, H3].

This action is unsafe because it could lead to [H1 - Aircraft cargo compartment containing lithium batteries experiences a fire], [H2a - Aircraft cargo compartment contains damaged lithium batteries], and [H3 - Aircraft cargo compartment contains non-compliant lithium batteries]. While the shipper utilizes packaging, since the shipper does not consult the applicable requirements, the packaging may not be sufficient for transport, or the contents not properly prepared and may become damaged. In a particular set of worst-case conditions, this damage could lead to a fire in the aircraft cargo compartment. Section 5.4 contains tables that identify unsafe control actions for various controllers including shippers, ground handling service providers, and battery manufacturers.

3.5 Identifying causal scenarios associated with unsafe control actions

Once unsafe control actions were compiled, the group identified the causal factors that lead to the unsafe control actions, which in turn led to hazards and by extension, to losses. Working backwards from the UCAs, this produces a list of contextualized scenarios that help explain why an unsafe control action occurred. Generally, causal scenarios explain how incorrect or inadequate feedback, information exchange, and other factors contribute to losses. The scenarios also explain how control actions when provided might not be received or improperly executed. Section 5.5 contains a table listing the various causal scenarios connected to unsafe control actions.

In the previous example of a shipper who does not apply appropriate marks, labels, or indicate the presence of lithium batteries in a consignment before offering for transport [H3] a causal scenario leading to this unsafe action follows.

Scenario: The shipper does not apply appropriate marks, labels or indicate the presence of lithium batteries in or with equipment prior to offering a package for transport [H3]. The shipper typically does not offer dangerous goods for transport and did not recognize that lithium batteries and battery powered equipment are regulated as dangerous goods. As a result, since there are no identifying marks, these non-compliant packages are undetected by the operator and loaded onto the aircraft.

4. RISK EVALUATION

4.1 Identifying mitigations to causal scenarios

The energy storage device working group identified UCAs and causal scenarios involving various controllers in the air transport system. The group identified battery manufacturers, shippers, and ground handling service providers as those controllers whose actions most directly led to hazards and losses. Following an analysis of the system using STPA, the working group developed a list of recommended mitigations or new requirements and applied a mitigation effectiveness score.

Table 6. List of potential additional requirements scored against the mitigation order of precedence and recommended action

Causal scenario ID	Causal scenario description	Recommended mitigation description	Mitigation effectiveness score	Recommended action
	Manufacturers do not conduct UN38.3 tests.	National authorities conduct inspections and surveillance on battery/equipment manufacturers to identify flawed assumptions in the battery testing and equipment environment and conditions that violate assumptions about usage conditions.	3	Add guidance to the new manual under development to support implementation of Annex 18
		Develop detailed requirements to identify acceptable design changes.	2	No action proposed. Requiring manufacturing requirements through transport regulations is complicated.
		Reduce the state of charge for rechargeable batteries.	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment 2. Recommendation for contained in equipment
CS 1.1A	Invalid UN 38.3 test results	Require competent authority approval of laboratories conducting UN38.3 testing.	2	<ol style="list-style-type: none"> 1. Submit informal paper to the Sixty-third session of the UN Sub-Committee (27 November to 06 December 2023) seeking support for a requirement in the UN Model Regulations 2. Submit formal proposal to Sixty-fourth session of the UN Sub-Committee if above supported
		Reduce the state of charge for rechargeable batteries.	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment

Causal scenario ID	Causal scenario description	Recommended mitigation description	Mitigation effectiveness score	Recommended action
				2. Recommendation for contained in equipment
CS 1.2	Manufacturers do not develop and adhere to a quality management system.	Develop detailed requirements for quality assessments including third-party verification.	2	<ol style="list-style-type: none"> 1. Submit informal paper to the Sixty-third session of the UN Sub-Committee (27 November to 06 December 2023) seeking support for the development of detailed requirements for inclusion in the UN Model Regulations 2. Submit formal proposal to Sixty-fourth session of the UN Sub-Committee if above supported
		Develop safety features for battery powered equipment	4	No action proposed. Requiring manufacturing requirements through transport regulations is complicated.
		Reduce the state of charge for rechargeable batteries.	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment 2. Recommendation for contained in equipment
CS 1.3	Shipper does not utilize lithium battery test summary information to make a classification decision.	Require shippers to produce lithium battery test summaries as a condition for carriage	2	No action recommended. Considered problematic and the effectiveness of this would be low

Causal scenario ID	Causal scenario description	Recommended mitigation description	Mitigation effectiveness score	Recommended action
CS 2.1	Shipper does not protect the battery from short circuits or damage prior to placement of the battery in the package with equipment.	Increase awareness of shipping and transport requirements	2	Add safety promotion guidance in the new manual under development to support implementation of Annex 18
		Require training for all shippers	2	No action proposed. Training is already required for batteries and equipment in accordance with Section I of the lithium battery packing instructions. It is considered infeasible to require it with those shipped in accordance with Section II due to the potential for every person in the world to be a shipper of these.
		Reduce the state of charge for rechargeable batteries	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment 2. Recommendation for contained in equipment
		Design equipment to protect installed batteries	4	No action proposed. Requiring manufacturing requirements through transport regulations is complicated.
		Require more robust packaging	3	Consider adding requirement for packages to be capable of withstanding a 3 m stack test
CS 2.2	Shipper/packer does not secure equipment within the outer packaging when offering for transport	Increase awareness of shipping and transport requirements	2	Add safety promotion guidance in the new manual under development to support implementation of Annex 18
		Require training for all shippers	2	No action proposed. Training is already required for batteries and

Causal scenario ID	Causal scenario description	Recommended mitigation description	Mitigation effectiveness score	Recommended action
				equipment in accordance with Section I of the lithium battery packing instructions. It is considered infeasible to require it with those shipped in accordance with Section II due to the potential for every person in the world to be a shipper of these.
		Reduce the state of charge for rechargeable batteries	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment 2. Recommendation for contained in equipment
		Design equipment to protect installed batteries	4	No action proposed. Requiring manufacturing requirements through transport regulations is complicated.
CS 3.1	Shipper/ packer selects a package of insufficient strength leading to damage of the contents during handling.	Increase awareness of shipping and transport requirements	2	Add safety promotion guidance in the new manual under development to support implementation of Annex 18
		Require training for all shippers	2	No action proposed. Training is already required for batteries and equipment in accordance with Section I of the lithium battery packing instructions. It is considered infeasible to require it with those shipped in accordance with Section II due to the potential for every person in the world to be a shipper of these.

Causal scenario ID	Causal scenario description	Recommended mitigation description	Mitigation effectiveness score	Recommended action
		Reduce the state of charge for rechargeable batteries	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment 2. Recommendation for contained in equipment
		Design equipment to protect installed batteries	4	No action proposed. Requiring manufacturing requirements through transport regulations is complicated.
		Require more robust packaging	3	Consider adding requirement for packages to be capable of withstanding a 3 m stack test
CS 3.2	Ground handling service provider damages packages during handling	Require quarantine or inspection of all packages subject to suspected damage	3	Add a recommendation for operators to establish procedures to follow when damage is suspected or after dropping packages with lithium batteries. Potentially for multimodal as well.
		Reduce the state of charge for rechargeable batteries	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment 2. Recommendation for contained in equipment
		Design equipment to protect installed batteries	4	No action proposed. Requiring manufacturing requirements through transport regulations is complicated.
		Review training and procedures for package handlers	2	If handling procedures are added to the Technical Instructions, training would naturally follow.

Causal scenario ID	Causal scenario description	Recommended mitigation description	Mitigation effectiveness score	Recommended action
		Require more robust packaging	3	Consider adding requirement for packages to be capable of withstanding a 3 m stack test
CS 4.1	Shipper does not apply appropriate marks, labels, or indicate the presence of lithium batteries in a consignment.	Eliminate provisions that allow consignments to be transported without identifying marks and documentation	3	No action proposed.
		Require training for all shippers	2	No action proposed. Training is already required for batteries and equipment in accordance with Section I of the lithium battery packing instructions. It is considered infeasible to require it with those shipped in accordance with Section II due to the potential for every person in the world to be a shipper of these.
		Reduce the state of charge for rechargeable batteries	4	<ol style="list-style-type: none"> 1. Mandatory requirement for packed with equipment 2. Recommendation for contained in equipment
		Design equipment to protect installed batteries	4	No action proposed. Requiring manufacturing requirements through transport regulations is complicated.
		Require more robust packaging	3	Consider adding requirement for packages to be capable of withstanding a 3 m stack test
		Require shipper to sign a declaration that package or consignment does not contain dangerous goods	2	<ol style="list-style-type: none"> 1. Require shippers to sign a declaration that package does not contain dangerous goods in an appropriate ICAO document (e.g.

Causal scenario ID	Causal scenario description	Recommended mitigation description	Mitigation effectiveness score	Recommended action
				<p>Annex 6 — <i>Operation of Aircraft</i> or Annex 9 — <i>Facilitation</i>)</p> <p>2. Require that operators not accept packages without signed declaration</p>
4.2	Operator accepts a consolidation of multiple consignments of lithium batteries contained in equipment in a mail sack without marks, labels, and declaration.	Eliminate provisions that allow consignments to be transported without identifying marks and documentation	3	No action proposed. I can't remember justification for no action
Require training for all mailers		2	No action proposed. It is considered infeasible to require it with those shipped in accordance with Section II due to the potential for every person in the world to be a shipper of these.	
Reduce the state of charge for rechargeable batteries		4	<p>1. Mandatory requirement for packed with equipment</p> <p>2. Recommendation for contained in equipment</p>	
Institute requirements for mailers to indicate the presence of electronic equipment or items containing batteries or attest to the absence of electronic equipment containing lithium batteries.		2	<p>1. Require mailers to sign a declaration that package does not contain dangerous goods.</p> <p>2. Require postal operators to not accept packages without signed declaration</p>	

5. CONCLUSION

The Technical Instructions identify the conditions in which lithium ion batteries and battery powered devices can be accepted for transport by air. These conditions identified as requirements and packing instructions are intended to ensure that the safety of dangerous goods in air transport is assured. Effectiveness of requirements can be inferred by a reduction of incidents from a specific cause, but little can be said about overall system safety other than incidents continue to occur. Compliance with safety requirements is verified using checklists, comparing a consignment with the package and documents provided by shippers, and a physical inspection. However, damaged, or improperly packaged lithium batteries and equipment are not readily identifiable through a physical inspection. Shipments that do not have visible marks or labels or shipping documents that identify the consignment as dangerous goods, are not subject to additional checks required for dangerous goods. The DGP-WG/Energy Storage Devices identified several themes throughout its analysis.

- a) The supply chain for lithium ion batteries and devices is fragmented and has many interactions amongst supply chain participants that introduce the possibility of safety issues.
- b) The dangerous goods air transport system is based on trust whereby downstream supply chain participants e.g. operators rely on information provided by entities further up the chain e.g. battery and equipment manufacturers, and shippers. However, these entities (battery or equipment manufacturer, shipper, freight forwarder, operator and the civil aviation authority) are often disconnected.
- c) A shipment prepared for transport may pass through multiple intermediaries such as freight forwarders and logistics agents who may not actually see a consignment. As such compliance with requirements is often assured only through the provision of suitable documentation and inspections immediately prior to loading.
- d) Checklists (for Section I shipments) and an external inspection of packages are the primary methods for operators to determine whether a package conforms to the regulations. However, acceptance checklists can only verify that the quantity is within limits, the packaging is undamaged, and the marks and labels accord with the dangerous goods transport document, and the external inspection of Section II shipments may be cursory.
- e) Civil aviation authorities obtain most of their information on safety performance through incident reports and inspections..
- f) While the ICAO can add requirements to the Technical Instructions national authorities are responsible for oversight. Manufacturers, shippers, and operators are responsible for complying with the provisions of the regulations. Collaborative work with all supply chain participants, will be necessary to ensure requirements are met.
- g) Additional requirements should be targeted at maximizing safety throughout the supply chain and work with supply chain participants to develop a means to ensure requirements are met.

5.1 **Future work**

The working group on energy storage devices developed detailed control structures and unsafe control actions for battery manufacturers, shippers, and ground handling service providers. Additional work could focus on the exploring the relationships between the original shipper, intermediaries including freight forwarders, indirect air carriers and the operator. These entities do not move cargo but instead contract with an operator and may assume the role of the shipper. The relationship between mailers, designated postal operators, national competent authorities and operators is another aspect of the control structure identified but not investigated in this report. The control structure depicting battery testing could be revisited to further identify specific inputs and feedback to derive detailed UCAs and causal scenarios that lead to the presence of low-quality batteries. Processes that involve battery assembly and integration of batteries into equipment and equipment testing could also be explored to identify how batteries that otherwise comply with testing can create safety hazards.

ATTACHMENT**GLOSSARY OF TERMS**

This report utilizes various terms used in normal parlance that denote a specific meaning within the context of this report. The following table defines many of these terms, derived or adapted from the STPA handbook.

Causal factor	A causal factor is an element that contributes to unsafe control actions and eventually system-level hazards.
Causal scenario	A causal scenario describes the contributing factors that cause unsafe control actions, why they could happen and how these causal factors lead to system-level hazards.
Control algorithm	The control algorithm represents the controller's decision-making process—it determines the control actions to provide.
Control action	A control action is the bringing about of an alteration in the system's state through activation of a device or implementation of a procedure with the intent of regulating or guiding the operation of a human being, machine, apparatus, or system.
Controller	The controller provides control actions on the system and gets feedback to determine the impact of the control actions. The controller enforces constraints on the behaviour of the system.
Feedback	Feedback includes evaluative or corrective information about an action, event, or process that is transmitted to the original or controlling source.
Loss	A loss involves something of value to stakeholders. Losses may include a loss of human life or human injury, property damage, environmental pollution, loss of mission, loss of reputation, loss or leak of sensitive information, or any other loss that is unacceptable to the stakeholders.
Process model	Process models represent the controller's internal beliefs used to make decisions. Process models may include beliefs about the process being controlled or other relevant aspects of the system or the environment.
System-level constraint	A constraint specifies system conditions or behaviours that need to be satisfied to prevent hazards (and ultimately prevent losses).
System-level hazard	A hazard is a system state or set of conditions that, together with a particular set of worst-case environmental conditions, will lead to a loss.
Unsafe control action	An Unsafe Control Action (UCA) is a control action that, in a particular context and worst-case environment, will lead to a hazard.

SYSTEM-LEVEL LOSS TABLE

The below table shows system level losses identified by the DGP-WG/Energy Storage Devices.

Loss ID	Loss description
L1	Loss of aircraft
L2	Loss of human life or injury
L3	Loss of cargo
L4	Loss of confidence in the air transport system
L5	Loss of means to effectively transport lithium batteries (mission)

SYSTEM-LEVEL HAZARD TABLE

The below table shows system level hazards identified by the DGP-WG/Energy Storage Devices. System-level hazards are linked to specific losses.

System hazard ID	Hazard description	Loss link
H1	Aircraft cargo compartment containing lithium batteries experiences a fire	L1-L5
H2a	Aircraft cargo compartment contains damaged lithium batteries	L3
H2b	Aircraft cargo compartment contains defective lithium batteries	L3
H2c	Aircraft cargo compartment contains untested lithium batteries	L4, L5
H3	Aircraft cargo compartment contains non-compliant lithium battery consignments	L4, L5

SYSTEM RESPONSIBILITIES

The responsibilities involve providing control actions and receiving feedback, thus creating the control-feedback loops of the **high-level control structure**.

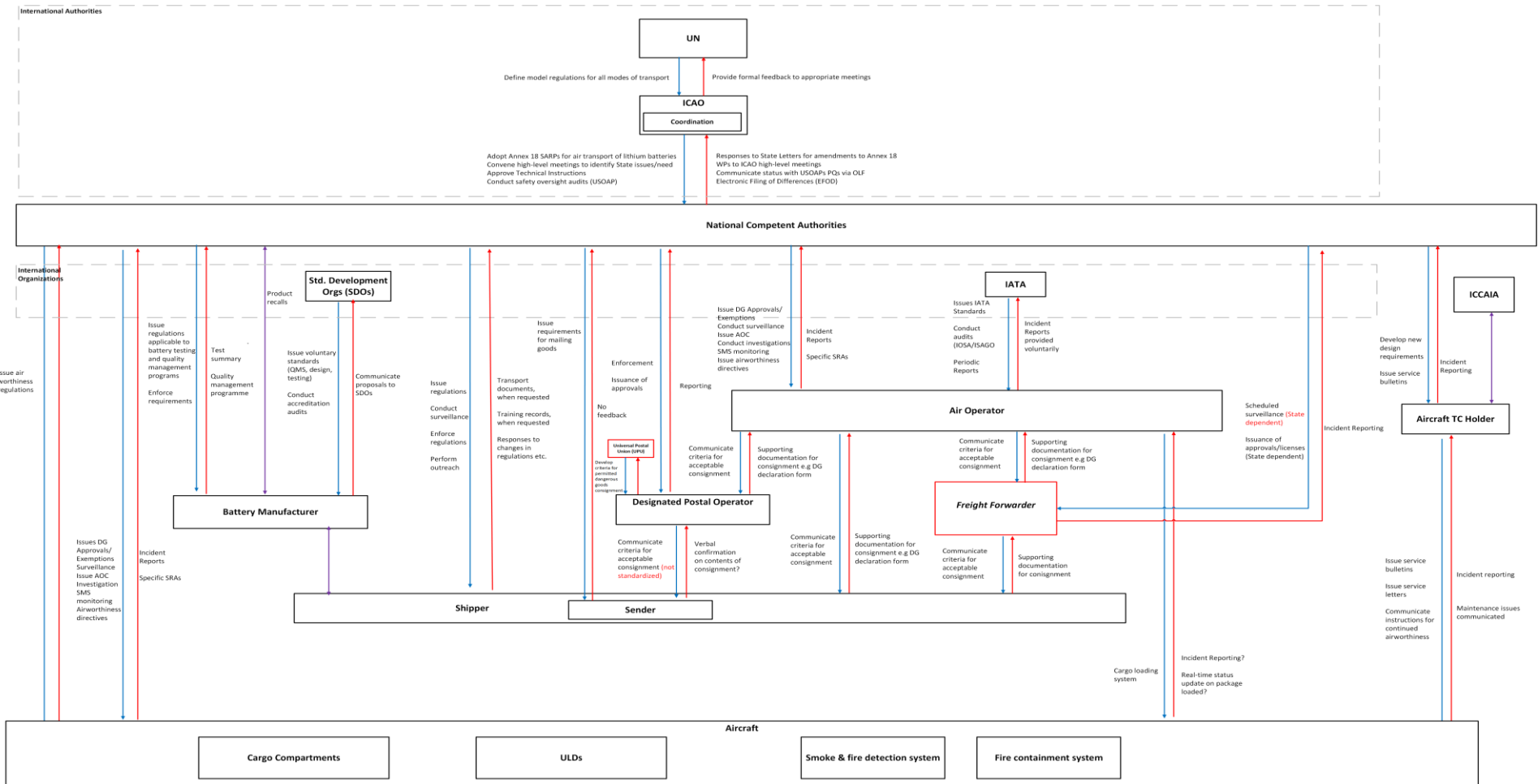
The controller and their responsibilities are identified in the context of the mission (i.e., continued safe and efficient air transport of lithium batteries packed with and contained in equipment).

System responsibilities	
Controller	Description
International Civil Aviation Organization (ICAO)	<ul style="list-style-type: none"> — Defines international Standards and Recommended Practices (SARPs), the Technical Instructions, and guidance material aimed at industry for the safe transport of dangerous goods by air — Establishes responsibilities for States — Conducts audits through its Universal Safety Oversight Audit Program (USOPA) on States for compliance with ICAO SARPs (Annex 6, Annex 18)
National competent authorities (NCA)	<ul style="list-style-type: none"> — Promulgate regulations for the safe transport of dangerous goods by air — Promulgate regulations for required aircraft features e.g handheld fire extinguishers, fire suppression systems — Conduct inspections and surveillance of air operators and other entities that offer dangerous goods for transport by air — Enforce regulations on regulated entities (e.g air operators, shipper, freight forwarders, designated postal operators (DPOs), ground handling service providers (GHSPs), packaging manufacturer) where non-compliance with Technical Instructions is identified — Issue air operator certificates (AOCs) — Issue specific approval for operator to carry dangerous goods as cargo — Approve policies, procedures and training developed by DPO — Grant approvals or exemptions for the transport of dangerous goods incl. lithium batteries — Investigate occurrences — Ensure operator conducts safety risk assessments of cargo compartment safety
Battery manufacturer or distributor	<ul style="list-style-type: none"> — Produces and distributes batteries that have passed all applicable UN 38.3 tests — Implements a quality management programme for the manufacture of lithium cells and batteries — Makes available UN 38.3 test summary

System responsibilities	
Controller	Description
Shipper/consignor/packer	<ul style="list-style-type: none"> — Ensure that employees tasked with preparing shipments are competent to perform the tasks — Classify lithium batteries and products with lithium content based in accordance with the Technical Instructions — Pack, mark, and label packages in accordance with the Technical Instructions prior to shipment — Complete dangerous goods transport document describing dangerous goods offered for transport in accordance with Part 5;4 of the Technical Instructions or provide appropriate information to be included on the air waybill, as applicable
Airline operations	<ul style="list-style-type: none"> — Document policies and procedures for the acceptance and handling of dangerous goods — Ensure that employees tasked with accepting and handling dangerous goods are competent to perform the task — Develop and implement effective controls to prevent the introduction of dangerous goods not in accordance with the Technical Instructions Chapter 7;6.1 — Conduct acceptance checks when triggered (with specific exceptions with respect to lithium batteries) — Perform safety risk assessment on cargo compartment safety — Review safety risk assessment based on change to operation and incidents that indicate risk mitigations may not be adequate (Doc 10102, guidance) — Report dangerous goods incidents to the NCA in accordance with the Technical Instructions — Develop and implement a process for investigation of reported incidents and identification and verification of appropriate corrective actions
Cargo compartment	Contain packages (different classes exist that meet certain regulatory standards concerning accessibility, a means to exclude hazardous quantities of smoke or extinguishing agent, smoke a fire detection, and a means to extinguish or control a fire)
Ground handling service provider (operator and/or 3rd party)	<ul style="list-style-type: none"> — Documents policies and procedures for the handling of dangerous goods — Ensures that employees tasked with handling dangerous goods are competent to perform the task — Loads/unloads packages into cargo compartment — Secures packages in cargo compartment — Secures packages in unit load device
Unit load devices (ULDs)	Contain packages in a single consolidation to provide protection or convenience of handling. Examples include any type of freight container, aircraft container, or aircraft pallet with a net. Some ULDs also have fire-resistant capabilities — no regulatory requirement for fire resistance.

CONTROL STRUCTURE

A high-level hierarchical control structure of the lithium battery air transport system was developed to identify and analyse the various entities responsible for the safe carriage of lithium batteries in air transport. High level controllers include international organizations and national authorities responsible for the development and implementation of basic safety requirements. Lower-level controllers include shippers/packers and battery manufacturers responsible for preparing shipments and testing batteries and equipment. This control structure includes additional entities not covered in this analysis including freight forwarders, standards development organizations and other international organizations.



UNSAFE CONTROL ACTIONS

The STPA specifies four ways a control action can be unsafe (represented in the columns below). Highlighted unsafe control actions are also reflected in causal scenarios:

Control Action	Control action provided	Control action not provided	Control action provided too early/too late	Control action stopped too soon or applied too long
Cell/Battery Manufacturer Complete UN 38.3 Tests Subject lithium batteries to UN 38.3 design tests Part 2;9	Battery manufacturer completes UN 38.3 tests on battery with the wrong input information [H2c, H3]	Battery manufacturer does not subject lithium batteries to UN 38.3 tests [H2c, H3]	Battery manufacturer completes UN 38.3 tests before subsequent changes are made to battery design [H2c, H3]	Battery manufacturer completes UN 38.3 tests in incorrect sequence [H2c, H3]
Cell/Battery Manufacturer Provide Lithium Battery Test Summary Develop and make available a lithium battery test summary	Battery manufacturer provides test summary for a battery different than that tested [H2c, H3]	Battery manufacturer does not make available test summary information [H2c, H3]	Battery manufacturer provides test summary information after subsequent shipper has offered the battery for transport [H3]	Battery manufacturer provides out of date test summary information [H3]
Cell/Battery Manufacturer Manufacture under a quality management programme	N/A	Battery manufacturer does not develop and adhere to a quality management system while producing batteries [H2b, H3]	Battery manufacturer quality management programme applied after design defects are discovered [H2b, H3]	Battery manufacturer continues to apply the same quality management programme without updating to account for changes in design or inputs [H2b, H3]

Control Action	Control action provided	Control action not provided	Control action provided too early/too late	Control action stopped too soon or applied too long
<p>Shipper</p> <p>Classify product</p> <p>The shipper must ensure the goods are not forbidden for transport by aircraft and ensure the goods are properly classified as required by the Technical instructions.</p>	N/A	Shipper does not classify product prior to offering for transport [H3]	Shipper classifies product after offering for transport [H3]	N/A
<p>Shipper</p> <p>Apply packaging</p> <p>Adhere to inner packaging and the maximum quantity per package limits.</p> <p>Select appropriate types of packaging according to the packing instructions.</p> <p>Apply closures to inner and outer packagings as appropriate.</p> <p>Secure packages within an overpack when applicable.</p>	Shipper applies packaging without consulting applicable requirements when offering for transport [H1, H2a, H2c, H3]	<p>Shipper does not pack product in strong rigid outer packaging when offering for transport [H1, H2a, H3]</p> <p>Shipper does not secure equipment within the outer packaging when offering for transport [H1, H2a, H3]</p> <p>Shipper does not protect the battery from short circuits prior to placement of the battery in the package [H1, H2a, H3]</p>	N/A	N/A

Control Action	Control action provided	Control action not provided	Control action provided too early/too late	Control action stopped too soon or applied too long
<p>Shipper</p> <p>Communicate hazards via marks, labels, and documents</p> <p>Apply appropriate marks and labels as required by the Technical Instructions.</p> <p>Complete transport documents and sign declaration when applicable</p>	<p>Shipper applies marks and labels to communicate hazards however visibility by is obscured [H3]</p>	<p>Shipper applies marks and labels that do not reflect the contents of the package [H3]</p> <p>Shipper does not apply appropriate marks, labels, or indicate the presence of lithium batteries in a consignment before offering for transport [H3]</p>	<p>N/A</p>	<p>Shipper applies marks and labels without completing documentation when offering for transport [H3]</p> <p>Shipper completes documentation however does not apply marks and labels when offering for transport [H3]</p>

Control Action	Control action provided	Control action not provided	Control action provided too early/too late	Control action stopped too soon or applied too long
Ground Handling Service Provider/Operator Perform acceptance check	<ul style="list-style-type: none"> — Ground handling service provider performs acceptance check using checklist without inspecting the package for damage [H2a, H3] — Ground handling service provider performs acceptance check without the means to verify the information on form [H3] — Ground handling service provider performs acceptance check when it is not possible to validate all the information on checklist [H3] 	Ground handling service provider does not perform acceptance check [H2a, H3]	Ground handling service provider performs acceptance check after packages are loaded into ULD [H2a, H3]	Ground handling service provider performs acceptance check on some but not all incoming packages prior to loading into ULD [H2a, H3]
Ground Handling Service Provider/Operator Inspect package for leakage/damage	N/A	Ground handling service provider does not inspect the package for leakage or damage prior to loading into ULD or aircraft cargo compartment [H1, H2a, H3]	N/A	Ground handling service provider does not perform any further inspections on package once it has been subjected to initial acceptance check [H1, H2a, H3]

Control Action	Control action provided	Control action not provided	Control action provided too early/too late	Control action stopped too soon or applied too long
<p>Ground Handling Service Provider/Operator</p> <p>Loads packages into unit load device or aircraft cargo compartment</p> <p>Loads unit load device into aircraft cargo compartment</p>	<p>Ground handling service provider loads damaged packages into ULD or aircraft cargo compartment [H1, H2a]</p> <p>Ground handling service provider places excessive superimposed weight on packages [H1, H2a]</p> <p>Ground handling service provider places too many packages placed into a ULD [H1, H2a]</p>	<p>Ground handling service provider does not secure packages against excessive movement inside of ULD [H1, H2a]</p> <p>Ground handling service provider does not secure packages against excessive movement inside of aircraft cargo compartment [H1, H2a]</p>	N/A	N/A

CAUSAL SCENARIOS TABLE

Causal scenarios are presented in the following tables as small stories that explain not only the contributing factors that cause unsafe control actions, why they could happen and resulting hazards.

CS ID	Unsafe control action	Causal scenario
1.1	Manufacturer does not subject lithium batteries to UN 38.3 testing and does not have a quality management system in place prior to offering for transport. [H2c, H3]	<p>A manufacturer does not subject lithium batteries to UN 38.3 testing because they believed the product being manufactured was sufficiently similar to a tested design.</p> <p>Manufacturer creates a battery that is intended to mimic a brand name to a tested type (counterfeit)</p> <p>Battery assembler manufacturers batteries from tested cells but does not test the assembled battery</p>
1.2	Manufacturer did not develop and adhere to a quality management system for battery manufacturing process while producing batteries. [H2b-H3]	<p>QA process does not include ongoing surveillance and defects were not detected prior to distribution</p> <p>QA process not sufficient or non-existent introducing defects into battery products</p>

CS ID	Unsafe control action	Causal scenario
1.3	<p>Shipper does not utilize lithium battery test summary information to make a classification before offering a package containing lithium batteries for transport because... leading to potentially non-compliant batteries loaded into an aircraft cargo compartment. [H3]</p>	<p>The shipper did not obtain the test summary information.</p> <p>The manufacturer or distributor does not make available a lithium battery test summary.</p> <p>Battery in the device is of an unknown origin.</p> <p>The shipper believes this information is unnecessary to make classification decisions. The shipper has sufficient information for shipping purposes based on a physical examination.</p> <p>The test summary does not match the product in the package.</p> <p>The shipper has a refurbished device containing a battery that is different than the original battery reflected in the available test summary.</p> <p>The devices contain batteries from a product different from that originally manufactured and used.</p>
2.1	<p>Shipper/packer does not protect the battery from short circuits prior to placement of the battery in the package with equipment because...</p> <p>As a result, terminals contact electrically conductive material in the same package generating excessive heat leading to a fire. [H1, H2a, H3]</p>	<p>The shipper assumes that the terminals are inherently protected.</p> <p>The shipper utilizes a package that is too large for the contents and subsequent shifting of the contents damages the battery.</p> <p>Shipper/packer misunderstands, mis-interprets or is unaware of this requirement.</p> <p>Shipper/packer does not recognize the importance of short circuit protection.</p> <p>Shipper/packer assumes that battery is sufficiently protected from short circuits without additional action.</p> <p>Electrically conductive products are placed into the same package as a battery.</p>

CS ID	Unsafe control action	Causal scenario
2.2	<p>Shipper/packer does not secure equipment within the outer packaging when offering for transport because...</p> <p>As a result, equipment is damaged due to shifting of the equipment or other contents in the in the same package, overpack, or adjacent consignments. [H1, H2a, H3]</p>	<p>The shipper/packer assumes that the package is sufficient to protect the equipment without additional securement</p> <p>Shipper/packer misunderstands, mis-interprets or is unaware of this requirement or the presence of a lithium battery contained in the equipment</p> <p>Shipper/packer does not recognize the importance of protecting against damage</p> <p>Shipper/packer determines the equipment is sufficiently protected from damage without additional action</p> <p>Shipper/packer determines the equipment does not require an outer packaging</p>
3.1	<p>Shipper/packer selects a package of insufficient strength leading to damage of the contents during handling and damage not detected prior to loading into the aircraft cargo compartment leading. [H1, H2a, H3]</p> <p>As a result, package contents are damaged through stacking or other handling conditions typically encountered in transportation immediately prior to or after loading into the aircraft cargo compartment.</p>	<p>Shipper does not recognize the hazard associated with the product if damaged.</p> <p>Shipper does not use sufficient cushioning material to protect batteries from damage from other items in the same package.</p> <p>Shipper places an item in the package heavier than package capability.</p> <p>Shipper does not understand the packing requirements of the Technical Instructions and selects a package of insufficient durability.</p>

CS ID	Unsafe control action	Causal scenario
3.2	<p>Ground handling service provider damages packages during handling leading to damage to contents prior to loading into the aircraft cargo compartment leading. [H1, H2a]</p> <p>As a result, package contents are damaged due to abuse conditions immediately prior to or after loading into the aircraft cargo compartment.</p>	<p>Packages crushed from overtightening of nets or pallet straps</p> <p>Too many packages pushed through a mechanized sort system /chute at once</p> <p>Forklift tines or handling vehicles crush packages containing batteries and equipment</p> <p>Penetration of packaged from external source such as forklift tines</p> <p>Package is dropped from a height greater than that capable of withstanding</p> <p>Packages consolidated improperly leading to excessive superimposed weight</p> <p>Packages inspected prior to consolidation but damaged during subsequent handling</p>
4.1	<p>The shipper does not apply appropriate marks, labels, or indicate the presence of lithium batteries in a consignment before offering for transport because...</p> <p>As a result, the shipper offered non-compliant batteries for transport leading to the possibility that misclassified batteries/equipment are loaded into an aircraft cargo compartment. [H3]</p>	<p>The shipper did not recognize that lithium batteries and equipment are regulated as dangerous goods.</p> <p>For lithium batteries contained in equipment (including button cells on circuit boards) (2 batteries/4 cells) up to 2 packages per consignment shippers need not apply marks, labels or identify to the operator.</p> <p>Regulations create an incentive to classify batteries as equipment or batteries packed with equipment.</p> <p>Changes in the physical appearance of batteries e.g., powerbanks leads to a shipper misclassify a battery as equipment.</p> <p>Shipper misclassifies certain a packaged batteries or a powerbank packed with an item of equipment as batteries packed with equipment.</p>

CS ID	Unsafe control action	Causal scenario
4.2	<p>Operator accepts a consolidation of multiple consignments of lithium batteries contained in equipment in a mail sack without marks, labels, and declaration. [H3]</p> <p>As a result, operators do not take actions or follow procedures specifically identified for handling dangerous goods.</p>	<p>Operators are not provided information regarding the true contents of a package or consignment.</p> <p>Operators do not observe or take special actions when consignments of batteries packed with or contained equipment display lithium battery marks but not hazard warning labels.</p> <p>Regulations are being applied in a manner beyond which they were intended.</p> <p>Changes in distribution system introduce potential for consolidation of many individual consignments. Each consignment is acceptable, but the consolidation of multiple packages in a mail sack is beyond the original intent of the Technical Instructions.</p> <p>Offerors are non-traditional dangerous goods personnel that only prepare lithium batteries/equipment.</p> <p>Regulations for shipping lithium batteries in the post do not support system constraints.</p>

**APPENDIX C TO THE REPORT ON AGENDA ITEM 4
(English only)**

ANALYSIS OF DGP/28 COMMENTS

1. INTRODUCTION

1.1 The working group on energy storage devices met virtually on 19 September 2023. During this meeting the working group agreed to submit to the DGP a working paper and two information papers that detail the results of its analysis on the transport of lithium batteries packed with and contained in equipment (See DGP/29-WP41, DGP/29-IP/1, and DGP/29-IP/2). The Secretariat explained that the proposals from DGP/28 that proposed state of charge limits for lithium ion batteries packed with equipment and contained in equipment would be resubmitted for consideration during DGP/29 (see DGP/29-WP/6). The working group recognized that those proposals were not fully mature and outstanding comments remained. Therefore, the working group decided to reconsider the DGP/28 comments (see DGP/28-WP/59; Section 4.3 and Appendix B) with the goal of resolving those comments where possible to provide the Panel the information necessary to make a fully informed decision.

1.2 The working group separated the DGP/28 comments into discrete themes and identified the available information that could be considered to address the comments. The working group also recognized that any potential amendments based on WGP/29-WP/6 would need to be further developed should the Panel agree to amendments to the Technical Instructions. The comment themes identified include:

- 1) data;
- 2) incident reports;
- 3) economic impact and market feasibility;
- 4) regulatory compliance liability for shipper other than the OEM;
- 5) lower SOC could lead to cell degradation;
- 6) provisions to facilitate transport of certain lifesaving/life-sustaining medical devices;
and
- 7) revisiting assumptions from what we have learned.

2. ANALYSIS

2.1 The panel over the last several years has reviewed extensive data involving lithium batteries and equipment including safety testing of various sizes, form factors and chemistries of lithium batteries forced into thermal runaway at various states of charge, effectiveness of aircraft fire suppression systems, trends in lithium ion battery energy density, and air transport volumes. This yields a clear summary

of certain identifiable trends and challenges to developing policies and actions the panel could take to support safe and efficient transport.

2.1.1 What we know

Safety impacts of reduced State of Charge (SOC) on the probability of a lithium-ion cell or battery to go into thermal runaway

- a) Batteries shipped at a reduced SOC are known to be less prone to thermal runaway as demonstrated through testing.
- b) The 30% SOC limit derived from testing of standard cells has been verified by multiple sources. It is recognized that the 30% limit might not be precise for all cell/battery designs; however, that limit is generally considered to be a practical safety limit to apply as a rule of general applicability.
- c) The limit is applied based on data from testing at cell/battery level, therefore this measurement of the likelihood of a cell/battery to go into thermal runaway is independent of package or equipment transport configuration. See: Report: Summary of FAA Studies Related to the Hazards Produced by Lithium Cells in Thermal Runaway in Aircraft Cargo Compartments - www.fire.tc.faa.gov/pdf/TC-16-37.pdf

Safety impacts of reduced SOC on the severity of reaction or consequence of thermal runaway

- a) Lower states of charge are well known for reducing the severity of a thermal runaway event. Test data indicates that severity from thermal runaway of commonly transported cells at 30% SOC or less is significantly reduced as compared to cells at higher SOC's, and in many cases, thermal runaway is not likely to propagate to other cells.
- b) Package configurations, including density and proximity of cells impact the severity of an event. However, the ability to propagate to other cells is greatly reduced for cells under 30% SOC.

Increasing Energy of lithium ion batteries

- a) Heat released during thermal runaway is impacted by the total energy storage capacity of a cell. Said another way, energy released during thermal runaway increases with increased stored energy.
- b) U.S. Department of Energy information shows a trend of increasing energy density of lithium-ion batteries from 2008-2020. See [FOTW #1234](#), April 18, 2022: Volumetric Energy Density of Lithium-ion Batteries Increased by More than Eight Times Between 2008 and 2020.
- c) The practical impacts of increasing energy density are that batteries in thermal runaway release heat faster making it less likely that the heat generated can be dissipated to the surrounding environment leading to increased consequences of thermal runaway. See: Journal of Electrochemical Society, [Investigating the Role of energy Density in](#)

[Thermal Runaway of Lithium-Ion Batteries with Accelerating Rate Calorimetry](#). Also see: [DGP-WG/22-IP/1](#)

Increasing volume of shipments

- a) The panel reviewed information presented to DGP-WG/22 that represented U.S. Import-Export data for UN3480/UN3481/UN3090 transported by air from 2015-2021.
- b) The figures indicate a continued increase in air transport of UN3481. Increased transport increases exposure to risk within the air transport system. See: [DGP-WG/22-IP/14](#)

Aircraft cargo compartment capabilities

- a) Lithium batteries release hydrogen and other flammable gases at various stages of thermal runaway. Concentrations of these gases could exceed the ability of current fire suppression systems. See: [DGP-WG/22-IP/9](#)
- b) Lithium batteries, if subjected to thermal runaway, have the potential to generate a pressure pulse within the cargo compartment. This pulse could potentially lead to the displacement of pressure relief panels, thus permitting the fire suppressant (halon) to escape into other compartments within the aircraft. This, in turn, could compromise the overall effectiveness/capabilities of the aircraft's fire suppression system. See: www.fire.tc.faa.gov/pdf/TC-16-37.pdf

2.1.2 What we don't know

2.1.2.1 Exact transport volumes and configurations of lithium batteries in any shipment and whether equipment adequately protects batteries from thermal runaway, contains the effects of a battery that has gone into thermal runaway or provides an additional means to initiate thermal runaway. There are infinite equipment designs incorporating batteries and package configurations containing equipment with batteries and defining a configuration that would support higher states of charge without propagation is difficult to predict. Despite extensive review of incident reports, causes of thermal events involving lithium batteries can only be attributed to general causes.

2.2 INCIDENT REPORTS

2.2.1 What we know

2.2.1.1 Incidents involving lithium ion batteries contained in or packed with equipment continue to occur within the air transport system and are not limited to one industry sector or geographic region. Most incidents were identified during storage incidental to transport, prior to loading and after unloading. Incidents also occurred during subsequent ground transport after the package was transported by air. Recorded incidents are relatively minimal in total, especially in comparison to the volume of shipments. The primary source of incident figures presented was from the UL managed voluntary system titled "Thermal Runaway Incident Program" or TRIP.

- a) One relevant trend detected by the TRIP information is that incident reports for UN3480 have trended down since 2016 when ICAO implemented the 30% SOC limit

for packaged batteries, while incidents reports for UN3481 have trended up during that same time. See: [DGP-WG/22-IP/10](#)

- b) An 11 April 2021 incident brought to the Panel's attention that occurred on the apron at Hong Kong International Airport involving a pallet containing cellular phones illustrates the consequences of a thermal runaway event involving consumer electronic devices containing a single installed lithium ion battery. See: [DGP/28-IP/2](#)

2.2.2 What we don't know

2.2.2.1 The cause of most lithium ion battery failures within the transportation system. Failure could arise from many factors, including non-compliance with manufacturing quality control, design testing, improper packaging, or rough handling. Recognizing there are incidents in the air transport system, there is not a specified number of incidents that would define an acceptable number of incidents. Further, there is not a measurement that considers an acceptable number of incidents when compared to a known mitigation measure to reduce risk.

2.3 ECONOMIC IMPACT AND MARKET FEASIBILITY

2.3.1 What we know

2.3.1.1 Implementation of a 30% SOC on packaged batteries for transport by cargo air did not stop the transport of packaged lithium ion batteries. The reduction of SOC for transport has become an accepted practice and experience indicates that the overall impact of implementing this safety mitigation measure is not as negative as might have been perceived. Import/export data indicate the use of lithium ion battery technology continues to expand. Anecdotal evidence also indicates that large well known lithium battery and equipment manufacturers ship products at a reduced state of charge. This implementation would appear to confirm that the technology exists to manage battery SOC. Although an approval reference was included for instances where air transport was necessary at higher than 30% SOC, very few approval requests have been submitted. Experience with packaged lithium ion batteries appears to show the ability to apply technology and process procedures to manage a specific SOC.

2.3.2 What we don't know

2.3.2.1 Some industry sectors already implement a process in their production line to control the state of charge prior to packaging and shipping. We do not currently have sufficient information to determine whether this practice is commonplace. Representatives from some sectors of industry indicated that implementation of a reduced SOC would be difficult or could cause extreme economic impact. It is unclear if this industry concern is related to safety, consumer marketing or simply a preference. No specific economic impact data has been provided that might indicate negative impacts on manufacturing processes, production times, or business practices.

2.4 REGULATORY COMPLIANCE LIABILITY FOR SHIPPER OTHER THAN THE OEM

2.4.1 What we know

2.4.1.1 A reduced SOC for batteries packed on their own and not for batteries packed with or contained in equipment was a conscious decision of the panel. Based on experience from implementation

of a 30% SOC limit on packaged batteries, no significant hardship or inability to ship critical or time-sensitive cargo has been verified. Comments from DGP/28 indicate a recognition that establishing a 30% SOC was routine for some battery manufacturers but not for others in the supply chain. Therefore, there's evidence to conclude that the technology and procedures exist for equipment manufacturers to manage battery SOC as well. Any change to a cell or battery by someone other than the original battery manufacturer could lead to additional risk to the air transport system. The shipper could verify the SOC limit through contractual conditions with their supplier, documentation, or physical verification, as appropriate. This verification may not be within the current business practice of some equipment distributors; however, experience indicates this verification is possible through adaptation of existing business practices. The current dangerous goods system is dependent on a level of trust in order to provide for efficient transport. Verification of an SOC requirement would therefore be consistent with how other dangerous goods transport provisions are verified once offered into the air transport system.

2.4.2 What we don't know

2.4.2.1 The industries producing and distributing electronic equipment containing or packed with lithium ion batteries is vast and ever expanding. We don't know every equipment configuration, application of use, market demand, customer performance demands, or inventory management practices. There is no known source to obtain that volume and detail of information. Rules of general applicability applied in the Technical Instructions largely reflect OEM practices. Lithium batteries and equipment offered for transport by secondary suppliers, non-OEM shippers, and end users introduce additional uncertainties including:

- a) The extent of secondary markets that may modify a battery in some way;
- b) If or how equipment distributors modify equipment containing lithium ion batteries;
- c) How the safety/stability of lithium ion batteries change with normal use or whether certain types of use, misuse or other actions impact the safety of equipment and the batteries that would render them unacceptable for transport;
- d) What additional risk these uncertainties introduce.

2.4.2.2 Further, it is challenging predict what additional types or applications of equipment might need to arrive at destination at a higher than 30% SOC, it might be appropriate to consider provisions to allow for the transport of equipment as needed where the risks are adequately managed.

2.5 LOWER SOC COULD LEAD TO CELL DEGRADATION

2.5.1 What we know

2.5.1.1 Previous discussions indicate that manufacturers regularly ship lithium ion battery powered products below 100% charge to maintain optimal product quality. Some expressed concern that batteries shipped at a 30% charge could self-discharge while in transport and storage. It has been stated in the past that over-discharged (below 0 volts) lithium batteries can lead to cell degradation and the potential thermal runaway during subsequent recharging. Battery over-discharge protection circuits and battery management systems prevent this occurrence by cutting off activity when the voltage falls below predetermined limits. One recent study involving cells and batteries of different form factors, cathode chemistries, and capacities show minimal to no loss of voltage after nine months of storage within a package. This indicates that transport and storage or relatively long periods do not create over-discharge conditions. Further, the use of

air transport typically implies an urgency for delivery. See: Journal of Electrochemical Society, [Safety of Lithium-Ion Cells and Batteries at Different States-of-Charge](#)

2.5.2 What we don't know

2.5.2.1 We have no data to indicate if there are current lithium ion battery compositions or chemistries that would pose a safety concern when shipped at a reduced state of charge.

2.6 PROVISIONS TO FACILITATE TRANSPORT OF CERTAIN LIFESAVING/LIFE-SUSTAINING MEDICAL DEVICES

2.6.1 What we know

2.6.1.1 Some members expressed sympathy during DGP/28 for ensuring any amendments to the Technical Instructions do not negatively impact the ability to expeditiously deliver critical medical devices where needed. Most of the examples provided relate to implantable medical devices. Providing an exception for implantable medical devices could be considered based on the small size of the batteries. Such an exception could be included easily as the term implantable is self-limiting and would not require a definition that might lead to application to unintended articles. The way by which the Technical Instructions characterize the hazard potential for lithium ion batteries is to force the battery into thermal runaway. Data indicates a battery's application has nothing to do with the likelihood or severity of thermal runaway.

2.6.2 What we don't know

2.6.2.1 It has been difficult to obtain comprehensive and reliable data on the types of medical devices or the need for these devices to be received at destination at higher than 30% SOC. We have no data to indicate that a battery's intended use either positively or negatively impacts the safety of the battery during air transport – particularly a battery exposed to an external fire.

2.7 REVISITING ASSUMPTIONS FROM WHAT WE HAVE LEARNED

2.7.1 The Technical Instructions regulate packaged lithium batteries differently than lithium batteries packed with or contained in equipment. For example, packing instructions 967 for lithium ion batteries contained in equipment offer additional flexibility on the packaging permitted and do not include a state of charge limit as compared to packing instruction 965 for packaged lithium ion batteries. This flexibility is based largely on the assumption that equipment protects the batteries from mechanical damage, limits the quantities of spare cells and batteries when packed with equipment, and a requirement to protect equipment from accidental activation to mitigate identified hazards. Additional justification for regulating batteries packed with and contained in equipment differently than packaged batteries seems to be based on the following additional assumptions:

- a) The net mass of lithium ion cells or batteries is small compared to the net mass of equipment;
- b) The batteries contained in equipment are effectively separated from each other reducing the likelihood of thermal runaway propagation; and

- c) The number of batteries per package is smaller compared to packaged battery shipments.

2.7.2 Recognizing these assumptions informed decisions of the Panel in the development of current requirements, the types of devices in use during that time were predominately notebook computers, cameras, and portable telephones. Batteries contained in those devices were primarily user replaceable, with hard outer casings containing cylindrical cells. More recently, the types of devices containing lithium batteries has evolved in include tablet computers, e-cigs, and outdoor power equipment. Batteries for consumer devices are now dominated by higher energy pouch cells with a flexible case permitting lighter, slimmer, more powerful devices. Also, the volume of shipments has increased dramatically, including large consignments of equipment containing batteries. This evolution warrants a review of the underlying assumptions to ensure they remain valid.

Agenda Item 5: Clarifying State oversight responsibilities in Annex 18 (Ref: Job Card DGP.005.04)

5.1 PROPOSED AMENDMENT TO ANNEX 18 TO CLARIFY STATES' RESPONSIBILITIES WITH RESPECT TO THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR (DGP/29-WP/4)

5.1.1 The meeting reviewed a draft amendment to Annex 18 developed by the DGP Working Group on Annex 18 (DGP-WG/Annex 18) and the former DGP Working Group on Reporting (DGP-WG/Reporting). The panel had been working for several years on amendments to Annex 18, starting with the development of provisions aimed at improving the ability of States to collect and analyse dangerous goods safety data and to share safety information so that it could be used globally to determine actions necessary for the enhancement of safety. The panel completed this work in 2019 through the development of a new chapter on safety data collection and processing systems and supporting guidance material (see Recommendation 5/1 of the DGP/27 Report (Montréal, 16 – 20 September 2019)). However, the output was put on hold pending additional work on clarifying States' responsibilities with respect to the safe transport of dangerous goods by air.

5.1.2 The work on data collection and analyses revealed a lack of clarity and sufficient detail in Annex 18 to effectively outline States' responsibilities with respect to the safe transport of dangerous goods by air and the interrelationship of responsibilities between dangerous goods and other aviation activities. Annex 18 was originally developed in the 1970s and early 1980s and was intended to provide broad provisions for the safe transport of dangerous goods by air with more detailed requirements provided in the Technical Instructions. Most of the panel's work since then had been on maintaining the Technical Instructions, which was directed at shippers and air operators, with little focus on Annex 18 and States' responsibilities. The focus on the Technical Instructions was necessary for day-to-day operational use and had been effective at ensuring dangerous goods could be transported safely by air, but the growth in volume of air cargo, changes in the types of dangerous goods being shipped and the increased complexity of the supply chain in recent years required a more robust, proactive framework that could be adapted to address evolving safety risks. Amendments to operator provisions had been made to account for these changes through a note in Annex 18 to clarify that the scope of an operator's safety management system included the carriage of dangerous goods and a new chapter on cargo compartment safety in Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes* and Part III — *International Operations — Helicopters* that required operators to conduct a specific safety risk assessment on the transport of items in the cargo compartment. However, nothing had been done to address the changes to the air cargo system at the State level. The proposed amendment to Annex 18 was intended to address this.

5.1.3 The amendment to Annex 18 is presented in Appendix B to the report on this agenda item. It is a substantial one, but panel members considered it a necessary one that would result in a significant improvement in how States manage the safe transport of dangerous goods by air and ultimately result in a more robust and safe global air cargo system. A chapter-by-chapter overview of the amendment proposal is provided in Appendix A to the report on this agenda item.

5.1.4 The panel was also developing guidance material to support implementation of the amended Annex 18. Guidance for States with regard to the safe transport of dangerous goods by air had traditionally been included in the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU). However, this document was intended to supplement or explain

in greater depth the basic information contained in the Technical Instructions, and State's responsibilities were much broader than that. The panel therefore recommended including the guidance material in a new manual. The panel considered whether some material should be provided in attachments to the Annex, recognizing that this could provide greater visibility to States. But it concluded that much of the material was too detailed for an attachment, and it was better to include it all in one place, at least as a first step. High-level guidance may be considered appropriate for inclusion in an attachment to the Annex once the amended version reached a level of maturity.

5.1.5 Informal coordination had been conducted with relevant experts in other aviation sectors having an impact on dangerous goods during the development of the amendment. Formal coordination with safety management, operations, airworthiness, aviation security, facilitation and legal experts would be conducted after DGP/29. The panel was advised that preliminary review of the amendment by the Air Navigation Commission would not be scheduled until the Fall of 2024. This gave time for the panel to thoroughly review feedback from the coordination process. The panel agreed to meet virtually following the coordination process to fine tune the amendments based on comments received.

5.2 RECOMMENDATION

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

RSPP	<p>Recommendation 5/1 — Amendment to Annex 18 to clarify States' responsibilities with respect to the safe transport of dangerous goods by air</p> <p>That Annex 18 be amended as indicated in Appendix B to the report on this agenda item.</p>
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APPENDIX A TO THE REPORT ON AGENDA ITEM 5
(English only)

CHAPTER-BY-CHAPTER OVERVIEW OF THE PROPOSED AMENDMENT TO ANNEX 18

Foreword

The foreword was amended to better describe the relationship between Annex 18 and the Technical Instructions, the amendment process for the Technical Instructions, and available guidance material.

1. CHAPTER 1 — DEFINITIONS

1.1 New definitions for “supply chain”, misdeclared dangerous goods, and undeclared dangerous goods were developed. The panel considered it necessary to define these terms, because they were referred to in proposed Standards and Recommended Practices (SARPs) aimed at mitigating risks associated with dangerous goods being shipped that did not comply with the Technical Instructions. “Misdeclared” and “Undeclared” were already referred to Chapter 12 of Annex 18 — Dangerous goods accident and incident reporting, and there had been on-going queries from States and industry on what was meant by the terms. The definition for “supply chain” included entities that offer, handle or transport dangerous goods in cargo or mail and entities that cause to offer, handle or transport dangerous goods in cargo or mail. “Cause to offer, handle or transport” was added to capture entities such as freight forwarders who may offer general cargo containing undeclared dangerous goods. How to regulate uncertificated entities not intending to perform dangerous goods functions, particularly with respect to training requirements, had been a topic of debate on the panel for many years. Most panel members believed there should be mandatory requirements in the Annex and the Technical Instructions for these entities, but some States did not have legal authority over entities not performing any functions described in the Annex or the Technical Instructions. However, they did have legal authority over entities once they did perform a function, regardless of whether they were knowingly or unknowingly doing so. “Cause to offer, handle or transport” was intended to capture this concept. It was based on terminology already used in some States’ national legislation.

1.2 Definitions for cargo, civil aviation authority and remote-pilot-in-command, which were already defined in other ICAO documents, were added because they were referenced in the proposed new Annex 18.

1.3 Existing definitions for “cargo aircraft” and “passenger aircraft” were deleted, because they were considered unnecessary.

1.4 The definition for “dangerous goods accident” was modified to clarify that a dangerous goods accident is not restricted to an accident associated with the operation of an aircraft as was the case for an accident defined in accordance with Annex 13 — *Aircraft Accident and Incident Investigation*. The amended definition aligned with text in the definition for dangerous goods incident.

1.5 Editorial amendments to the definition for “Dangerous goods incident” were developed to improve the readability of the definition.

1.6 Amendments to the definitions for “dangerous goods” and “packaging” had been developed by DGP/26 and DGP/27, but were never adopted by Council, because the Air Navigation Commission (ANC) wanted them to be consolidated with more substantive amendments to Annex 18. The ANC had conducted a final review of the amendment to the definition for “dangerous goods” following State consultation (AN 209-02) and a preliminary review of the definition for “packaging” (AN 213-3). The definition for “packaging” had yet to be sent for State consultation.

1.7 The definition for “unit load device” was updated to reflect modern technology.

2. **CHAPTER 2 — GENERAL**

2.1 The title of Chapter 2 was changed from “Applicability” to “General” to better reflect its content, some of which was unrelated to applicability. General principles currently contained in other chapters were moved to this chapter, and SARPs were rearranged into what the panel considered to be a more logical order. Some SARPs and notes that were specific to the operator were moved to the chapter on operator responsibilities (Chapter 6).

2.2 A new Standard was added requiring each Contracting State to have the safety of the aircraft, its occupants, ground personnel, the public and the environment as its primary objective. The panel considered this important, because there were entities beyond the aviation system that performed dangerous goods transport by air functions whose objective was not typically safety.

2.3 The applicability SARPs were broadened from “international operations of civil aircraft” and “domestic civil aircraft operations” to “international civil aviation” and “domestic civil aviation” to ensure entities beyond the air operator were captured.

2.4 Articles and substances for which Annex 18 was not applicable, i.e. those listed in 2.4.1 of the current Annex 18, were moved to the applicability section.

2.5 The existing Standard in 2.4.2 requiring articles and substances intended as replacements or removed for replacement for those excepted from Annex 18 in accordance with 2.4.1 to be transported in accordance with the Annex was moved to the chapter on operator responsibilities (Chapter 6), recognizing this was an operator responsibility. A note referring to the Standard in Chapter 6 was added to Chapter 2.

2.6 The panel considered the exception from the Annex for articles and substances carried by passengers and crew contained in 2.4.3 to be inappropriate given that they were not excepted from the Annex. They were forbidden unless specifically permitted in accordance with the Technical Instructions, and there were specific criteria for allowing them. The exception was therefore removed, and a new Standard was added under “Dangerous goods permitted for transport by air” related to passengers and crew in the “Limitation on the transport of dangerous goods by air” section (see paragraph 2.8 below).

2.7 The Standard making the Technical Instructions binding on a State was modified to refer to entities in the supply chain, passengers and crew members to make who needed to comply with them clear.

2.8 The panel considered the limitations on the transport of dangerous goods by air contained in Chapter 4 of existing Annex 18 to be part of the general principles and framework for States to regulate

dangerous goods. They were therefore moved to Chapter 2. A distinction was made between dangerous goods transported as cargo or mail and dangerous goods carried by passengers or crew members. The panel considered it necessary to do this, because the regulatory requirements for each was very different.

2.9 SARPs related to States notifying ICAO of difficulties encountered in the application of the Technical Instructions, the appropriate national authority for ensuring compliance with Annex 18, and variations from the Technical Instructions were moved to a new Chapter 3 — Provision of information to ICAO (see paragraph 3 below). The panel proposed deleting the recommendation for the State of the Operator to take necessary measures to ensure that ICAO was notified of operator variations. A very small number of operator variations were reported to ICAO, and updates to already reported variations were not always provided. Users of the Technical Instructions could therefore not depend on what was published. Operator variations were more reliably reported to industry and included in industry regulations.

3. **CHAPTER 3 — PROVISION OF INFORMATION TO ICAO**

3.1 A new chapter capturing all existing SARPs that required various types of information to be provided to ICAO was added. It included:

- a) the recommendation for States to inform ICAO of difficulties encountered in the application of the Technical Instructions (2.2.2 of current Annex 18);
- b) the requirement for each State to specify an appropriate authority within its administration responsible for ensuring compliance with Annex 18 (2.7 of current Annex 18); and
- c) the requirement for States to notify ICAO of variations from the Technical Instructions (2.5.1 of current Annex 18).

4. **CHAPTER 4 — STATE SAFETY MANAGEMENT RESPONSIBILITIES**

4.1 A new chapter on State safety management responsibilities specific to dangerous goods was developed. Having a common understanding of safety was a particular challenge for dangerous goods transport because of the number of entities involved, many existing outside the aviation system. The chapter was developed to make it clear that transporting dangerous goods was an integral part of the State safety programme (SSP) required by *Annex 19 — Safety Management*. It was divided into four sections, each corresponding to one of the four components of an SSP. Standards and Recommended Practices (SARPs) were developed only when there was a need to elaborate on Annex 19 requirements to capture dangerous goods-specific responsibilities. Several notes to specific guidance that would be included in the new manual supporting States in implementing Annex 18 were added. An overview of the new chapter is provided below.

4.2 Several new and modified SARPs were included under State safety risk management:

- a) A new SARP was added requiring each Contracting State to implement documented processes and procedures to ensure that individuals and organizations performing

activities related to the transport of dangerous goods met established requirements before being permitted to exercise the privileges of an exemption or an approval. The panel believed this new SARP, coupled with guidance material that would be included in the new manual (see paragraph 5.1.4 of this report), would lead to a safer and more effective exemption and approval system globally.

- b) SARPs related to investigating dangerous goods incidents, dangerous goods accidents, and occasions when undeclared or misdeclared dangerous goods were discovered in cargo or mail contained in current Chapter 12 of Annex 18 were captured in a section on dangerous goods safety investigations. The SARPs were expanded to include occasions when dangerous goods not permitted in passenger or crew baggage were discovered and other safety issues. The existing provisions included a recommended practice for investigating domestic occurrences. The proposed Standards did not distinguish between domestic or international occurrences.
- c) A recommendation for States to participate in cooperative efforts with other States concerning violations of dangerous goods regulations in current Chapter 11 of Annex 18 was moved to the safety risk management section. The panel considered cooperation of States when conducting safety investigations of an international nature to be critical for the resolution of dangerous goods safety issues. The recommendation was therefore upgraded to a Standard. The existing recommendation was supplemented with examples of what might be considered cooperative efforts. The panel proposed deleting these examples as it considered it more appropriate for them to be included in the new guidance document to support implementation of Annex 18.
- d) SARPs were added requiring States to include the supply chain in their hazard identification, safety risk assessment and safety risk management processes. Hazards throughout the supply chain could pose significant safety risks to aviation. Annex 6 obligated the operator to consider the supply chain in its safety risk management activities. Supply chains could impact multiple operators. It was therefore important for the State to identify and assess system-wide hazards.
- e) SARPs were added with the aim of ensuring dangerous goods not in compliance with the Technical Instructions were not transported in cargo or mail and dangerous goods not permitted to be carried by passengers or crew were not carried on board an aircraft as part of the State's safety risk management activities. Guidance on measures that could be taken to do this, including security screening, would be provided in the new guidance document to support implementation of Annex 18.
- f) SARPs related to surveillance were included in Chapter 11 of existing Annex 18. It required inspection, surveillance and enforcement procedures for all entities performing any dangerous goods function prescribed in a State's regulations. Requiring surveillance activities for all entities was impossible to implement given the vast numbers performing dangerous goods functions. Entities other than the operator and designated postal operator did not normally have a direct relationship with the State. Safety issues related to entities performing dangerous goods functions that were not subject to surveillance would be addressed through safety risk management activities. The Standard in Chapter 11 was therefore deleted. It was replaced with a note referring to guidance in the new document to support implementation of

Annex 18. The guidance would be aimed at ensuring the State was aware how Annex 19 surveillance obligations applied to dangerous goods.

- g) SARPs related to State safety promotion were added to ensure activities extended beyond the aviation system. This was essential to the management of safety risks associated with the transport of dangerous goods, particularly the risk of non-compliance with dangerous goods regulations.

5. CHAPTER 5 — SAFETY OF THE SUPPLY CHAIN

5.1 A new chapter on the safety of the supply chain replaced four existing chapters dealing with preparing and offering dangerous goods for transport, i.e. Chapter 3 — Classification; Chapter 5 — Packing, Chapter 6 — Labelling and marking and Chapter 7 — Shipper's responsibilities. These four chapters pointed to the provisions of the Technical Instructions, and some provisions from the Technical Instructions were repeated in the Annex. The existing provisions did not directly state what was required of the State, and there did not appear to be any rationale for determining what should be repeated and what should simply be referred to. The new chapter clearly defined what was expected of the State, which was to ensure authorities were empowered to oversee and manage the safe transport of dangerous goods by air and the enforcement of regulations throughout the supply chain. It listed the functions for which regulations needed to be adopted and referred to applicable parts of the Technical Instructions where the detailed instructions were found. Terminology to capture entities not deliberately performing dangerous goods functions but nevertheless causing undeclared dangerous goods to enter the air transport system was added. The terminology was consistent with the language used in the new definition for the supply chain (see paragraph 1.1).

6. CHAPTER 6 — OPERATOR'S RESPONSIBILITIES

6.1 The existing chapter on operator's responsibilities was expanded to summarize in more detail what was required by the Technical Instructions. The panel believed this would create greater visibility to States and make the State of the Operator better able to assess an operator's ability to perform dangerous goods functions through the air operator certification process and during surveillance activities. The amendments distinguished between operators with and without specific approval to transport dangerous goods as cargo. The amendments proposed included:

- a) A new note was added at the beginning of the chapter specifying that the State was required to recognize an air operator certificate issued by another Contracting State as valid in accordance with the provisions for the surveillance of operations by a foreign operator in Parts I, III — International Operations — Helicopters and IV of Annex 6 (surveillance of a foreign operator). A simplified version of the note was included in existing Chapter 10 — Training programmes. The existing note was added to remind States that training programmes were subject to the approval of the State of the Operator and that training programmes of foreign operators were not subject to the State's approval. The existing note simply referenced the applicable Standard in Annex 6. The existing note was modified to describe the Standard and moved to the operator chapter because it applied to more than training.

- b) A new section was added specifying that dangerous goods could not be transported as cargo unless specifically approved to do so by the State in accordance with the applicable provisions of Annex 6, that an operator holding a specific approval to carry dangerous goods as cargo issued by the State could only do so in accordance with the specific approval, and that operators authorized to carry radioactive material must implement and maintain a radiation protection programme as specified in the Technical Instructions.
- c) A new section was added specifying what information needed to be provided in the Operations Manual or other appropriate manual. It distinguished between responsibilities applicable to all operators and additional responsibilities applicable to operators with a specific approval to transport dangerous goods as cargo. It included detailed dangerous goods-related SARPs currently in Annex 6, Part I, Chapter 14 and Part III, Chapter 12. The panel identified errors in the dangerous goods provisions in Annex 6 which led it to recommend removing the details from Annex 6 while maintaining the distinction between operators with and without a specific approval to transport dangerous goods as cargo with high-level references to the relevant parts of Annex 18 for each type of operator (see the report on Agenda Item 7). This would eliminate redundancy and reduce the risk of future errors in the dangerous goods provisions in Annex 6.
- d) A new Standard was added requiring the operator to implement procedures aimed at preventing the introduction of undeclared and misdeclared dangerous goods into air transport.
- e) References to remote-pilot-in-command were added wherever pilot-in-command was referenced to align with Annex 6, Part IV.
- f) Operator responsibilities related to providing information that were in Chapter 9 — Provision of information of existing Annex 18 were moved to this chapter with the goal of keeping all operator responsibilities in one location.

7. CHAPTER 7. DANGEROUS GOODS CARRIED BY PASSENGERS AND CREW

7.1 A new chapter devoted to passenger provisions was added. It focused on the need for States to adopt regulations prohibiting passengers and crew from carrying dangerous goods on board aircraft unless permitted in accordance with the Technical Instructions. It modified the existing Standard in Chapter 9 — Provision of information that required States to promulgate information to warn passengers of the types of dangerous goods forbidden to be carried to align with the more prescriptive requirement in the Technical Instructions that required airport operators to promulgate the information. It included a note referring to the similar requirement for the operator that was moved from Chapter 9 to Chapter 6 — Operator responsibilities.

8. CHAPTER 8. TRANSPORT OF DANGEROUS GOODS BY POST

8.1 A new chapter on the transport of dangerous goods by post was created to merge into one chapter the Standard for the civil aviation authority to approve the designated postal operator's dangerous goods training programme in existing 10.2.2 of Chapter 10 and the Standard in 11.4 of Chapter 11 for the civil aviation authority to approve the designated postal operator's procedures for controlling the introduction of dangerous goods in airmail. The new chapter distinguished between responsibilities applicable only to designated postal operators with a policy to allow dangerous goods in mail and those applicable to all designated postal operators. A new Standard was added to require the State's designated postal operators accepting mail in another State ensured procedures and training were in place in that State. The Standard was intended to address challenges with respect to extraterritorial offices of exchange (ETOE) or any similar business entities that might emerge.

9. CHAPTER 9. TRAINING AND ASSESSMENT

9.1 The panel replicated many of the dangerous goods training provisions from the Technical Instructions into the chapter on training in the Annex to provide greater visibility to States and to ensure States would be consulted when amendments were proposed. The panel considered this important because of the State's obligation to approve the dangerous goods training programme of the operator and the designated postal operator. Additional amendments proposed included:

- a) "Assessment" was added to the chapter title to reflect the critical role it played in ensuring personnel were competent to perform their dangerous goods functions.
- b) A new Standard establishing for which entity a dangerous goods training programme was required was added. The entities requiring a dangerous goods training programme were established in the Technical Instructions, and the panel had extensive discussions over several years on whether training programmes could be required for entities not intending to handle dangerous goods shipped by air. Most panel members wanted to mandate training for such entities, but this was not feasible in States that did not have oversight authority over entities not performing functions described in the Annex or the Technical Instructions. However, if an entity performed a function described in Annex 18 or the Technical Instructions, they were required to have been trained in these States regardless of whether they knowingly or unknowingly performed them. The proposed Standard was intended to capture this concept by stating that training programmes were required by any entity that offered, handled or transported dangerous goods by air or caused to offer, handle, or transport dangerous goods by air.
- c) The need for recurrent training and assessment within 24 months of previous training and assessment was one of the requirements moved from the Technical Instruction. Twenty-four months was established to reflect the fact that the regulations were modified at least once every two years through the biennial editions of the Technical Instructions. There were concerns that this could imply that training once every two years was sufficient to ensure competency was maintained. The provision was revised to focus on the need for supplemental training to ensure competency was maintained while still maintaining the minimum requirement for recurrent training and assessment within 24 months of previous training and assessment.

10. **CHAPTER 10. DANGEROUS GOODS SAFETY INTELLIGENCE**

10.1 Chapter 10 replaced reporting and investigation provisions in existing Chapter 12 of Annex 18. It was the output of work stemming from a request from the Air Navigation Commission (ANC) to develop a dangerous goods incident reporting system began 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.

10.2 The panel 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. It questioned whether development of an effective global system was feasible. The panel 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 might have an impact on global safety. The proposed amendments to Annex 18 supported this goal while aligning with Annexes 19 and 13. 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 expanded in cases where further clarity was needed or where entities other than operators needed to be addressed. The panel concluded that this approach would strengthen the link between dangerous goods and State safety management responsibilities.

10.3 The panel completed the proposed amendment and supporting guidance material at its twenty-sixth and twenty-seventh meetings but recommended against seeking comments from Contracting States at that time in case further refinement was needed to align with the panel's larger task of clarifying State oversight responsibilities in Annex 18 (see DGP/26 Report on Agenda Item 6 and DGP/27 Report on Agenda Item 5). Accordingly, Chapter 10 has been refined since DGP/27 to ensure alignment with the over-all amendment proposal.

11. **CHAPTER 11. DANGEROUS SECURITY PROVISIONS**

11.1 Existing Chapter 13 was modified to include physical and cyber security of data provisions with respect to the processing of exemptions for the transport of high consequence dangerous goods and a requirement for security personnel to receive dangerous goods training.

**APPENDIX B TO THE REPORT ON AGENDA ITEM 5
(English only)**

**PROPOSED AMENDMENT TO ANNEX 18 — THE SAFE TRANSPORT
OF DANGEROUS GOODS BY AIR**

NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT

The text of the amendment is arranged to show revisions as shown below:

~~Text to be deleted is shown in blue with a blue line through it.~~ (strikeout text)

text to be deleted

New text to be inserted is shown in red with red underline (redline text)

new text to be inserted

~~Text to be deleted is shown in blue with a blue line through it~~ (strikeout text) followed by the replacement text which is shown in red with red underline (redline text).

new text to replace existing text

Text moved from a different location is identified with a reference to the location it is moved from in a light-red shaded box immediately before the redline text in the new location.

text moved from a different location

Text that is moved to a different location is identified with a reference to the location it is moved to in a light-blue shaded box immediately before the strikeout text in the original location.

text moved to a different location

FOREWORD**Historical background**

The provisions of Annex 18 govern the international transport of dangerous goods by air. The material in this Annex was developed by the Air Navigation Commission in response to a need expressed by Contracting States for an internationally agreed set of provisions governing the safe transport of dangerous goods by air. They were adopted by Council on 26 June 1981 and became applicable on 1 January 1984.

**Relationship with the Technical Instructions
for the Safe Transport of Dangerous Goods by Air
(Doc 9284)**

Annex 18 specifies the broad Standards and Recommended Practices to be followed to enable dangerous goods to be carried safely. The broad provisions are amplified by the detailed specifications of the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) (Technical Instructions). In order to assist in achieving compatibility with the regulations covering the transport of dangerous goods by other modes of transport, the provisions of this Annex the Technical Instructions are based on the Recommendations of the on the transport of dangerous goods for all modes of transport developed by the United Nations Committee of Experts on the Transport of Dangerous Goods Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods and the Regulations for the Safe Transport of Radioactive Materials of the International Atomic Energy Agency. The intent of using this common base by all modes of transport is to allow cargo to be transferred safely and smoothly between air, sea, rail, and road modes. Modifications from these recommendations are made in the Technical to address specific aviation needs while keeping in the mind the need to ensure modal compatibility.

**Relationship with Status of the Technical Instructions
for the Safe Transport of Dangerous Goods by Air
(Doc 9284)**

The provisions of Annex 18 govern the international transport of dangerous goods by air. The broad provisions of this Annex are amplified by the detailed specifications of the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284). The detailed requirements of the Technical Instructions are considered binding on a State by virtue of 2.3.1.1 of this Annex unless it has notified a difference to this provision under Article 38 of the Convention.

Amendments to Annex 18 and the Technical Instructions

Annex 18 is intended to contain stable material requiring only minor amendments using the normal Annex amendment process. The Technical Instructions require more substantial and frequent amendments to keep up with day-to-day operational use. The significant growth and complexity in air cargo operations since Annex 18 was first adopted necessitates the implementation of the same proactive strategy to improve safety performance needed in other aviation sectors through the State safety programme (SSP). Provisions aimed at ensuring States integrate dangerous goods operations within their SSP were adopted by Council on ... 2025 through Amendment 13. The provisions provide clarity and sufficient detail to effectively outline States' responsibilities with respect to the safe transport of

dangerous goods by air and the interrelationship of responsibilities between dangerous goods and other aviation activities. In order that a comprehensive document may be available to States for implementation of the dangerous goods provisions prescribed by this Annex, an Attachment hereto describes the interrelationships between Annex 18 and other Annexes bearing on the safe transport of dangerous goods by air.

The Air Navigation established the Dangerous Goods Panel (DGP) and tasked it with maintaining the Technical Instructions. The DGP meets periodically to review comments received from States and interested international organizations, to consider any changed recommendations of the United Nations Committee or the IAEA, to address safety and facilitation issues specific to air transport and to prepare revised editions of the Technical Instructions. Amendments recommended by the DGP are published in panel meeting reports and made available on www.icao.int/safety/DangerousGoods/.

Amendments recommended by the DGP are reviewed by the Air Navigation Commission and approved, issued and amended by the Council. Action taken by the Air Navigation Commission or the Council on the recommendations is published in the Supplement to DGP meeting reports and made available on www.icao.int/safety/DangerousGoods/.

A new edition of the Technical Instructions is published every two years. Amendments to the Technical Instructions during the specific period of applicability of an edition of the document may also be published if deemed necessary. Amendments during the specific period of applicability are made available on www.icao.int/safety/dangerous goods.

Guidance

Guidance to States on the implementation of Annex 18 is contained in *Oversight and Management of the Safe Transport of Dangerous Goods by Air Manual (Doc xxxxx)*.

The Technical Instructions are supported by the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284)*. The Supplement contains guidance to assist States when considering authorizations to transport dangerous goods by air that the Technical Instructions forbid under normal circumstances through approvals or exemptions.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex, and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specific request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.

The attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

In the specific case of 2.2.1 of this Annex, it should be noted that States are expected to file a difference only if they are unable to accept the binding nature of the Technical Instructions. Variations from the detailed provisions of the Technical Instructions are to be reported to ICAO for publication in that document as required by 2.5 of this Annex. Such detailed variations from the Technical Instructions will not be published with any other differences in a Supplement to this Annex and are not expected to be published under the provisions of Annex 15.

Promulgation of information. The establishment and withdrawal of any changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards specified in this Annex should be notified and take effect in accordance with the provisions of Annex 15.

...

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS

When the following terms are used in this Annex, they have the following meanings:

Approval. An authorization granted by an appropriate national authority for:

- a) the transport of dangerous goods forbidden on passenger and/or cargo aircraft where the Technical Instructions state that such goods may be carried with an approval; or
- b) other purposes as provided for in the Technical Instructions.

Note.— In the absence of a specific reference in the Technical Instructions allowing the granting of an approval, an exemption may be sought.

Cargo. Any property carried on an aircraft other than mail and accompanied or mishandled baggage.

Note.— This definition differs from the definition of “cargo” given in Annex 9 — Facilitation.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The term is referred to in Annex 18. The definition is replicated from the Technical Instructions.

~~**Cargo aircraft.** Any aircraft, other than a passenger aircraft, which is carrying goods or property.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The term is not referred to in Annex 18.

Civil aviation authority (CAA). The governmental entity or entities, however titled, that are directly responsible for the regulation of all aspects of civil air transport, technical (i.e. air navigation and aviation safety) and economic (i.e. the commercial aspects of air transport).

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The term is referred to in Annex 18. The definition is replicated from the <i>Safety Oversight Manual</i> (Doc 9734).

Consignment. One or more packages of dangerous goods accepted by an operator from one shipper at one time and at one address, received for in one lot and moving to one consignee at one destination address.

Crew member. A person assigned by an operator to duty on an aircraft during a flight duty period.

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 the Technical Instructions or which are classified according to those Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/26 AN Min. 207-5 AN Min. 209-2	Justification: The need was identified during work on harmonizing provisions of the Technical Instructions with the UN Recommendations on the Transport of Dangerous Goods for incorporation in the 2019-2020 Edition. The amendment corrected inaccurate use of the term “risk”. The definition in the Technical Instructions already aligns with the UN Model Regulations. The ANC conducted a final review of the amendment following State consultation. It was pointed out, and recognized by the Commission, that the amendment proposal was administrative in nature and, as such, should be consolidated with other Annex 18 amendment proposals which could imply a later applicability date than the currently indicated 7 November 2019. (AN Min 209-2).

Dangerous goods accident. An occurrence associated with and related to the transport of dangerous goods by air, not necessarily occurring on board an aircraft, which results in fatal or serious injury to a person or major property or environmental damage.

Note.— A dangerous goods accident may also constitute an aircraft accident as defined in Annex 13— Aircraft Accident and Incident Investigation.

<i>Origin:</i>	<i>Rationale:</i>
DGP/26 and DGP/29	Clarification that a dangerous goods accident is not restricted to an accident associated with the operation of an aircraft. The wording aligns with text in the definition for dangerous goods incident. It is important to capture accidents not associated with the operation of an aircraft because they could indicate a safety deficiency that might have resulted in an aircraft accident if the dangerous goods had been loaded on the aircraft. (see DGP/26 Report and DGP/26-IP/6)

Dangerous goods incident. An occurrence, other than a dangerous goods accident, associated with and related to the transport of dangerous goods by air, not necessarily occurring on board an aircraft, ~~which results in injury to where:~~

- a) ~~a person;~~ is injured;
- b) ~~there is~~ property or environmental damage~~;~~
- c) ~~there is~~ fire, breakage, spillage, leakage of ~~fluid~~contents or radiation or ~~there is~~ other evidence that the integrity of the packaging has not been maintained. ~~Any;~~ or
- d) ~~occurrence relating to the transport of dangerous goods which seriously jeopardizes the safety of the aircraft or its occupants~~ is also deemed to constitute a ~~is~~ jeopardized.

Note.— A dangerous goods incident; may also constitute an aircraft incident as defined in Annex 13 — Aircraft Accident and Incident Investigation.

<i>Origin:</i>	<i>Rationale:</i>
DGP/26 and DGP/29	— Editorial amendments to improve readability (see DGP/26 Report and DGP/26-IP/6). — “fluid” is replaced with “contents” to include solids. — Note added to establish relationship between a dangerous goods incident and an aircraft incident under Annex 13. It is similar to the one added under “Dangerous goods accident”.

Designated postal operator. Any governmental or non-governmental entity officially designated by a Universal Postal Union (UPU) member country to operate postal services and to fulfil the related obligations arising from the acts of the UPU Convention on its territory.

Exception. A provision in this Annex which excludes a specific item of dangerous goods from the requirements normally applicable to that item.

Exemption. An authorization, other than an approval, granted by an appropriate national authority providing relief from the provisions of the Technical Instructions.

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

Misdeclared dangerous goods. Dangerous goods offered for transport by air that are identified to not be in accordance with the information provided on the dangerous goods transport document or other documentation, when applicable.

Note.— Dangerous goods identified by the operator during the acceptance check as not being in compliance with the applicable provisions of the Technical Instructions are not included in this definition.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The term is referred to in Annex 18.

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Overpack. An enclosure used by a single shipper to contain one or more packages and to form one handling unit for convenience of handling and stowage.

Note.— A unit load device is not included in this definition.

Package. The complete product of the packing operation consisting of the packaging and its contents prepared for transport.

Packaging. ~~Receptacles~~ One or more receptacles and any other components or materials necessary for the ~~receptacle~~ receptacles to perform ~~its~~ their containment ~~function~~ and other safety functions.

Note.— For radioactive material, see Part 2, paragraph 7.21.3 of the Technical Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/27 AN Min. 213-3	Recommended by DGP/27 (Recommendation 1/1). Harmonizes the definition with the one contained in the UN Recommendations on the Transport of Dangerous Goods and corrects an out-of-date reference in the note. The definition is also contained in the Technical Instructions and already aligns with the UN Model Regulations. The Air Navigation Commission made a preliminary review of Recommendation 1/1 and, noting the amendment was editorial in nature, agreed that it should be referred for comments to Contracting States and appropriate international organizations, together with the Commission's own comments and proposals thereon, only as part of a more substantive amendment to Annex 18. (AN Min. 213-3)

~~**Passenger aircraft.** An aircraft that carries any person other than a crew member, an operator's employee in an official capacity, an authorized representative of an appropriate national authority or a person accompanying a consignment or other cargo.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The term is not referred to in Annex 18.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Remote pilot-in-command. The remote pilot designated by the operator as being in command and charged with the safe conduct of a flight.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The term is referred to in Annex 18.

Safety management system (SMS). A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Serious injury. An injury which is sustained by a person in an accident and which:

- a) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or
- b) results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
- c) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or
- d) involves injury to any internal organ; or
- e) involves second or third degree burns, or any burns affecting more than 5 per cent of the body surface; or
- f) involves verified exposure to infectious substances or injurious radiation.

State of Destination. The State in the territory of which the consignment is finally to be unloaded from an aircraft.

State of Origin. The State in the territory of which the consignment is first to be loaded on an aircraft.

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Supply chain. Includes any entity that:

a) offers, handles or transports; or

b) causes to offer, handle or transport;

dangerous goods in cargo or mail.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Proposed amendment introduces new provisions for safety of the supply chain. The definition scopes the term.

Technical Instructions. The *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284), approved and issued periodically in accordance with the procedure established by the ICAO Council.

Undeclared dangerous goods. Dangerous goods offered for transport by air where there is no dangerous goods transport document or other documentation, when permitted, describing the contents as containing dangerous

goods or the package is not marked to identify the contents as containing dangerous goods, as required by the Technical Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The term is referred to in Annex 18.

UN number. The four-digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals to identify an article or substance or a particular group of articles or substances.

Unit load device (ULD). ~~Any type of freight container. Any type of freight container, aircraft container, aircraft pallet with a net, or aircraft pallet with a net over an igloo.~~ A device for grouping and restraining cargo, mail and baggage for air transport. It is either an aircraft container, or a combination of an aircraft pallet with a net, or and an aircraft pallet with a net over an igloo. A ULD is designed to be directly restrained by the aircraft cargo loading system.

Note 1.— An overpack is not included in this definition.

Note 2.— A freight container for radioactive material is not included in this definition (see Part 2, paragraph 7.1.3 of the Technical Instructions).

<i>Origin:</i>	<i>Rationale:</i>
DGP/29 and DGP- WG/23	The definition has been in the Annex since its first edition. It is also contained in the Technical Instructions. The wording refers to older terminology and to articles that are no longer used. The amendment modernizes the terminology. The addition of Note 2 is made for the sake of alignment with the definition in the Technical Instructions. It was added to the Technical Instructions to differentiate a freight container for radioactive material from a ULD, because the former has specific characteristics that do not necessarily apply to a ULD. It was never made The amendment will ensure this concept is clear and ensure alignment between the two documents.

CHAPTER 2. APPLICABILITY GENERAL

2.1 Objectives

Each Contracting State shall have as a primary objective in the transport of dangerous goods by air the safety of the aircraft, its occupants, ground personnel, the general public and the environment.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The safe transport of dangerous goods by air is dependent on the diligence of entities both within and outside the aviation system. The primary objective when using aviation to transport or carry dangerous goods for those outside the aviation system is not typically the safety of the aircraft and its occupants. It is therefore important to make this the primary objective when it comes to the safe transport of dangerous goods by air in addition to those entities that could be impacted by dangerous goods by other modes (i.e. ground personnel, the general public and the environment). This SARP is based on 2.1.1 of Annex 17 — <i>Security</i> , another Annex that deals with entities outside the aviation system.

2.1.2 General Applicability

~~2.1.2.1~~ 2.2.1 The Standards and Recommended Practices of this Annex shall be applicable to ~~all~~ international ~~operations of civil aircraft~~ aviation.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<ul style="list-style-type: none"> a) “General” is removed for the sake of consistency with other Annexes. b) Applying the Annex to aviation rather than to the operation of the aircraft is intended to ensure that entities other than the operator that contribute to the safe transport of dangerous goods are covered by this Annex.

The following is moved from 2.3:

Recommendation.—~~In the interests of safety and of minimizing interruptions to the international transport of dangerous goods, Each Contracting States should also take the necessary measures to achieve compliance with apply the Standards and Recommended Practices contained in this Annex and the Technical Instructions for to domestic civil aircraft operations~~ aviation.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<ul style="list-style-type: none"> a) The provision relates to the applicability of the Annex and the Technical Instructions to domestic civil aircraft operations. There is a current recommendation to take the necessary measures to achieve compliance with the Annex and the Technical Instructions to domestic transport, but it is currently located outside of the applicability section of Chapter 2 (2.3). It is therefore proposed to move the recommended practice under the international applicability SARP. b) “Each” is added before “Contracting State” for the sake of consistency.

	<p>c) The current recommendation refers to the Annex and the Technical Instruction. Removing the reference to the Technical Instructions is proposed as it is considered redundant, given that Annex 18 makes the document binding on a State.</p> <p>d) It is proposed to replace “to achieve compliance” with “apply” for the sake of clarity and consistency.</p> <p>e) Text referring to “the interests of safety and minimizing interruptions to the international transport of dangerous goods” is considered more appropriate as guidance material. It is therefore proposed to remove it from the recommended practice and to elaborate on the concept in a new guidance document to support the implementation of Annex 18 (<i>Oversight and Management of the Safe Transport of Dangerous Goods by Air Manual (Doc xxxxx)</i>).</p> <p>f) “to domestic aircraft operations” is replaced with “to domestic civil aviation” to align with the revision to the previous SARP for the same reason, i.e. to ensure that entities other than the operator that contribute to the safe transport of dangerous goods are covered.</p>
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The following is moved from 2.4.1:

~~2.4.1~~2.2.2 Articles and substances which would otherwise be ~~classified~~ **classified** as dangerous goods but which are required to be aboard the aircraft in accordance with the pertinent airworthiness requirements and operating regulations, or for those specialized purposes identified in the Technical Instructions, shall be excepted from the provisions of this Annex.

The following is moved from 2.4.2:

~~2.4.2~~ *Note.—Where **See Chapter 6 for the requirements applicable to the transport of** articles and substances intended as replacements for those described in ~~2.4.1~~ 2.2.3 or which have been removed for replacement ~~are when~~ carried on an aircraft, ~~they shall be transported in accordance with the provisions of this Annex except as permitted in the Technical Instructions.~~*

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<p>a) The provision in current 2.4.1 relates to the applicability of the Annex and the Technical Instructions, but it is currently located outside of the applicability section of Chapter 2. It is therefore proposed to move the Standard to this section, i.e. the applicability section.</p> <p>b) The current Standard in 2.4.2 requiring articles and substances classified as dangerous goods which are intended as replacements for those described in 2.4.1 and those removed for replacement to be transported in accordance with the Annex is proposed for deletion from this chapter because it is proposed to be captured in Chapter 6 — Operator Responsibilities. Chapter 6 is intended to outline the dangerous goods elements the State of the Operator needs to consider when authorizing an operator to conduct air transport operations. How an operator ensures that articles and substances classified as dangerous goods needing to be replaced or intended as replacements for those described in new 2.2.3 are transported safely is one of those elements. Addressing this in Chapter 6 instead of this chapter allows for a comprehensive list of elements to be considered. The note under 2.2.2 referring to the provision in Chapter 6 is proposed to emphasize that there are limits to the exception in 2.2.2.</p>

The following is moved to new 2.4.2.1:

~~2.1.2 Where specifically provided for in the Technical Instructions, the States concerned may grant an approval provided that in such instances an overall level of safety in transport which is equivalent to the level of safety provided for in the Technical Instructions is achieved.~~

The following is moved to new 2.4.2.2:

~~2.1.3 In instances:~~

~~a) of extreme urgency; or~~

~~b) when other forms of transport are inappropriate; or~~

~~c) when full compliance with the prescribed requirements is contrary to the public interest,~~

~~the States concerned may grant an exemption from the provisions of the Technical Instructions provided that in such instances every effort shall be made to achieve an overall level of safety in transport which is equivalent to the level of safety provided for in the Technical Instructions.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	It is proposed to move the approval and exemption provisions from the applicability section to the limitation on the transport of dangerous goods by air section because they are more associated with the latter than with applicability. Approvals and exemptions are already mentioned in that section, so keeping all the relevant SARPs together makes them more comprehensive.

~~2.1.4 For the State of Overflight, if none of the criteria for granting an exemption are relevant, an exemption may be granted based solely on whether it is believed that an equivalent level of safety in air transport has been achieved.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The Standard in 2.1.4 is proposed for deletion as it is considered more appropriate to address its intent, which is not clear by the wording, in guidance material. The intent of the SARP is to address challenges faced by the State of Overflight when considering whether to grant an exemption when the criteria for granting it are not applicable to that State. The challenges faced by the State of overflight are transferred to applicants, who are often unable to acquire an exemption. Addressing the issue through guidance will allow for more comprehensive assistance to States on the subject.

Note 1 is moved to under 2.4.2.1 and Notes 2 and 3 are moved to under 2.4.2.2:

~~Note 1. For the purpose of approvals, "States concerned" are the States of Origin and the Operator, unless otherwise specified in the Technical Instructions.~~

~~Note 2. For the purpose of exemptions, "States concerned" are the States of Origin, Operator, Transit, Overflight and Destination.~~

~~— Note 3. — Guidance for the processing of exemptions, including examples of extreme urgency, may be found in the Supplement to the Technical Instructions (Part S 1, Chapter 1, 1.2 and 1.3).~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Note 1 is specific to approvals and Notes 2 and 3 are specific to the exemptions. It is proposed to move Note 1 under the provision for approvals (now 2.4.2.1) and Notes 2 and 3 under the provision for exemptions (now 2.4.2.2) to improve clarity.

~~— Note 4. — Refer to 4.3 for dangerous goods forbidden for transport by air under any circumstances.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The note is necessary in the current Annex because the provisions for approvals and exemptions and the provisions for dangerous goods forbidden under any circumstance are in different sections of this chapter. This is no longer necessary, since all of these provisions are proposed for inclusion in the same location, i.e. the limitation on the transport of dangerous goods section.

Note 5 is moved to under the title of Chapter 6 (Operator's Responsibilities) as Note 4:

~~— Note 5. — It is not intended that this Annex be interpreted as requiring an operator to transport a particular article or substance or as preventing an operator from adopting special requirements on the transport of a particular article or substance.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The note is moved to Chapter 6: Operator responsibilities as Note 4. The note is currently under the provisions for approvals and exemptions, but its application goes beyond these. Moving the note to Chapter 6 makes the provisions for operators more comprehensive.

~~2.2.3~~ **Detailed instructions**

2.3.1 Dangerous Goods Technical Instructions

~~2.2.1~~**2.3.1.1** Each Contracting State shall take ~~the necessary~~ measures ~~to~~ **aimed at ensuring entities in the supply chain, passengers, and crew members** achieve compliance with the detailed provisions contained in the Technical Instructions.

2.3.1.2 Each Contracting State shall also take the necessary measures to achieve compliance with any amendment to the Technical Instructions which may be published during the specified period of applicability of an edition of the Technical Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	a) The addition of a new heading in 2.3 is proposed to describe the intent of the Technical Instructions.

	<p>b) The current Standard could incorrectly be interpreted to imply that the State needs to comply with the detailed provisions contained in the Technical Instructions. It is the entities performing functions related to the transport of dangerous goods by air that need to achieve compliance. The proposed amendment makes who needs to comply with the Technical Instructions clear.</p> <p>c) Current 2.2.1 contains two Standards. Editorial amendment to separate it into two.</p>
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The following is moved to 4.3:

~~2.2.2~~ **Recommendation.**— ~~Each Contracting State should inform ICAO of difficulties encountered in the application of the Technical Instructions and of any amendments which it would be desirable to make to them.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	It is proposed to move the requirement for States to inform ICAO of difficulties applying the Technical Instructions to a proposed new Chapter 3: Provision of information to ICAO. The new chapter is intended to contain all requirements related to providing ICAO with information in one place.

~~2.2.3~~**2.3.1.2** **Recommendation.**— *Although an amendment to the Technical Instructions with an immediate applicability for reasons of safety may not yet have been implemented in a Contracting State, such State should, nevertheless, facilitate the movement of dangerous goods in its territory which are consigned from another Contracting State in accordance with that amendment, providing the goods comply in total with the revised requirements.*

The following is moved from 2.6:

~~2.6~~**2.3.1.3** ~~Surface transport~~**Multimodal transport**

Recommendation.— ~~States~~ *Each Contracting State should ~~make provisions~~ take measures to enable dangerous goods intended for air transport and prepared in accordance with the ~~ICAO~~ Technical Instructions to be accepted for ~~surface~~ transport ~~by other modes of transport~~ to or from aerodromes.*

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<p>a) The amendment to the heading is proposed because multimodal transport is a common term in the dangerous goods world and makes the intent of the provision easier to understand.</p> <p>b) Editorial revisions are proposed for the sake of clarity and consistency.</p> <p>c) The references to “ICAO” is unnecessary as there is now a definition for “Technical Instructions”.</p> <p>d) It is proposed to move the recommendation from its current location to this location so that all provisions related to the Technical Instructions are in one place.</p>

2.4 Limitation on the transport of dangerous goods by air

The following is moved from 4.1:

4.1.2.4.1 Dangerous goods permitted for transport by air

2.4.1.1 Each Contracting State shall only permit the transport of dangerous goods as cargo or mail by air shall be forbidden except as established in this Annex and the detailed specifications and procedures provided in provisions of the Technical Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<ul style="list-style-type: none"> a) Moved from Chapter 4 (Limitation on the transport of dangerous goods by air) to keep the general regulatory framework for transport of dangerous goods by air in one place. b) Editorial revisions to the Standard are proposed to improve clarity by aligning the wording with the header. c) “Each Contracting State” is added to reflect the fact that the SARP is directed at the State. d) The addition of a reference to cargo or mail is proposed to differentiate from passenger baggage in the next SARP (2.4.1.2). e) “specifications and procedures” is replaced with “provisions” for the sake of consistency with other parts of the Annex.

2.4.1.2 Each Contracting State shall only permit the carriage of dangerous goods by passengers or crew members when specifically permitted in accordance with Part 8 of the Technical Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<ul style="list-style-type: none"> a) New Standard which replaces the exception from the Annex of specific articles and substances carried by passengers or crew members currently contained in 2.4.3 because dangerous goods carried by passengers and crew are not excepted from the Annex. They are forbidden unless specifically permitted in the Technical Instructions, and there are criteria for allowing them there. b) Having the provision here clarifies the distinction between dangerous goods carried as cargo and dangerous good carried by passengers and crew and the fact that they are both covered by the Annex

The following heading and Standard are moved from 4.2:

4.2.2.4.2 Dangerous goods forbidden for transport by air unless approved or exempted

~~The dangerous goods described hereunder shall be forbidden on aircraft unless exempted by the States concerned under the provisions of 2.1 or~~ Each Contracting State shall not permit the transport of dangerous goods identified in the Technical Instructions as being forbidden for transport in normal circumstances unless the provisions of the Technical Instructions indicate they may be transported under an approval granted by the ~~State of Origin~~ States concerned in accordance with 2.4.2.1 or an exemption granted by the States concerned in accordance with 2.4.2.2.

~~— a) dangerous goods that are identified in the Technical Instructions as being forbidden for transport in normal circumstances; and~~

~~— b) infected live animals.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<ul style="list-style-type: none"> a) Moved from Chapter 4 (Limitation on the transport of dangerous goods by air) to keep the general regulatory framework for transport of dangerous goods by air in one place. b) The addition of “ approved” in the heading is proposed because the SARP refers to both approvals and exemptions. c) “Each Contracting State shall not permit ...” added to reflect the fact that the SARP is directed at the State. d) Editorial amendments to clarify intent. e) The references to exemption and approval provisions have changed because it is proposed to move these provisions from the general applicability section this section. f) Reference to only State of Origin for an approval is inconsistent with what is currently in the general applicability section which includes the State of the Operator as part of the approval process. “States concerned” is explained under the specific provisions for approvals (2.4.2.1) and exemptions (2.4.2.2) below. g) Deleted “infected live animals” because this is covered by the Technical Instructions.

2.4.2.1 Approvals

The following Standard is moved from 2.1.2:

2.1.2—Where specifically provided for in the Technical Instructions, the States concerned may grant an approval provided that in such instances an overall level of safety in transport which is equivalent to the level of safety provided for in the Technical Instructions is achieved.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<ul style="list-style-type: none"> a) Moved from the current general applicability section in 2.1.2 as it relates more to the limitation provisions than to applicability provisions. b) Addition of heading for the sake of clarity.

The following noted is moved from 2.1 (below 2.1.4):

~~Note 1.~~— For the purpose of approvals, “States concerned” are the States of Origin and the Operator, unless otherwise specified in the Technical Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The note applies to the States concerned when issuing an approval. It is moved from under 2.1.4 (Note 1) so that it is directly below the approval provision.

2.4.2.2 Exemptions

The following Standard is moved from 2.1.3:

2.1.3—In instances:

- a) of extreme urgency; or
- b) when other forms of transport are inappropriate; or

- c) when full compliance with the prescribed requirements is contrary to the public interest,

the States concerned may grant an exemption from the provisions of the Technical Instructions provided that in such instances every effort shall be made to achieve an overall level of safety in transport which is equivalent to the level of safety provided for in the Technical Instructions.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	a) Moved from the current general applicability section in 2.1.3 as it relates more to the limitation provisions than to applicability provisions. b) Addition of heading for the sake of clarity.

The following note is moved from 2.1 (below 2.1.4):

Note 2.1.— For the purpose of exemptions, “States concerned” are the States of Origin, Operator, Transit, Overflight and Destination.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The note applies to the States concerned when issuing an exemption. It is moved from under 2.1.4 (Note 2) so that it is directly below the exemption provision.

The following note is moved from 2.1 (below 2.1.4):

Note 3.— Guidance for the processing of exemptions, including examples of extreme urgency, may be found in the ~~Supplement to the Technical Instructions (Part S-1, Chapter 1, 1.2 and 1.3)~~ Oversight and Management of the Safe Transport of Dangerous Goods by Air Manual (Doc xxxxx), Chapter yy.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The guidance for processing of exemptions is currently contained in the Supplement to the Technical Instructions, but it is proposed to move all guidance specific to States from the Supplement to a new manual so that all guidance is consolidated in one place. The note is updated accordingly.

The following heading and Standard are moved from 4.3:

4.3.2.4.3 Dangerous goods forbidden for transport by air under any circumstances

~~Articles and substances that are specifically identified by name or by generic description in the Technical Instructions as being forbidden for transport by air under any circumstances shall not be carried on any aircraft.~~

2.4.3.1 Each Contracting State shall forbid any article or substance to be transported by air under any circumstance if, as presented for transport, it is liable to explode, dangerously react, produce a flame or dangerous evolution of heat or dangerous emission of toxic, corrosive or flammable gases or vapours under conditions normally encountered in transport.

2.4.3.2 Each Contracting State shall not grant approvals or exemptions for articles and substances identified in 2.4.3.1.

Note.— Guidance on dangerous goods forbidden for transport under any circumstance is provided in Doc xxxx, Chapter yy.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<p>a) Moved from Chapter 4 (Limitation on the transport of dangerous goods by air) to keep the general regulatory framework for transport of dangerous goods by air in one place.</p> <p>b) The current SARP in 4.3 refers to articles or substances specifically identified by name or by generic description in the Technical Instructions as being forbidden for transport under and circumstance. The Technical Instructions make it clear that it is not possible to list all dangerous goods that should be forbidden under any circumstance. It is therefore proposed to include an explanation of what cannot be safely transported on an aircraft in the SARP and to include guidance for determining this in the new document referred to in the note.</p> <p>c) States should not grant approvals or exemptions to transport such articles or substances. New 2.4.3.2 makes this clear.</p>

The following is moved to 2.2:

2.3—Domestic civil aircraft operations

~~—Recommendation.— In the interests of safety and of minimizing interruptions to the international transport of dangerous goods, Contracting States should also take the necessary measures to achieve compliance with the Annex and the Technical Instructions for domestic civil aircraft operations.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The recommendation relates to the applicability of the Annex and the Technical Instructions to domestic civil aircraft operations. It is therefore proposed to move the recommended practice to the applicability section of this chapter (2.2.2).

The following is moved to 2.2.3:

2.4—Exceptions

~~— 2.4.1—Articles and substances which would otherwise be classed as dangerous goods but which are required to be aboard the aircraft in accordance with the pertinent airworthiness requirements and operating regulations, or for those specialized purposes identified in the Technical Instructions, shall be excepted from the provisions of this Annex.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The SARP relates to the applicability of the Annex and the Technical Instructions. It is therefore proposed to move it to the applicability section of this chapter (2.2.3).

The following is moved to Chapter 6:

~~— 2.4.2—Where articles and substances intended as replacements for those described in 2.4.1 or which have been removed for replacement are carried on an aircraft, they shall be transported in accordance with the provisions of this Annex except as permitted in the Technical Instructions.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	This SARP is proposed to be captured in Chapter 6 — Operator Responsibilities. Chapter 6 is intended to outline the dangerous goods elements the State of the Operator needs to consider when authorizing an operator to conduct air transport operations. How an operator ensures that articles and substances classified as dangerous goods which are intended as replacements is one of those elements. Addressing this in Chapter 6 instead of this chapter allows for a comprehensive list of elements to be considered.

~~— 2.4.3 Specific articles and substances carried by passengers or crew members shall be excepted from the provisions of this Annex to the extent specified in the Technical Instructions.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The exception for dangerous goods carried by passengers and crew is proposed for deletion because they are not excepted from the Annex. They are forbidden unless specifically permitted in the Technical Instructions, and there are criteria for allowing them there. A new SARP related to dangerous goods carried by passengers and crew is proposed for inclusion under Dangerous goods permitted for transport by air (see proposed 2.4.1) and a new chapter devoted to dangerous goods permitted for carriage by passengers and crew (Chapter 7).

The is moved to 3.2:

~~2.5 Notification of variations from the Technical Instructions~~

~~— 2.5.1 Where a Contracting State adopts different provisions from those specified in the Technical Instructions, it shall notify ICAO promptly of such State variations for publication in the Technical Instructions.~~

~~— Note. Contracting States are expected to notify a difference to the provisions of 2.2.1 under Article 38 of the Convention only if they are unable to accept the binding nature of the Technical Instructions. Where States have adopted different provisions from those specified in the Technical Instructions, they are expected to be reported only under the provisions of 2.5.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The requirement for States to inform ICAO of State variations is proposed to be moved to a new Chapter 3: Provision of information to ICAO. The new chapter is proposed so that all requirements related to providing ICAO with information is in one place.

~~— 2.5.2 Recommendation. The State of the Operator should take the necessary measures to ensure that when an operator adopts more restrictive requirements than those specified in the Technical Instructions, the notification of such operator variations is made to ICAO for publication in the Technical Instructions.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Few operator variations are reported to ICAO, and updates to already reported variations are not always provided. Users of the Technical Instructions cannot depend on these variations. Operator variations are more reliably reported to industry and included in industry regulations. It is therefore proposed that the recommendation be deleted.

The following is moved to 2.3.1.3:

~~2.6~~ **Surface transport**

~~**Recommendation.** States should make provisions to enable dangerous goods intended for air transport and prepared in accordance with the ICAO Technical Instructions to be accepted for surface transport to or from aerodromes.~~

The following is moved to Chapter 4.1:

~~2.7~~ **National authority**

~~Each Contracting State shall designate and specify to ICAO an appropriate authority within its administration to be responsible for ensuring compliance with this Annex.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The requirement for States to designate and specify to ICAO an appropriate authority within its administration to be responsible for ensuring compliance with this Annex is proposed to be moved to a new Chapter 3: Provision of information to ICAO. The new chapter is proposed so that all requirements related to providing ICAO with information is in one place.

~~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 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.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The intent of this Standard is to ensure anyone preparing a package containing dangerous goods for transport classifies the hazards associated with the dangerous goods in accordance with the Technical Instructions. However, the Standard does not make this clear nor does it make the obligation the Standard places on a State clear. A new Chapter 5 on the safety of the supply chain is proposed which captures the intent and State obligation of this SARP and similar SARPs in current Chapters 5 (Packing), 6 (Labelling and marking) and 7 (Shipper's responsibilities).

CHAPTER 3. PROVISION OF INFORMATION TO ICAO

The following is moved from 2.7:

2.7.3.1 National authority

Each Contracting State shall designate and specify to ICAO an appropriate authority within its administration to be responsible for ensuring compliance with this Annex.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	a) Proposed to be moved from Chapter 2 to this chapter so that all SARPs related to providing information to ICAO are in one place. b) Some States have more than one authority responsible for ensuring compliance with this Annex, so “an appropriate authority” is replaced with “the authorities”.

The following is moved from 2.5:

2.5.3.2 Notification of variations from the Technical Instructions

2.5.1—Where a Contracting State adopts different provisions from those specified in the Technical Instructions, it shall notify ICAO promptly of such State variations for publication in the Technical Instructions.

Note.— *Each Contracting State ~~are~~ is expected to notify a difference to the provisions of ~~2.2.1~~ 2.3.1.1 under Article 38 of the Convention only if they are unable to accept the binding nature of the Technical Instructions. Where States have adopted different provisions from those specified in the Technical Instructions, they are expected to be reported only under the provisions of ~~2.5~~ 3.2.*

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Proposed to be moved from Chapter 2 to this chapter so that all SARPs related to providing information to ICAO are in one place.

3.3 Difficulties encountered in the application of the Technical Instructions

The following is moved from 2.2.2:

2.2.2—**Recommendation.**— *Each Contracting State should inform ICAO of difficulties encountered in the application of the Technical Instructions and of any amendments which it would be desirable to make to them.*

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	a) Heading added to differentiate between other sections of this chapter b) Proposed to be moved from Chapter 2 to this chapter so that all SARPs related to providing information to ICAO are in one place.

~~CHAPTER 4. — LIMITATION ON THE TRANSPORT OF DANGEROUS GOODS BY AIR~~

The following is moved to 2.4.1:

~~4.1 — Dangerous goods permitted for transport by air~~

~~The transport of dangerous goods by air shall be forbidden except as established in this Annex and the detailed specifications and procedures provided in the Technical Instructions.~~

The following is moved to 2.4.2:

~~4.2 — Dangerous goods forbidden for transport by air unless exempted~~

~~The dangerous goods described hereunder shall be forbidden on aircraft unless exempted by the States concerned under the provisions of 2.1 or unless the provisions of the Technical Instructions indicate they may be transported under an approval granted by the State of Origin:~~

- ~~— a) dangerous goods that are identified in the Technical Instructions as being forbidden for transport in normal circumstances; and~~
- ~~— b) infected live animals.~~

The following is moved to 2.4.3:

~~4.3 — Dangerous goods forbidden for transport by air under any circumstances~~

~~Articles and substances that are specifically identified by name or by generic description in the Technical Instructions as being forbidden for transport by air under any circumstances shall not be carried on any aircraft.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<p>The SARPs currently in Chapter 4 for the limitation on the transport of dangerous goods are moved to Chapter 2 to keep the general regulatory framework for transport of dangerous goods by air in one place.</p> <p>It is proposed that Chapter 4 contain safety management provisions specific to dangerous goods.</p>

CHAPTER 4. STATE SAFETY MANAGEMENT RESPONSIBILITIES

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	A new chapter on State safety management responsibilities specific to dangerous goods is proposed with the aim of ensuring all entities involved with the safe transport of dangerous goods are working towards the level of safety expected in aviation. Having a common understanding of safety presents challenges unique to dangerous goods transport because of the many entities involved, including regulatory authorities and industries outside the aviation system. The chapter is intended to make the fact that transporting dangerous goods is an integral part of the State safety programme required by Annex 19 and to ensure activities necessary to achieve targeted levels of safety specific to dangerous goods that go beyond what Annex 19 requires are covered. The structure of the chapter is based on the components of an SSP so that there are four sections, one for each component.

Note 1.— The provisions for a State Safety Programme contained in Chapter 3 to Annex 19 are applicable to this Annex. This chapter of Annex 18 contains specific State safety management responsibilities relevant to the safe transport of dangerous goods by air.

Note 2.— Guidance on an SSP is contained in the Safety Management Manual (SMM) (Doc 9859).

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Authorities involved with the safe transport of dangerous goods by air may not all be part of the aviation sector in some States. The notes are intended to ensure all are aware of the requirements for a State safety programme and the fact that the transport of dangerous goods by air is an integral part of it.

4.1 State safety policy, objectives and resources

Note 1.— See 5.1 for primary aviation legislation specific to the safe transport of dangerous goods by air.

Note 2.— See 5.2 and 8.1 for specific operating regulations specific to the safe transport of dangerous goods by air.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	SARPs related to primary aviation legislation and specific operator regulations specific to dangerous goods are proposed for inclusion in Chapter 5. References to these sections in Notes 1 and 2 are proposed for the sake of comprehensiveness.

Note 3.— Guidance on the establishment of authorities or government agencies supported by sufficient and qualified personnel and provided with adequate financial resources for the management of safety specific to dangerous goods is contained in Doc xxxx, Chapter yy.

Note 4.— Guidance on staffing, minimum qualification requirements and training for dangerous goods technical personnel involved in the regulation and oversight of transport of dangerous goods by air is contained in Doc xxxx, yyyy.

Note 5.— Guidance on coordination between the civil aviation authority and other appropriate national authorities that could have an impact on the transport of dangerous goods by air is contained in Doc xxxx, yyyy.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The SSP elements highlighted by Notes 3 to 4 are covered by the existing SARPs in Annex 19, so there is no need for SARPs specific to dangerous goods. However, they highlight areas that have been identified as needing to be strengthened through safety oversight audits. The notes refer to guidance on how these elements apply to dangerous goods and how they can be established.

4.2 State safety risk management

4.2.1 Exemption and approval obligations

Each Contracting State shall implement documented processes and procedures to ensure that individuals and organizations performing activities related to the transport of dangerous goods meet the established requirements before they are allowed to exercise the privileges of an exemption or approval to conduct the relevant dangerous goods activity.

Note.— Guidance on the establishment of documented processes and procedures related to the granting of exemption and approval obligations is contained in Doc xxxx, Chapter yyyy.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29 DGP/27	This Standard is aimed at ensuring States meet their responsibilities with respect to the granting of exemptions and approvals related to the transport of dangerous goods by air. The DGP has identified a need for additional guidance on the issuance of approvals and exemptions, particularly with respect to which entities the approval or exemption should be issued to and the relationship between the shipper, the operator and the State authorities processing them. Ensuring each Contracting State has documented process and procedures and providing guidance to assist them in developing them will help ensure States meet their exemption and approval obligations under Critical element 6.

4.2.2 Safety management system obligations

Note 1.— The transport of dangerous goods is included in the scope of the operator's safety management system (SMS).

Note 2.— See Annex 6 — Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes, Chapter 15 and Part IV — International Operations — Remotely Piloted Aircraft Systems, Chapter 15 for SARPs concerning hazards associated with the transport of items in the cargo compartment, the conduct of a specific safety risk assessment, and the responsibilities for the transport of dangerous goods.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29 DGP/27	The notes are aimed at ensuring the State is aware how safety management system obligations apply to dangerous goods. A new SARP is unnecessary because Note 1 is a statement of fact and Note 2 is covered by the SARPs in Annex 6.

4.2.3 Dangerous goods safety investigations

Moved from 12.1 and 12.2:

~~— 12.1 With the aim of preventing the recurrence of dangerous goods accidents and incidents, each Contracting State shall establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory and which involve the transport of dangerous goods originating in or destined for another State. Reports on such accidents and incidents shall be made in accordance with the detailed provisions of the Technical Instructions.~~

~~— 12.2 **Recommendation.** With the aim of preventing the recurrence of dangerous goods accidents and incidents, each Contracting State should establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory other than those described in 12.1. Reports on such accidents and incidents should be made in accordance with the detailed provisions of the Technical Instructions.~~

4.2.3.1 Each Contracting State shall establish a process to investigate dangerous goods accidents and dangerous goods incidents reported in accordance with Chapter 10 in support of the management of safety in the State.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<p>This new Standard replaces the SARPs currently in 12.1 and 12.2 that require each Contracting State to establish procedures for investigating and compiling information concerning dangerous goods accidents and incidents which occur in its territory and involve the transport of dangerous goods originating or destined for another State and to report in accordance with the Technical Instructions and recommends the same when not originating or destined for another State.</p> <p>While accidents and incidents defined in accordance with Annex 13 apply to the operation of an aircraft, dangerous goods accidents and incidents defined in accordance with Annex 18 do not necessarily occur on board an aircraft. This SARP is intended to ensure that dangerous goods accidents or incidents that do not meet the criteria for accidents or incidents defined in Annex 13 are investigated. The investigation of an accident or incident that did not occur on board an aircraft is valuable because it may reveal safety deficiencies that need to be resolved to prevent another accident or incident and to prevent an incident from leading to an accident.</p> <p>The wording of the Standard is revised to:</p> <ol style="list-style-type: none"> a) align with the wording in Annex 19; b) require the establishment of a process to conduct safety investigations for all accidents and incidents involving the transport of dangerous goods that are reported to the State regardless of where they occurred; c) remove the reference to compiling information because this is covered in new Chapter 10 which is proposed to contain provisions related to safety intelligence.

Moved from 12.3:

~~— 12.3 With the aim of preventing the recurrence of instances of undeclared or misdeclared dangerous goods in cargo, each Contracting State shall establish procedures for investigating and compiling information concerning such~~

~~occurrences which occur in its territory and which involve the transport of dangerous goods originating in or destined for another State. Reports on such instances shall be made in accordance with the detailed provisions of the Technical Instructions.~~

~~—12.4 **Recommendation.**—With the aim of preventing the recurrence of instances of undeclared or misdeclared dangerous goods in cargo, each Contracting State should establish procedures for investigating and compiling information concerning such occurrences which occur in its territory other than those described in 12.3. Reports on such instances should be made in accordance with the detailed provisions of the Technical Instructions.~~

4.2.3.2 Each Contracting State shall establish and implement a risk-based process for the investigation of:

- a) occasions when undeclared dangerous goods are discovered in cargo or mail;
- b) occasions when dangerous goods not permitted in passenger or crew baggage are discovered; and
- c) other safety issues

which are reported in accordance with Chapter 10 in support of the management of safety in the State.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	<p>This new Standard replaces the SARPs currently in 12.3 and 12.4 that require each Contracting State to establish procedures for investigating and compiling information concerning occurrences of undeclared or misdeclared dangerous in cargo which occur in its territory and involve the transport of dangerous goods originating or destined for another State and to report in accordance with the Technical Instructions and recommends the same when not originating or destined for another State.</p> <p>The new Standard is revised to:</p> <ul style="list-style-type: none"> a) emphasize the need for the process to be risk-based; b) require the establishment of the risk-based process for all occurrences of undeclared dangerous goods involving the transport of dangerous goods that are reported to the State regardless of where they occurred; c) expand the requirement to dangerous goods discovered in passengers and crew baggage that are not permitted and to other safety issues. d) remove the reference to compiling information because this is covered in new Chapter 10 which is proposed to contain provisions related to safety intelligence. <p>The expansion of the requirement to dangerous goods discovered in passengers and crew baggage is made to reflect a long-standing requirement in the Technical Instructions. Prohibited dangerous goods pose a safety risk if they are carried onboard aircraft by passengers and crew because they are either unaware of or deliberately ignore the requirements. Investigations should be conducted with the aim of reducing the likelihood of prohibited dangerous goods being carried by passengers and crew.</p>

Moved from 11.2:

Recommendation.—4.2.3.2 Each Contracting State ~~should~~ shall participate in cooperative efforts with other Contracting States ~~concerning~~ conducting safety investigations, as necessary, with the aim of resolving safety issues

~~and eliminating~~ violations of dangerous goods regulations, ~~with the aim of eliminating such violations. Cooperative efforts could include coordination of investigations and enforcement actions; exchanging information on a regulated party's compliance history; joint inspections and other technical liaisons, exchange of technical staff, and joint meetings and conferences. Appropriate information that could be exchanged include safety alerts, bulletins or dangerous goods advisories; proposed and completed regulatory actions; incident reports; documentary and other evidence developed in the investigation of incidents; proposed and final enforcement actions; and educational/outreach materials suitable for public dissemination.~~

Note 1.— See 10.4 for requirements related to the exchange of information.

Note 2.— Guidance on dangerous goods safety investigations can be found in Doc xxxx.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Revised to expand beyond violations of dangerous goods regulations to include any safety issue. The cooperation of States when conducting safety investigations of an international nature is critical for the resolution of dangerous goods safety issues. The recommendation is therefore upgraded to a SARP. The text proposed for deletion is not a Standard or a Recommended Practice, but it is helpful so it will be incorporated in the new guidance document to support implementation of Annex 18.

4.2.4 Hazard identification and safety risk assessment

4.2.4.1 Each Contracting State shall establish and maintain a process to identify the State's system-level hazards associated supply chains from collected safety data.

4.2.4.2 Each Contracting State shall develop and maintain a process to assess safety risks associated with identified hazards introduced within supply chains.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	See rationale under 4.2.5.

4.2.5 Management of safety risks

4.2.5.1 Each Contracting State shall ensure that the mechanism for the resolution of safety issues required by Annex 19 addresses safety issues associated with the supply chain, passengers and crew.

4.2.5.2 Each Contracting State shall include preventing dangerous goods not in compliance with the Technical Instructions from being transported in cargo or mail as part of their safety risk management activities.

4.2.5.3 Each Contracting State shall implement measures with the aim of ensuring that entities within the supply chain have processes and procedures in place to identify dangerous goods in cargo or mail that are not in compliance with the Technical Instructions and to prevent them from being loaded on an aircraft.

4.2.5.4 Each Contracting State shall include preventing passengers and crew from taking dangerous goods on board an aircraft which they are not permitted to carry as part of their safety risk management activities.

4.2.5.5 Each Contracting State shall implement measures with the aim of ensuring that entities handling baggage can recognize dangerous goods not permitted to be carried by passengers and crew and prevent them from being carried on an aircraft when they are discovered.

Note.— Guidance on managing safety risks associated with dangerous goods is contained in Docs 10102 and Doc xxxx, Chapter yyyy.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Annex 19 requires that States establish and maintain processes for hazard identification, assessing safety risks and managing safety risks. Hazards introduced throughout the supply chain may pose significant safety risks to aviation. Annex 6 obligates the operator to consider the supply chain in its safety risk management activities. Supply chains impact multiple operators. It is therefore important for the State to assess system-wide hazards and manage system-wide safety risks the aim of improving system-wide safety.

4.3 State Safety assurance

Moved from 11.1:

11.1— Inspection systems

~~Each Contracting State shall establish inspection, surveillance and enforcement procedures for all entities performing any function prescribed in its regulations for air transport of dangerous goods with a view to achieving compliance with those regulations.~~

~~— Note 1.— It is envisaged that these procedures would include provisions for:~~

~~— inspecting dangerous goods consignments prepared, offered, accepted or transported by the entities referred to in 11.1;~~

~~— inspecting the practices of the entities referred to in 11.1; and~~

~~— investigating alleged violations (see 11.3).~~

~~— Note 2.— Guidance on dangerous goods inspections and enforcement may be found in the Supplement to the Technical Instructions (Part S-5, Chapter 1 and Part S-7, Chapters 5 and 6).~~

Note.— Guidance on surveillance obligations and State safety performance specific to dangerous goods is contained in Doc xxxx, Chapter yyyy.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The current Standard in 11.1 requires inspection, surveillance and enforcement procedures for all entities performing any dangerous goods function prescribed in a State's regulations. Requiring surveillance activities for all these entities is impossible to implement given the vast numbers performing dangerous goods functions and the fact that licence, certification, authorization or approval obligations do not apply to entities other than operators and designated postal operators. Inspection and enforcement procedures are covered by the SARPs for State safety risk management. The note provides guidance which will be incorporated in the new guidance manual. It will be aimed at ensuring the State is aware how Annex 19 surveillance obligations apply to dangerous goods.

4.4 State Safety promotion

4.4.1 Each Contracting State shall establish and manage safety promotional activities aimed at preventing passengers from carrying dangerous goods forbidden to be carried by passengers on board an aircraft.

Note.— See Chapter 7 for dangerous goods carried by passengers and crew.

4.4.2 Each Contracting State shall include preventing the introduction of dangerous goods in cargo and mail which are not in compliance with the provisions of this Annex and the Technical Instructions in the State safety promotion activities required by Annex 19.

4.4.3 Each Contracting State shall establish measures to improve safety awareness and promote a positive safety culture throughout the supply chain.

Note.— Guidance related to State safety promotion and a positive safety culture specific to the safe transport of dangerous goods is contained in Doc xxx, Chapter yyy.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	State safety promotion specific to dangerous goods is needed for the same reasons it is needed in other aviation sectors. The new SARP's are needed because State safety promotion needs to extend beyond the aviation system. This is essential to the management of safety risks associated with the transport of dangerous goods, particularly the risk of non-compliance with dangerous goods regulations.

~~CHAPTER 5. PACKING~~

~~5.1—General requirements~~

~~Dangerous goods shall be packed in accordance with the provisions of this chapter and as provided for in the Technical Instructions.~~

~~5.2—Packagings~~

~~—5.2.1—Packagings used for the transport of dangerous goods by air shall be of good quality and shall be constructed and securely closed so as to prevent leakage which might be caused in normal conditions of transport, by changes in temperature, humidity or pressure, or by vibration.~~

~~—5.2.2—Packagings shall be suitable for the contents. Packagings in direct contact with dangerous goods shall be resistant to any chemical or other action of such goods.~~

~~—5.2.3—Packagings shall meet the material and construction specifications in the Technical Instructions.~~

~~—5.2.4—Packagings shall be tested in accordance with the provisions of the Technical Instructions.~~

~~—5.2.5—Packagings for which retention of a liquid is a basic function, shall be capable of withstanding, without leaking, the pressure stated in the Technical Instructions.~~

~~—5.2.6—Inner packagings shall be so packed, secured or cushioned as to prevent their breakage or leakage and to control their movement within the outer packaging(s) during normal conditions of air transport. Cushioning and absorbent materials shall not react dangerously with the contents of the packagings.~~

~~—5.2.7—No packaging shall be reused until it has been inspected and found free from corrosion or other damage. Where a packaging is reused, all necessary measures shall be taken to prevent contamination of subsequent contents.~~

~~—5.2.8—If, because of the nature of their former contents, uncleaned empty packagings may present a hazard, they shall be tightly closed and treated according to the hazard they constitute.~~

~~—5.2.9—No harmful quantity of a dangerous substance shall adhere to the outside of packages.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The provisions in this chapter are details contained in the Technical Instructions. The SARPs are therefore redundant. Packing requirements are now covered more generally by the SARP proposed in new Chapter 5, 5.2.1 b) 3).

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	A new chapter on the safety of the supply chain is proposed to more clearly outline the expectations of States. Current Annex 18 has three separate chapters that address responsibilities of entities involved with preparing and offering dangerous goods for transport. These are: Chapter 3, Classification; Chapter 5, Packing; Chapter 6: Labelling and marking; Chapter 7: Shipper's responsibilities. All of them point to the provisions of the Technical Instructions, with some provisions from the Technical Instructions repeated in the Annex. They do not directly state what is required of the State, and there does not appear to be any rationale for determining what should be repeated and what should simply be referred to. This new chapter clearly defines what is expected of the State, which is to adopt regulations directed at entities in the supply chain preparing, offering and transporting dangerous goods for transport by air. The new chapter lists the functions for which regulations are needed and refers to the applicable parts of the Technical Instructions where the detailed Instructions are found. Listing the functions provides the added benefit of an overview of how the Technical Instructions mitigate risk.

CHAPTER 5. SAFETY OF THE SUPPLY CHAIN

5.1 Primary aviation legislation (CE 1)

5.1.1 Each Contracting State shall promulgate laws that enable the oversight and management of the safety of the supply chain for the transport of dangerous goods by air, the resolution of safety issues and the enforcement of regulations through the relevant authorities established for that purpose.

5.2 Specific operating regulations

5.2.1 Each Contracting State shall adopt regulations to require, at a minimum, that:

a) a person does not offer or cause to be offered for transport:

1) articles or substances which are forbidden for transport in accordance with 2.4.3;

2) articles or substances which are forbidden for transport in accordance with 2.4.2 unless permitted by the States concerned through an approval or exemption;

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	4.1.2 a) and b) replaces part of current 7.1.

b) a person does not offer or cause to be offered dangerous goods for transport unless:

1) policies and procedures have been developed and provided to enable them to carry out the function for which they are responsible;

2) associated hazards are identified in accordance with the classification criteria of Part 2 of the Technical Instructions;

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	4.1.2 b) 2) replaces current Chapter 3

3) risks associated with the identified hazards are mitigated at the package level through quantity limitations and packing and packaging requirements in accordance with Parts 3, 4 and 6 of the Technical Instructions;

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	4.1.2 b)3 Replaces part of current 7.1 (Shippers' responsibilities — general requirements) and Chapter 5 (Packing).

4) hazard and handling information are communicated to entities in the supply chain in accordance with the marking, labelling and documentation requirements of Parts 3, 4 and 5 of the Technical Instructions;

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	4.1.2 b) 4) replaces Chapter 6 (Labelling and Marking) and 7.2 (Dangerous goods transport document).

5) documentation is retained in accordance with the Technical Instructions;

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The need for documentation to be retained is required by the detailed provisions of the Technical Instructions. The documentation is evidence of compliance and provides important information for safety investigations.

6) in the case of radioactive material, a radiation protection programme has been established and is maintained in accordance with Part 1;6 of the Technical Instructions;

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The Technical Instructions contain provisions for a radiation protection programme by entities involved with the transport of radioactive material. There was never any reference to this in Annex.

- c) operators accept, handle and transport dangerous goods in accordance with Chapter 6;
- d) dangerous goods accidents, dangerous goods incidents and occasions when undeclared or misdeclared dangerous goods are discovered are reported in accordance with Chapter 10;
- e) training and assessment is provided in accordance with Chapter 9; and
- f) dangerous goods are not offered, caused to be offered or accepted for transport by mail unless specifically permitted in accordance with Chapter 8.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	5.2.1 c), d), e) and f) establish the need for the State to adopt regulations aimed at the operator, reporting, training and assessment and the mail. They refer to the associated SARPs in the Annex.

|

~~CHAPTER 6. LABELLING AND MARKING~~

~~6.1—Labels~~

~~Unless otherwise provided for in the Technical Instructions, each package of dangerous goods shall be labelled with the appropriate labels and in accordance with the provisions set forth in those Instructions.~~

~~6.2—Markings~~

~~—6.2.1—Unless otherwise provided for in the Technical Instructions, each package of dangerous goods shall be marked with the proper shipping name of its contents and, when assigned, the UN number and such other markings as may be specified in those Instructions.~~

~~—6.2.2—*Specification markings on packagings.* Unless otherwise provided for in the Technical Instructions, each packaging manufactured to a specification contained in those Instructions shall be so marked in accordance with the appropriate provisions of those Instructions and no packaging shall be marked with a packaging specification marking unless it meets the appropriate packaging specification contained in those Instructions.~~

~~6.3—Languages to be used for markings~~

~~—**Recommendation.**—*In addition to the languages required by the State of Origin and pending the development and adoption of a more suitable form of expression for universal use, English should be used for the markings related to dangerous goods.*~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The provisions in this chapter are details contained in the Technical Instructions. The SARPs are therefore redundant. Labelling and marking requirements are now covered more generally by the SARP proposed in new Chapter 5, 5.2.1 b) 4).

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	This rationale applies to all of Chapter 6. SARPs for the operator responsibilities have been expanded to include more details from the Technical Instructions. The SARPs also differentiate between operators with and without specific approvals to transport dangerous goods as cargo. Including more details in the Annex should allow the State of the Operator to better assess an operator's ability to perform dangerous goods functions through the AOC process and during surveillance activities.

Moved from Chapter 8:

CHAPTER ~~8~~6. OPERATOR'S RESPONSIBILITIES

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

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

Moved from under 2.1.4, Note 5:

Note ~~5~~3.— It is not intended that this Annex be interpreted as requiring an operator to transport a particular article or substance or as preventing an operator from adopting special requirements on the transport of a particular article or substance.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Moved from Chapter 2: Applicability. The note is currently under the provisions for approvals and exemptions, but its application goes beyond these. Moving the note to this chapter makes the provisions for operators more comprehensive.

Note 3.— The Each Contracting State is required to recognize as valid an air operator certificate issued by another Contracting State in accordance with 4.2.2 of Annex 6, Part I, 2.2.2 of Part III — International Operations — Helicopters and 4.2.3 of Part IV. This includes the specific approval to transport dangerous goods as cargo issued by another Contracting State.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Moved from Chapter 10: Training programmes. The note currently in Chapter 10 was added to remind States that training programmes were subject to the approval of the State of the Operator and that training programmes of foreign operators were not subject to the State's approval. The existing note simply referenced the applicable Standard in Annex 6. The panel modified the note to describe the Standard and moved it to the operator chapter because it applied to more than training.

6.1 General

6.1.1 The operator shall not transport dangerous goods as cargo unless specifically approved to do so by the State of the Operator in accordance with the applicable provisions of Annex 6.

6.1.3 The operator with a specific approval to transport dangerous goods as cargo that includes the carriage of radioactive material shall develop, implement and maintain a radiation protection programme in accordance with the Technical Instructions.

6.2 Dangerous goods components of the Operations Manual

6.2.1 The operator shall develop and implement procedures in accordance with the Technical Instructions, which shall be documented in the operations or other appropriate manual available to flight crew, cabin crew and other employees, that address, as applicable, the transport of cargo and mail and the carriage of dangerous goods in passenger and crew baggage, aimed at ensuring that:

a) undeclared and misdeclared dangerous goods are identified and prevented from being transported as cargo or carried by passengers and crew;

Note.— This includes operator material classified as dangerous goods.

b) information on the transport of dangerous goods is displayed at cargo acceptance areas in accordance with the Technical Instructions;

c) passengers and crew are prevented from carrying dangerous goods either as or in carry-on baggage, as or in checked baggage, or on their person unless the dangerous goods are permitted in accordance with Part 8 of the Technical Instructions;

d) information is provided to passengers in accordance with Chapter 7;

e) the reporting requirements of 6.9 are fulfilled;

f) all personnel, including third-party personnel, involved in the acceptance, handling, loading and unloading of cargo, mail, passenger and crew baggage are informed of the operator's limitations with regard to the transport of dangerous goods;

g) articles and substances intended as replacements for those described in 2.2.3 or which have been removed for replacement are carried in accordance with this Annex and the detailed provisions of the Technical Instructions by an operator with specific approval to transport dangerous goods as cargo.

6.2.2 An operator with a specific approval to transport dangerous goods as cargo shall in addition:

a) develop and implement procedures in accordance with the Technical Instructions, which shall be documented in the Operations or other appropriate manuals available to flight crew, cabin crew and other employees, that address, as applicable, the carriage of dangerous goods in cargo, mail, passenger and crew baggage; and

b) ensure that all personnel, including third-party personnel, involved in the acceptance, handling, loading and unloading of cargo, mail, passenger and crew baggage are informed of the operator's specific approvals [and limitations] with regard to the transport of dangerous goods.

Moved from 8.1:

8.16.3 Acceptance for transport

6.3.1 The operator shall develop and implement procedures aimed at preventing the introduction of undeclared and misdeclared dangerous goods into air transport.

Note.— See 6.9 concerning the reporting of dangerous goods accidents, dangerous goods incidents and instances where undeclared or misdeclared dangerous goods are identified.

6.3.2 An operator with a specific approval to transport dangerous goods as cargo shall:

a) An operator shall develop and implement procedures to ensure that dangerous goods are not accepted ~~dangerous goods~~ for transport by air:

~~a)1)~~ 1) unless the dangerous goods are accompanied by a completed dangerous goods transport document, except where the Technical Instructions indicate that such a document is not required; and

~~b)2)~~ 2) until the package, overpack or freight container containing the dangerous goods has been inspected in accordance with the acceptance procedures contained in the Technical Instructions.

~~Note 1.— See Chapter 12 concerning the reporting of dangerous goods accidents and incidents.~~

~~Note 2.— Special provisions relating to the acceptance of overpacks are contained in the Technical Instructions.~~

8.2 Acceptance checklist

b) An operator shall develop and use an acceptance checklist as an aid to compliance with the provisions of 8.1 ~~6.3.2 a), except where the Technical Instructions indicate that such an acceptance checklist is not required.~~

Moved to 6.6:

8.3 Loading and stowage

~~Packages and overpacks containing dangerous goods and freight containers containing radioactive materials shall be loaded and stowed on an aircraft in accordance with the provisions of the Technical Instructions.~~

8.46.4 Inspection for damage or leakage

~~8.4.16.4.1 An operator shall develop and implement procedures to ensure that if evidence of damage or leakage is found, the area where the cargo or unit load device were stowed on the aircraft shall be inspected for damage or contamination by dangerous goods.~~

6.4.2 An operator with a specific approval to transport dangerous goods as cargo shall develop and implement procedures to ensure that:—

a) Packages and overpacks containing dangerous goods and freight containers containing radioactive materials shall be inspected for evidence of leakage or damage before loading on an aircraft or into a unit load device. Leaking or damaged packages, overpacks or freight containers shall not be loaded on an aircraft.

b) unit load devices containing packages of dangerous goods bearing a hazard label are identified in accordance with the Technical Instructions;

~~8.4.2 c)~~ A unit load devices ~~shall~~ are not ~~be~~ loaded aboard an aircraft unless the device has been inspected and found free from any evidence of leakage from, or damage to, any dangerous goods contained therein.

~~8.4.3 d)~~ Where any package of dangerous goods loaded on an aircraft that appears to be damaged or leaking, ~~is the operator shall~~ removed ~~such package~~ from the aircraft, or ~~arrange for~~ its removal by an appropriate authority or organization is arranged, and thereafter shall ensure that the remainder of the consignment is in a proper condition for transport by air and that no other package has been contaminated.

~~8.4.4 e)~~ Packages or overpacks containing dangerous goods and freight containers containing radioactive materials ~~shall be~~ are inspected for signs of damage or leakage upon unloading from the aircraft or unit load device. ~~If evidence of damage or leakage is found, the area where the dangerous goods or unit load device were stowed on the aircraft shall be inspected for damage or contamination.~~

Moved from 8.6:

8.6.5 Removal of contamination

8.6.1—An operator shall develop and implement procedures to ensure that:

a) Any hazardous contamination found on an aircraft as a result of leakage or damage to dangerous goods ~~shall~~ be is removed without delay.

8.6.2—b) An aircraft which has been contaminated by radioactive materials ~~shall~~ is immediately ~~be~~ taken out of service and not returned to service until the radiation level at any accessible surface and the non-fixed contamination are not more than the values specified in the Technical Instructions.

Note.— The procedures of an operator without a specific approval to transport dangerous goods as cargo are applicable to contamination from the inadvertent transport of undeclared dangerous goods; and dangerous goods carried by passengers and crew.

Moved from 8.3:

8.3.6.6 Loading and stowage

An operator with a specific approval to transport dangerous goods as cargo shall develop and implement procedures to ensure that:

a) Packages, ~~and~~ overpacks and unit load devices containing dangerous goods and freight containers containing radioactive materials ~~shall be~~ are loaded and stowed on an aircraft in accordance with the provisions of the Technical Instructions;

Moved from 8.7:

8.7.1—b) Packages containing dangerous goods which might react dangerously one with another ~~shall~~ are 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.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/26 AN Min. 209-2	Justification: The Standard in 8.7.2 is no longer necessary as it refers to detailed segregation requirements in the Technical Instructions which no longer exist. Segregation requirements for toxic and infectious substances were removed from the 2015-2016 Edition of the Technical Instructions (see paragraph 2.7.1.1 of the DGP/24 Report). The ANC conducted a final review of the amendment following State consultation. It was pointed out, and recognized by the Commission, that the amendment proposal was administrative in nature and, as such, should be consolidated with other Annex 18 amendment proposals which could imply a later applicability date than the currently indicated 7 November 2019. (AN Min 209-2).

~~8.7.3 c) Packages of containing radioactive materials shall be are~~ 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.

Moved from 8.8:

~~d) When packages containing dangerous goods subject to the provisions contained herein are~~ loaded in an aircraft, ~~the operator shall are~~ protected ~~the dangerous goods~~ from being damaged, and ~~shall~~ secured ~~such goods~~ in the aircraft in such a manner that will prevent any movement in flight which would change the orientation of the packages. ~~For packages containing radioactive materials, the securing shall be adequate to ensure that the separation requirements of 8.7.3 are met at all times.~~

Moved from 8.9:

~~e) Packages of dangerous goods bearing the “Cargo aircraft only” label shall be are~~ loaded in accordance with the ~~provisions in the~~ Technical Instructions; ~~and~~

~~8.5 Loading restrictions in passenger cabin or on flight deck~~

~~f) Dangerous goods shall are~~ not ~~be~~ carried in an aircraft cabin occupied by passengers or on the flight deck of an aircraft, except in circumstances permitted by the ~~provisions of the~~ Technical Instructions.

Moved to 6.5:

~~8.6 Removal of contamination~~

~~— 8.6.1 Any hazardous contamination found on an aircraft as a result of leakage or damage to dangerous goods shall be removed without delay.~~

~~— 8.6.2 An aircraft which has been contaminated by radioactive materials shall immediately be taken out of service and not returned to service until the radiation level at any accessible surface and the non-fixed contamination are not more than the values specified in the Technical Instructions.~~

~~8.7—Separation and segregation~~

Moved to 6.6:

~~— 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 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.~~

~~8.8—Securing of dangerous goods cargo loads~~

Moved to 6.6:

~~When dangerous goods subject to the provisions contained herein are loaded in an aircraft, the operator shall protect the dangerous goods from being damaged, and shall secure such goods in the aircraft in such a manner that will prevent any movement in flight which would change the orientation of the packages. For packages containing radioactive materials, the securing shall be adequate to ensure that the separation requirements of 8.7.3 are met at all times.~~

~~8.9—Loading on cargo aircraft~~

Moved to 6.6:

~~Packages of dangerous goods bearing the “Cargo aircraft only” label shall be loaded in accordance with the provisions in the Technical Instructions.~~

Moved from 9.1:

~~9.16.7~~ **Information to pilot-in-command or remote-pilot-in-command**

~~The operator of an aircraft in which dangerous goods are to be carried shall~~An operator with a specific approval to transport dangerous goods as cargo shall develop and implement procedures to ensure that when an aircraft is to transport dangerous goods as cargo, ~~provide~~ the pilot-in-command or remote-pilot-in-command, as applicable, is provided as early as practicable before departure of the aircraft with ~~written~~ information ~~as specified~~ in accordance with the Technical Instructions.

Moved from 9.2:

~~9.26.8~~ **Information and instructions to flight crew members Emergency procedures**

~~6.8.1~~ The operator shall **develop and** provide such information in the Operations Manual as will enable the flight crew to carry out its responsibilities with regard to the transport of dangerous goods and shall provide instructions to

crew members as to the action to be taken in the event of an emergencies-emergency arising involving dangerous goods.

Moved from 9.5:

6.8.2 An operator with a specific approval to transport dangerous goods as cargo shall develop and implement procedures to address that if an in-flight emergency occurs, the pilot-in-command or remote-pilot-in-command shall, as soon as the situation permits, inform the appropriate air traffic services unit, for the information of aerodrome authorities, of any dangerous goods on board the aircraft, as provided for in the Technical Instructions.

Moved from 9.6:

9-6-16.8.3 An operator with a specific approval to transport dangerous goods as cargo shall develop and implement procedures to ensure that if in the event of:

- a) an aircraft accident; or
- b) a serious incident where dangerous goods carried as cargo may be involved,

the operator of the aircraft carrying dangerous goods as cargo shall provide information information that was provided to the pilot-in-command or remote-pilot-in-command is provided, without delay, to emergency services responding to the accident or serious incident about the dangerous goods on board, as shown on the written information to the pilot-in-command. As soon as possible, the operator shall also provide this information to the appropriate authorities of the State of the Operator and the State in which the accident or serious incident occurred.

9-6-26.8.4 An operator with a specific approval to transport dangerous goods as cargo shall develop and implement procedures to ensure that if in the event of an aircraft incident, the operator of an aircraft carrying dangerous goods as cargo shall, if requested to do so, provide the information that was provided to the pilot-in-command or remote-pilot-in-command is provided without delay to emergency services responding to the incident and to the appropriate authority of the State in which the incident occurred, about the dangerous goods on board, as shown on the written information to the pilot-in-command.

Note.— The terms “accident”, “serious incident” and “incident” are as defined in Annex 13.

6.9 Reporting

6.9.1 The operator shall develop and implement procedures to ensure that:

- a) where undeclared dangerous goods are discovered in cargo or mail, a report is provided to the appropriate authorities of the State of the Operator and the State in which this occurred;
- b) where dangerous goods not permitted by the Technical Instructions are discovered in passenger or crew baggage by the operator, or the operator is advised of such dangerous goods, that a report is submitted to the appropriate authority of the State in which this occurred.

6.9.2 An operator with a specific approval to transport dangerous goods as cargo shall in addition develop and implement procedures to ensure that:

- a) dangerous goods accidents and dangerous goods incidents are reported to the appropriate authorities of the State of the Operator and the State in which the dangerous goods accident or dangerous goods incident occurred; and
- b) where misdeclared dangerous goods are discovered in cargo or mail, a report is provided to the appropriate authorities of the State of the Operator and the State in which this occurred.

6.10 Retention of documents

6.10.1 An operator with a specific approval to transport dangerous goods as cargo shall develop and implement procedures to ensure that documents are retained in accordance with the Technical Instructions.

~~CHAPTER 7. SHIPPER'S RESPONSIBILITIES~~

~~7.1—General requirements~~

~~Before a person offers any package or overpack of dangerous goods for transport by air, that person shall ensure that the dangerous goods are not forbidden for transport by air and are properly classified, packed, marked, labelled and accompanied by a properly executed dangerous goods transport document, as specified in this Annex and the Technical Instructions.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	This SARP is covered by proposed new 5.2.1 a), 5.2.1 b) 2), 5.2.1 b) 3), 5.2.1 b) 4) and 5.2.1 b) 5)

~~7.2—Dangerous goods transport document~~

~~7.2.1 Unless otherwise provided for in the Technical Instructions, the person who offers dangerous goods for transport by air shall complete, sign and provide to the operator a dangerous goods transport document, which shall contain the information required by those Instructions.~~

~~7.2.2 The transport document shall bear a declaration signed by the person who offers dangerous goods for transport indicating that the dangerous goods are fully and accurately described by their proper shipping names and that they are classified, packed, marked, labelled, and in proper condition for transport by air in accordance with the relevant regulations.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The provisions in 7.2 are details contained in the Technical Instructions. The SARPs are therefore redundant. The dangerous goods transport document is covered by proposed new 5.2.1 b) 4)

~~7.3—Languages to be used~~

~~**Recommendation.** In addition to the languages which may be required by the State of Origin and pending the development and adoption of a more suitable form of expression for universal use, English should be used for the dangerous goods transport document.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	This recommendation is contained in by Part 5, Chapter 4, 4.1.6.3 of the Technical Instructions. It is therefore redundant.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	This rationale applies to all of Chapter 7. Currently Annex 18 excepts dangerous goods carried by passengers and crew to the extent specified in the Technical Instructions. Saying they are excepted is not entirely accurate because they are forbidden unless specifically permitted in the Technical Instructions, and there are criteria for allowing them there. The proposed new Standard in 2.4.1.2 makes this clear. This new chapter is proposed to make the responsibility of the State clear and to merge provisions related to the carriage of dangerous goods by passengers and crew together in one place.

CHAPTER 7. DANGEROUS GOODS CARRIED BY PASSENGERS AND CREW

7.1 Limitations

Each Contracting State shall adopt regulations which prohibit passengers and crew from carrying dangerous goods as or in carry-on baggage, as or in checked baggage or on their person unless the dangerous goods are permitted in accordance with Part 8 of the Technical Instructions.

Moved from 9.3:

9.3.2 Provision of information to passengers

Each Contracting State shall ~~ensure that information is~~ adopt regulations to require that airport operators promulgated ~~information~~ in such a manner that passengers are warned ~~as to~~ of the types of dangerous goods which they are forbidden from ~~transporting~~ carrying aboard an aircraft as provided for in ~~the~~ Part 7 of the Technical Instructions.

Note.— Requirements for the operator to provide information to passengers are contained in Chapter 6.

Moved to Chapter 6:

CHAPTER 8.— OPERATOR’S RESPONSIBILITIES

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

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

8.1— Acceptance for transport

~~An operator shall not accept dangerous goods for transport by air:~~

- ~~— a) unless the dangerous goods are accompanied by a completed dangerous goods transport document, except where the Technical Instructions indicate that such a document is not required; and~~
- ~~— b) until the package, overpack or freight container containing the dangerous goods has been inspected in accordance with the acceptance procedures contained in the Technical Instructions.~~

~~— Note 1.— See Chapter 12 concerning the reporting of dangerous goods accidents and incidents.~~

~~— Note 2.— Special provisions relating to the acceptance of overpacks are contained in the Technical Instructions.~~

8.2— Acceptance checklist

~~An operator shall develop and use an acceptance checklist as an aid to compliance with the provisions of 8.1.~~

8.3— Loading and stowage

~~Packages and overpacks containing dangerous goods and freight containers containing radioactive materials shall be loaded and stowed on an aircraft in accordance with the provisions of the Technical Instructions.~~

8.4— Inspection for damage or leakage

~~— 8.4.1 Packages and overpacks containing dangerous goods and freight containers containing radioactive materials shall be inspected for evidence of leakage or damage before loading on an aircraft or into a unit load device. Leaking or damaged packages, overpacks or freight containers shall not be loaded on an aircraft.~~

~~— 8.4.2 A unit load device shall not be loaded aboard an aircraft unless the device has been inspected and found free from any evidence of leakage from, or damage to, any dangerous goods contained therein.~~

~~— 8.4.3 Where any package of dangerous goods loaded on an aircraft appears to be damaged or leaking, the operator shall remove such package from the aircraft, or arrange for its removal by an appropriate authority or organization, and thereafter shall ensure that the remainder of the consignment is in a proper condition for transport by air and that no other package has been contaminated.~~

~~— 8.4.4 Packages or overpacks containing dangerous goods and freight containers containing radioactive materials shall be inspected for signs of damage or leakage upon unloading from the aircraft or unit load device. If evidence of damage or leakage is found, the area where the dangerous goods or unit load device were stowed on the aircraft shall be inspected for damage or contamination.~~

~~8.5—Loading restrictions in passenger cabin or on flight deck~~

~~Dangerous goods shall not be carried in an aircraft cabin occupied by passengers or on the flight deck of an aircraft, except in circumstances permitted by the provisions of the Technical Instructions.~~

~~8.6—Removal of contamination~~

~~—8.6.1—Any hazardous contamination found on an aircraft as a result of leakage or damage to dangerous goods shall be removed without delay.~~

~~—8.6.2—An aircraft which has been contaminated by radioactive materials shall immediately be taken out of service and not returned to service until the radiation level at any accessible surface and the non-fixed contamination are not more than the values specified in the Technical Instructions.~~

~~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—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.~~

~~8.8—Securing of dangerous goods cargo loads~~

~~When dangerous goods subject to the provisions contained herein are loaded in an aircraft, the operator shall protect the dangerous goods from being damaged, and shall secure such goods in the aircraft in such a manner that will prevent any movement in flight which would change the orientation of the packages. For packages containing radioactive materials, the securing shall be adequate to ensure that the separation requirements of 8.7.3 are met at all times.~~

~~8.9—Loading on cargo aircraft~~

~~Packages of dangerous goods bearing the “Cargo aircraft only” label shall be loaded in accordance with the provisions in the Technical Instructions.~~

CHAPTER 8. TRANSPORT OF DANGEROUS GOODS BY POST

Moved from under 11.4, Note 1.

Note 4.— *In accordance with the Universal Postal Union (UPU) Convention, dangerous goods are not permitted in mail, except as provided for in the Technical Instructions.*

8.1 Designated postal operator's responsibilities

8.1.1 All designated postal operators accepting mail into air transport shall:

- a) establish and maintain a dangerous goods training programme in accordance with Chapter 9;
- b) develop and implement procedures for preventing the introduction of dangerous goods in mail when not in compliance with the provisions of this Annex and the Technical Instructions; and
- c) develop and implement procedures for the reporting of dangerous goods accidents, dangerous goods incidents and occasions when undeclared or misdeclared dangerous goods are discovered in mail offered for air transport in accordance with Chapter 10.

8.1.2 A designated postal operator with a policy to allow dangerous goods in mail shall:

- a) establish procedures for controlling the introduction of dangerous goods in mail into air transport; and
- b) not permit lithium batteries identified in Part 1:2.3 of the Technical Instructions in the mail into air transport unless the civil aviation authority of its State has issued a specific approval.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Current Standard 11.4 requires procedures of designated postal operators for controlling the introduction of dangerous goods in mail into air transport be approved by the civil aviation authority of the State where the mail is accepted. Annex 18 does not require the designated postal operators to do anything. This new SARP outlines what the designated operator needs to do and what the civil aviation authority needs to consider when approving its procedures. It also adds a requirement for procedures for reporting of dangerous goods accidents, dangerous goods incidents and occasions when undeclared or misdeclared dangerous goods offered for air transport are discovered in mail. Data from these reports is necessary for the State's safety risk management activities.

8.1.3 Each Contracting State's designated postal operator accepting mail in another State shall establish procedures and training for the activities described by this chapter.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The designated postal operator is responsible for its postal operators regardless of where they operate. The civil aviation authority needs to evaluate how the designated postal operator manages its operation in other States when approving the dangerous goods training programme.

Moved from 11.4:

11.48.2 Approval of procedures for controlling the introduction of dangerous goods by mail into air transport

The procedures of a State's designated postal operators ~~for controlling the introduction of dangerous goods in mail into air transport identified in 8.1~~ shall be approved by the State's civil aviation authority ~~of the State where the mail is accepted.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The wording of the Standard was modified to remove any implication that the State must approve procedures of a foreign designated postal operator operating in its territory.

Current Note 1 is moved to top of this chapter:

~~*Note 1.— In accordance with the Universal Postal Union (UPU) Convention, dangerous goods are not permitted in mail, except as provided for in the Technical Instructions.*~~

Note 1.— See Chapter 9 for approval of the designated postal operator's dangerous goods training programmes.

~~*Note 2.— The Universal Postal Union has established procedures to control the introduction of dangerous goods into air transport through the postal services. The Universal Postal Convention embodies the rules applicable throughout the international postal service and the provisions concerning the letter-post and parcel-post services. The Universal Postal Union (UPU) requires that member countries ensure that their designated postal operators fulfil the obligations arising from the Universal Postal Convention. The Regulations to the Universal Postal Convention contain the rules of application necessary for the implementation of the Universal Postal Convention and reflect the ICAO Standards for the transport of dangerous goods in airmail (see the UPU Convention Manual Parcel Post Regulations and Letter Post Regulations).*~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Amendments to the note were made to more accurately reflect the role of the Universal Postal Union.

~~*Note 3.— Guidance for approving the procedures established by designated postal operators to control the introduction of dangerous goods into air transport may be found in the Supplement to the Technical Instructions (Part S-1, Chapter 3).*~~

CHAPTER 9. — PROVISION OF INFORMATION

Moved to 6.7:

9.1 — Information to pilot in command

~~The operator of an aircraft in which dangerous goods are to be carried shall provide the pilot in command as early as practicable before departure of the aircraft with written information as specified in the Technical Instructions.~~

Moved to 6.8.1:

9.2 — Information and instructions to flight crew members

~~The operator shall provide such information in the Operations Manual as will enable the flight crew to carry out its responsibilities with regard to the transport of dangerous goods and shall provide instructions as to the action to be taken in the event of emergencies arising involving dangerous goods.~~

Moved to 7.2:

9.3 — Information to passengers

~~Each Contracting State shall ensure that information is promulgated in such a manner that passengers are warned as to the types of dangerous goods which they are forbidden from transporting aboard an aircraft as provided for in the Technical Instructions.~~

Captured in Chapter 6:

9.4 — Information to other persons

~~Operators, shippers or other organizations involved in the transport of dangerous goods by air shall provide such information to their personnel as will enable them to carry out their responsibilities with regard to the transport of dangerous goods and shall provide instructions as to the action to be taken in the event of emergencies arising involving dangerous goods.~~

9.5 — Information from pilot in command to aerodrome authorities

Moved to 6.8.2:

~~If an in-flight emergency occurs, the pilot in command shall, as soon as the situation permits, inform the appropriate air traffic services unit, for the information of aerodrome authorities, of any dangerous goods on board the aircraft, as provided for in the Technical Instructions.~~

Moved to 6.8.3:

9.6—Information in the event of an aircraft accident or incident

~~— 9.6.1 In the event of:~~

~~— a) an aircraft accident; or~~

~~— b) a serious incident where dangerous goods carried as cargo may be involved;~~

~~the operator of the aircraft carrying dangerous goods as cargo shall provide information, without delay, to emergency services responding to the accident or serious incident about the dangerous goods on board, as shown on the written information to the pilot in command. As soon as possible, the operator shall also provide this information to the appropriate authorities of the State of the Operator and the State in which the accident or serious incident occurred.~~

~~— 9.6.2 In the event of an aircraft incident, the operator of an aircraft carrying dangerous goods as cargo shall, if requested to do so, provide information without delay to emergency services responding to the incident and to the appropriate authority of the State in which the incident occurred, about the dangerous goods on board, as shown on the written information to the pilot in command.~~

~~— Note. The terms “accident”, “serious incident” and “incident” are as defined in Annex 13.~~

<i>Origin:</i>	<i>Rationale for approach taken in amending the training provisions:</i>
DGP/29	Much of the dangerous goods training provisions currently in the Technical Instructions are proposed for inclusion in Annex 18. It is considered more appropriate to include training provisions in the Annex because the State's oversight responsibilities including the obligation to approve dangerous goods training programmes of the operator and may determine that approval is necessary for other entities in its State as well. Keeping the provisions in the Annex creates more visibility to the State and ensures they are consulted when amendments are proposed.

Moved from Chapter 10:

CHAPTER ~~10~~. TRAINING PROGRAMMES AND ASSESSMENT

<i>Origin:</i>	<i>Rationale for approach taken in amending the training provisions:</i>
DGP/29	The title is modified to reflect the critical role assessment plays in ensuring personnel are competent to perform their dangerous goods functions.

10.19.1 Establishment of Dangerous goods training programmes

Note 1.— A training programme includes elements such as design methodology, assessment, initial and recurrent training, instructor qualifications and competencies, training records, and evaluation of its effectiveness.

<i>Origin:</i>	<i>Rationale for approach taken in amending the training provisions:</i>
DGP/29	The note is moved from the Technical Instructions. It is intended to make it clear that the State needs to consider more than a course syllabus when approving dangerous goods training programmes.

~~Initial and recurrent dangerous goods training programmes shall be established and maintained in accordance with the Technical Instructions.~~ 9.1.1 Each Contracting State shall require the establishment and maintenance of a dangerous goods training programme by any entity that:

a) offers, handles, or transports dangerous goods by air; or

b) causes to offer, handle, or transport dangerous goods by air.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Who requires a dangerous goods training programme is currently established in the Technical Instructions. There have been extensive discussions on the Dangerous Goods Panel on whether training programmes can be required for entities not intending to handle dangerous goods by air. Entities such as freight forwarders play an important role in preventing undeclared dangerous goods from being introduced into the air cargo system, but they can only do this if they know how to identify them. A mandatory requirement for freight forwarders and other entities handling general cargo to be trained was introduced into the 2005-2006 Edition of the Technical Instructions, but some panel members had not interpreted the provisions to be mandatory because they referred to guidance. Whether mandating

	training for entities not intending to handle dangerous goods is feasible globally was raised by the DGP when it was revising the dangerous goods training provisions in the Technical Instructions to support a competency-based approach to training and assessment. Some States did not have oversight authority over entities not performing functions described in the Technical Instructions, so a mandatory requirement was not feasible in those States. However, entities performing functions described in the Technical Instructions are required to be trained in those States regardless of whether they knowingly or unknowingly perform them. The amendment is intended to capture this concept.
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Moved from under 10.2.1:

Note 1.— ~~A~~ Dangerous goods training programmes ~~are~~ is required for all operators regardless of whether ~~or not they are approved~~ the operator has been issued a specific approval to transport dangerous goods ~~as cargo in accordance with Annex 6.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Amendments to the note are proposed to refer to the specific approval required by Annex 6 and to specify that it applies to cargo. The need for all operators to have dangerous goods training programmes is established in new 9.1.1, but it is important to maintain this note for the same reason it was added through Amendment 12 to Annex 18. The need for clarification was based on safety oversight audit results that highlighted a lack of awareness of dangerous goods training requirements in relation to operators not approved to carry dangerous goods.

Note 2.— See Annex 6, Part I, Chapter 14; Part III, Chapter 12; and Part IV, Chapter 14 for the establishment of dangerous goods training programmes by the operator.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The note is added to establish a connection between Annex 18 and 6 with respect to the operator's dangerous goods programme. The need for a dangerous goods training programme and for the details of it to be included in the operator's operations manual are provided in Annex 6.

9.1.2 Each Contracting State shall require the establishment and maintenance of a dangerous goods programme by its designated postal operators regardless of whether the designated postal operator allows the introduction of dangerous goods in mail.

10.29.2 Approval of training programmes

10.2.19.2.1 The operator's ~~D~~dangerous goods training programme ~~for operators~~ shall be approved by the appropriate authority of the State of the Operator.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Editorial revision for the sake of alignment with the wording of other Standards.

Moved from under 10.2.3

~~Note 2.— See 4.2.2 of Annex 6—Operation of Aircraft, Part I—International Commercial Air Transport—Aeroplanes for surveillance of operations by a foreign operator, Parts I, III and IV require that States recognize as valid the air operator certificate (AOC) issued by another State provided that the requirements under which the certificate was issued are at least equal to the applicable Standards specified in Annexes 6 and 19. This includes the dangerous goods training programme.~~

Origin:	Rationale:
DGP/29	Modified to clarify the intent of the existing note and to add missing references. It has been reported that some States subject foreign operators' training programmes to review and approval despite training programmes only being subject to the approval of the State of the Operator. A reference to the Standard in Annex 6 that specifies that the State shall recognize as valid an air operator certificate issued by another Contracting State was added through Amendment 12 to Annex 18. The expands the note by describing the actual requirement in Annex 6.

Moved to under 9.1.1 as Note 1:

~~Note. Dangerous goods training programmes are required for all operators regardless of whether or not they are approved to transport dangerous goods.~~

~~10.2.29.2.2~~ Dangerous goods training programmes of a State's ~~for~~ designated postal operators shall be approved by the State's civil aviation authority ~~of the State where the mail is accepted by the designated postal operator.~~

Origin:	Rationale:
DGP/29	Revised to clarify the scope of oversight. Designated postal operators may operate in different States. The wording of the current Standard may imply that the civil aviation authority must approve the training programme of foreign designated postal operators operating in its State. The existing SARP was added to Annex 18 through Amendment 12, along with new Standards in current 11.4, to control the introduction of dangerous goods not permitted in mail from entering the airmail stream. The provisions were intended to provide for stronger relationships between civil aviation and postal authorities. Not specifying the civil aviation authority as the authority required to approve the training programme could result in the designated postal operator approving itself. The civil aviation authority needs to approve the dangerous goods programme because of the unique risks to air transport of which the designated postal operator may not be aware.

~~10.2.39.2.3~~ **Recommendation.**— *Dangerous goods training programmes required for entities other than operators and designated postal operators should be approved as determined by the appropriate national authority in accordance with its safety risk management activities.*

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Modified to clarify that a risk-based approach to determining whether to approve other entities should be used. The decision will be different among States based on the level of risk posed by specific entities in the State and the size and complexity of the State. Alternate risk mitigating approaches may be more appropriate

~~— Note 1. See 11.4 for dangerous goods by mail.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Deleted because provisions for the mail are no longer contained in one area and it would be inconsistent to cross reference provisions for one entity without cross referencing parts of the Annex for others.

Moved to under 9.2.1

~~— Note 2. See 4.2.2 of Annex 6 — Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes for surveillance of operations by a foreign operator.~~

9.3 Competency of personnel

9.2.1 Each Contracting State shall require the employer to ensure their personnel are competent to perform any function for which they are responsible prior to performing any of the functions through dangerous goods training and assessment commensurate with the functions for which they are responsible.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Moved from the Technical Instructions to make the objective of training clear.

Note.— 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 (Doc 10147).

9.2.2 Each Contracting State shall require the employer to periodically supplement training for their personnel to take account of changes in regulations and to ensure that competency has been maintained. This shall be achieved, at a minimum, by providing recurrent training and assessment within 24 months of previous training and assessment.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The need for recurrent training and assessment within 24 months of previous training and assessment is moved from the Technical Instruction. It is a long-standing requirement aimed at ensuring an employee's competence is maintained and that they are current with new regulations. Twenty-four months was established to reflect the fact that the regulations are modified at least once every two years through the biennial editions of the Technical Instructions. It implies that training once every two years is sufficient to ensure competency is maintained. The provision is revised to focus on the need for supplemental training to ensure competency is maintained while still maintaining the minimum requirement of recurrent training and assessment within 24 months of previous training and assessment.

9.2.3 Each Contracting State shall require the employer to ensure that instructors delivering training are competent in instruction and the function(s) that they will instruct prior to delivering such training.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	Moved from the Technical Instructions.

9.3 Training and assessment records

9.3.1 Each Contracting State shall require the employer to maintain a record of training and assessment for its personnel for a minimum period of 36 months from the most recent training and assessment completion month.

9.3.2 The record of training and assessment required by 9.3.1 shall be made available upon request to personnel or the appropriate national authority.

9.3.3 Each Contracting State shall identify the minimum information required to be included in a record of training and assessment.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The SARPs in Section 9.3 are moved from the Technical Instructions. The record of training provides evidence that employees have been trained and assessed as competent to perform their functions. They provide a standardized tool for authorities to use when evaluating training programmes.

Moved to Chapter 9:

~~CHAPTER 10. TRAINING PROGRAMMES~~

Moved to 9.1:

~~10.1 Establishment of training programmes~~

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

Moved to 9.2:

~~10.2 Approval of training programmes~~

~~10.2.1 Dangerous goods training programmes for operators shall be approved by the appropriate authority of the State of the Operator.~~

Moved to under 9.1.1:

~~*Note.* Dangerous goods training programmes are required for all operators regardless of whether or not they are approved to transport dangerous goods.~~

Moved to 9.2.2:

~~10.2.2 Dangerous goods training programmes for designated postal operators shall be approved by the civil aviation authority of the State where the mail is accepted by the designated postal operator.~~

Moved to 9.2.3:

~~10.2.3 **Recommendation.** 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 1.* See 11.4 for dangerous goods by mail.~~

Moved to under 9.2.1:

~~*Note 2.* See 4.2.2 of Annex 6 — Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes for surveillance of operations by a foreign operator.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	This rationale applies to all of Chapter 10. Chapter 10 replaces reporting and investigation provisions currently contained in Chapter 12. It expands upon the safety data and safety information collection, analysis, protection, sharing and exchange SARP's contained in Chapter 5 of Annex 19 to apply specifically to dangerous goods.

CHAPTER 10. DANGEROUS GOODS SAFETY INTELLIGENCE

Note.— In addition to the provisions of this chapter, other provisions relative to the promotion of dangerous goods accident and incident prevention by collection and analysis of safety data and by a prompt exchange of safety information, as part of the State safety programme (SSP), are included in Annex 19 — Safety Management and, to this effect, are applicable to this Annex. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859).

10.1 Safety data collection and processing systems

The State shall ensure its safety data collection and processing systems (SDCPS) capture, store, aggregate and enable the analysis of dangerous goods safety data and dangerous goods safety information in accordance with Annex 19, 5.1.

Note 1.— Within the context of this Annex, SDCPS refers to processing and reporting systems, safety databases, schemes for exchange of information, and recorded information including but not limited to:

- a) data and information related to safety investigations by State authorities, operators or other entities involved with the transport of dangerous goods by air;*
- b) mandatory safety reporting systems as indicated in 5.1.2 of Annex 19 and 8.1.1 of this Annex; and*
- c) voluntary safety reporting systems as indicated in 5.1.3 of Annex 19 and 8.1.2 of this Annex.*

Note 2.— Guidance related to SDCPS is contained in the Safety Management Manual (SMM) (Doc 9859) and the [DG guidance material].

10.1.1 Mandatory safety reporting system

10.1.1.1 States shall include reporting of dangerous goods accidents, dangerous goods incidents and occasions when undeclared or misdeclared dangerous goods are discovered as part of their mandatory safety reporting systems in accordance with the provisions of Annex 19.

10.1.1.2 States' mandatory reporting systems shall include a requirement for the operator to report dangerous goods accidents and dangerous goods incidents to the appropriate authority of the State in which they occurred and to the State of the Operator.

10.1.1.3 States' mandatory reporting systems shall include a requirement for the operator to report occasions when undeclared or misdeclared dangerous goods are discovered in cargo or mail to the appropriate authority of the State in which they were discovered and the State of the Operator.

10.1.1.4 States' mandatory reporting systems shall include a requirement for the operator to report occasions when dangerous goods not permitted to be carried by passengers or crew are discovered by the operator, or the operator is advised by the entity that discovers the dangerous goods, either in the baggage or on the person, of passengers or crew members to the appropriate authority of the State in which this occurred.

Note.— Dangerous goods permitted to be carried by passengers and crew are provided in Part 8 of the Technical Instructions.

10.1.1.5 States' mandatory reporting systems shall include a requirement for entities other than operators to report dangerous goods accidents and dangerous goods incidents to the appropriate authority of the State in which they occurred.

10.1.1.6 **Recommendation.**— States' mandatory reporting systems should include a requirement for entities other than operators to report occasions when undeclared or misdeclared dangerous goods are discovered to the appropriate authority of the State in which they were discovered.

10.1.2 Voluntary safety reporting system

10.1.2.1 States shall establish a voluntary dangerous goods safety reporting system to collect safety data and safety information from operators that is not captured by mandatory safety reporting systems in accordance with Annex 19, 5.1.

10.1.2.2 **Recommendation.**— States should establish a voluntary dangerous goods safety reporting system to collect safety data and safety information from entities other than operators, not captured by mandatory reporting systems in accordance with Annex 19, 5.1.

10.2 Safety data and safety information analysis

States shall establish and maintain a process to analyse the dangerous goods safety data and dangerous goods safety information from the SDCPS and associated safety databases in accordance with Annex 19, 5.2.

10.3 Safety data and safety information protection

10.3.1 States shall accord protection to dangerous goods safety data captured by, and dangerous goods safety information derived from, voluntary safety reporting systems and related sources in accordance with Annex 19, 5.3.

10.3.2 **Recommendation.**— States should extend the protection referred to in 10.3.1 to safety data captured by, and safety information derived from, mandatory dangerous goods safety reporting system and related sources in accordance with Annex 19, 5.3.

10.4 Safety information sharing and exchange

10.4.1 The State shall share and exchange dangerous goods safety information in accordance with Annex 19, 5.4.

10.4.2 If a State, in the analysis of the dangerous goods information contained in its safety data collection and processing system (SDCPS), identifies safety issues which may pose an unacceptable risk to the global aviation safety system, that State shall forward such safety information to ICAO with a minimum of delay.

Note 1.— Provisions for a SDCPS and safety information sharing and exchange between States are included in Annex 19. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859).

Note 2.— Whenever practicable, the safety information sent to ICAO is to be prepared in one of the working languages of the Organization.

10.4.3 States shall provide ICAO with dangerous goods information from their SDCPS upon request to address global safety issues related to the transport of dangerous goods.

10.4.4 States shall participate in cooperative efforts with other States with the aim of eliminating unsafe practices and non-compliance with the Technical Instructions.

10.4.5 States' cooperative efforts shall include coordination of investigations of dangerous goods accidents and dangerous goods incidents, identified safety issues related to the transport of dangerous goods, non-compliance with the Technical Instructions and enforcement actions.

CHAPTER 11.— COMPLIANCE

Moved to

11.1— Inspection systems

~~Each Contracting State shall establish inspection, surveillance and enforcement procedures for all entities performing any function prescribed in its regulations for air transport of dangerous goods with a view to achieving compliance with those regulations.~~

~~— Note 1. — It is envisaged that these procedures would include provisions for:~~

~~— inspecting dangerous goods consignments prepared, offered, accepted or transported by the entities referred to in 11.1;~~

~~— inspecting the practices of the entities referred to in 11.1; and~~

~~— investigating alleged violations (see 11.3).~~

~~— Note 2. — Guidance on dangerous goods inspections and enforcement may be found in the Supplement to the Technical Instructions (Part S 5, Chapter 1 and Part S 7, Chapters 5 and 6).~~

11.2— Cooperation between States

Moved to 3.2.3.2:

~~— **Recommendation.** — Each Contracting State should participate in cooperative efforts with other States concerning violations of dangerous goods regulations, with the aim of eliminating such violations. Cooperative efforts could include coordination of investigations and enforcement actions; exchanging information on a regulated party's compliance history; joint inspections and other technical liaisons, exchange of technical staff, and joint meetings and conferences. Appropriate information that could be exchanged include safety alerts, bulletins or dangerous goods advisories; proposed and completed regulatory actions; incident reports; documentary and other evidence developed in the investigation of incidents; proposed and final enforcement actions; and educational/outreach materials suitable for public dissemination.~~

11.3— Penalties

~~— 11.3.1 — Each Contracting State shall take such measures as it may deem appropriate to achieve compliance with its dangerous goods regulations including the prescription of appropriate penalties for violations.~~

~~— 11.3.2 **Recommendation.** — Each Contracting State should take appropriate action to achieve compliance with its dangerous goods regulations, including the prescription of appropriate penalties for violations, when information about a violation is received from another Contracting State, such as when a consignment of dangerous goods is found not to comply with the requirements of the Technical Instructions on arrival in a Contracting State and that State reports the matter to the State of Origin.~~

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	

Moved to Chapter 7:

11.4—Dangerous goods by mail

~~The procedures of designated postal operators for controlling the introduction of dangerous goods in mail into air transport shall be approved by the civil aviation authority of the State where the mail is accepted.~~

~~—Note 1.—In accordance with the Universal Postal Union (UPU) Convention, dangerous goods are not permitted in mail, except as provided for in the Technical Instructions.~~

~~—Note 2.—The Universal Postal Union has established procedures to control the introduction of dangerous goods into air transport through the postal services (see the UPU Parcel Post Regulations and Letter Post Regulations).~~

~~—Note 3.—Guidance for approving the procedures established by designated postal operators to control the introduction of dangerous goods into air transport may be found in the Supplement to the Technical Instructions (Part S-1, Chapter 3).~~

~~CHAPTER 12. DANGEROUS GOODS ACCIDENT AND INCIDENT REPORTING~~

Moved partly to 3.2.3 and partly to 10.1.1.2:

~~12.1 With the aim of preventing the recurrence of dangerous goods accidents and incidents, each Contracting State shall establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory and which involve the transport of dangerous goods originating in or destined for another State. Reports on such accidents and incidents shall be made in accordance with the detailed provisions of the Technical Instructions.~~

~~—12.2 **Recommendation.** With the aim of preventing the recurrence of dangerous goods accidents and incidents, each Contracting State should establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory other than those described in 12.1. Reports on such accidents and incidents should be made in accordance with the detailed provisions of the Technical Instructions.~~

~~—12.3 With the aim of preventing the recurrence of instances of undeclared or misdeclared dangerous goods in cargo, each Contracting State shall establish procedures for investigating and compiling information concerning such occurrences which occur in its territory and which involve the transport of dangerous goods originating in or destined for another State. Reports on such instances shall be made in accordance with the detailed provisions of the Technical Instructions.~~

~~—12.4 **Recommendation.** With the aim of preventing the recurrence of instances of undeclared or misdeclared dangerous goods in cargo, each Contracting State should establish procedures for investigating and compiling information concerning such occurrences which occur in its territory other than those described in 12.3. Reports on such instances should be made in accordance with the detailed provisions of the Technical Instructions.~~

CHAPTER ~~13~~ 11. DANGEROUS GOODS SECURITY PROVISIONS

11.1 Each Contracting State shall establish dangerous goods security measures, applicable ~~to shippers, operators and other individuals~~ entities in the supply chain engaged in the transport of dangerous goods by air, to be taken to minimize theft or misuse of dangerous goods that may endanger persons, property or the environment. These measures should be commensurate with security provisions specified in other Annexes and the Technical Instructions.

11.2 Each Contracting State shall establish measures to ensure the physical and cyber security of data it collects when processing exemptions for the transport of high consequence dangerous goods.

11.3 Each Contracting State shall adopt regulations to require that training and assessment in accordance with Chapter 9 are provided to security personnel who are involved with the screening of passengers and crew and their baggage and cargo or mail.

<i>Origin:</i>	<i>Rationale:</i>
DGP/29	The existing Standard is modified to include physical and cyber security of data provisions with respect to the processing of exemptions for the transport of high consequence dangerous goods and a requirement for security personnel to receive dangerous goods training. The final defence for the detection of undeclared dangerous goods is usually through security screening. This cannot be done unless security personnel are trained to recognize dangerous goods and to take measures to prevent them from being loaded on an aircraft.

Agenda Item 6: Dangerous goods provisions to support RPAS operations (Ref: Job Card DGP.007.01)

6.1 UPDATE ON THE WORK OF THE DGP WORKING GROUP ON REMOTELY PILOTED AVIATION SYSTEMS (RPAS)

6.1.1 The rapporteur of the DGP Working Group on Remotely Piloted Aircraft Systems (RPAS) (DGP-WG/RPAS) provided an update on work progressed. The group had focused on input to the amendment to Annex 18 developed to clarify States' responsibilities with respect to the safe transport of dangerous goods by air (see report on Agenda Item 5). It concluded that no significant amendments to Annex 18 were necessary to support RPAS. The scope of operations was already established through Annex 8 — *Airworthiness of Aircraft* and proposed new Annex 6 — *Operation of Aircraft, Part IV — International Operations — Remotely Piloted Aircraft Systems*. The group did recommend expanding references to pilot-in-command to include remote pilot-in-command and adding the definition for remote pilot-in-command proposed for inclusion in Annex 6, IV to Annex 18.

6.1.2 The group had started work on the Technical Instructions, but conflicting priorities, including the extensive amount of time needed for the comprehensive amendment to Annex 18, made it impossible to complete. The group would be focussing its attention on the Technical Instructions during the next biennium. It had already reviewed existing requirements for cargo compartments and fire protection systems contained in Annex 8 through the help of airworthiness experts. The group believed understanding the requirements was a critical first step to ensure the panel's assumptions were valid. The group would next be reviewing each relevant part of the Technical Instructions to identify gaps between existing requirements and RPAS operations. Recommendations for amendment would be made to the DGP's 2024 working group meeting.

Agenda Item 7: Review of Annex 6 provisions having an impact on dangerous goods (REC-A-DGS-2025)**7.1 PROPOSED AMENDMENTS TO ANNEX 6 PROVISIONS
HAVING AN IMPACT ON DANGEROUS GOODS
(DGP/29-WP/7)**

7.1.1 The Dangerous Goods Working Group on Annex 18 (DGP-WG/Annex 18) identified inconsistencies between dangerous goods provisions in Annex 6 — *Operation of Aircraft* and the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284). The provisions in Annex 6 were contained in Chapter 14 to Part I — *International Commercial Air Transport — Aeroplanes* and Chapter 12 to Part III — *International Operations — Helicopters* (Chapter 12). They were also included in proposed new Part IV — *International Operations — Remotely Piloted Aircraft Systems* in Chapter 14. They were developed to make it clear that all operators were subject to dangerous goods regulations regardless of whether they held a specific approval to transport dangerous goods as cargo. The provisions distinguished between responsibilities derived from the Technical Instructions for each type of operator. The inconsistencies identified were largely due to Annex 6 not being updated to reflect changes to the provisions in the Technical Instructions since the provisions in the Annex were adopted.

7.1.2 The amendments to Annex 18 developed under Agenda Item 4 (see paragraph 4.1 of this report) included more detailed operator responsibilities extracted from the Technical Instructions than the existing Annex 18. It was recommended to simplify the provisions in Annex 6, through coordination with the Flight Operations Panel (FLTOSP), by replacing the detailed dangerous goods responsibilities with references to the applicable provisions in the proposed amendment to Annex 18. The distinction between operators with and those without specific approval to transport dangerous goods in cargo would remain in Annex 6, only the detailed provisions, which were duplicated from Annex 18 and the Technical Instructions, would be removed. That way the original objective of clarifying that all operators were subject to dangerous goods regulations would still be achieved in Annex 6. Removing the detailed provisions from Annex 6 would eliminate redundancy and reduce the risk of additional inconsistencies between the dangerous goods provisions in Annex 6, Annex 18 and the Technical Instructions.

7.1.3 DGP-WG/Annex 18 would develop a proposed amendment to Annex 6 during the next biennium through coordination with FLTOSP.

Agenda Item 8: Aviation Security/Dangerous Goods Coordination (REC-A-DGS-2025)

8.1 There were no updates from the Aviation Security Panel (AVSECP).

Agenda Item 9: Coordination with other panels
9.1: Flight Operations Panels (FLTOSP)

9.1 AMENDMENT TO CABIN CREW PROCEDURES FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT (DGP/29-WP/9)

9.1.1 The meeting was invited to consider amendments to the cabin crew procedures for dangerous goods incidents in the passenger cabin during flight contained in Sections 3.3 and 3.4 of the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481). The amendments were drafted with the advice and expertise of the ICAO Cabin Safety Group (ICSG). The ICSG was composed of representatives from States, airlines, approved training organizations, aircraft manufacturers, and international organizations. It included representatives from fifty nominating organizations, sixteen of which had nominated members on the DGP. Expertise on the group included cabin procedures design, cabin crew training, engineering, dangerous goods, accident investigation, human factors and flight operations. The ICSG and DGP had a long history of collaboration.

9.1.2 The secretary of the ICSG presented the amendments to the meeting. He noted that the amendments included new guidance for dangerous goods incidents involving fire or smoke events from a portable electronic device (PED) on the flight deck that required the intervention of cabin crew and guidance on the use of fire containment equipment when carried on board the aircraft. They also included revisions to existing guidance taking into consideration experience and best practices acquired since the last major update to the procedures were introduced in the 2015-2016 Edition of Doc 9481. The proposed amendments for inclusion in the 2025-2026 Edition included:

- a) simplification of the lists in Section 3.3 by including only the action needed by cabin crew with details included in the amplified lists in Section 3.4;
- b) a new recommendation for operators to ensure aircraft were equipped with appropriate firefighting and protective equipment for use by crew members;
- c) revised guidance to determine when it was safe to move a portable electronic device following a thermal runaway event;
- d) new guidance for single cabin crew member operations;
- e) revised guidance specific to overhead bin firefighting procedures;
- f) revised wording to make action needed clear and unambiguous to cabin crew, including the replacement of the title for “PED inadvertently crushed or damaged in electrically adjustable seat” with “PED fallen into / trapped in a passenger seat”;
- g) new procedures to be followed in the event of fire or smoke from a battery/portable electronic device when fire containment equipment was carried on board the aircraft.

9.1.3 The meeting extended its appreciation to the ICSG for the improvements made. While agreeing to the amendments in principle, several comments were raised and further revisions suggested. These are described in the appendix to the report on this agenda item. Interested panel members would

work with the secretary of the ICSG through correspondence to develop any revisions deemed necessary. These would be circulated to the panel via correspondence.

9.1.4 RECOMMENDATION

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

Recommendation 9/1 — Amendment to the cabin crew procedures in the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481)

That the proposed amendments to the cabin crew procedures presented in Appendix C to the report, subject to minor revisions to address issues raised in the appendix to the report on Agenda Item 9, be incorporated in the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481).

9.2 PROVISIONS FOR THE USE OF ELECTRONIC DATA FOR INFORMATION TO THE PILOT-IN-COMMAND (DGP/29-WP/25) AND PROVISIONS FOR THE USE OF ELECTRONIC DATA FOR INFORMATION TO THE PILOT-IN-COMMAND (DGP/29-IP/7 AND ADDENDUM)

9.2.1 The meeting was invited to consider a revised amendment allowing the use of electronic data for information to the pilot-in-command in lieu of written or printed information in accordance with Part 7;4.1.1 of the Technical Instructions. The panel had considered various proposals for several years starting with the 2016 working group meeting (DGP-WG/16, Montréal, 17 to 21 October 2016) (see paragraph 3.2.7.1 of the DGP-WG/16 Report) and most recently with the 2023 working group meeting (DGP-WG/23, Rio de Janeiro, Brazil, 15 to 19 May 2023) (see paragraph 4.9.1.1 of the DGP-WG/23 Report). There had always been support for allowing the information to be provided electronically, with many believing the existing provisions did not preclude electronic transmission. But the member nominated by the International Federation of Air Line Pilots' Associations (IFALPA) could only support allowing electronic information if it was not the sole source of information, because eliminating a paper copy might reduce the availability of critical information to the flight crew during an emergency and might prevent the reliable transfer of the information to rescue and fire fighting services. The member provided a summary of previous discussions to the meeting, which highlighted issues IFALPA considered unresolved. These were documented in a DGP/29 information paper.

9.2.2 The revised amendment allowed the provision of information to the pilot-in-command by electronic data processing (EDP) or electronic data interchange (EDI) provided an agreement existed with the appropriate authority of the State of the Operator. The proposer noted concerns raised in the past that references to EDP or EDI was too limiting but argued that references to these terms were generic and consistent with terminology used with respect to the transmission of the dangerous goods transport information by the shipper electronically. He also argued against suggestions in the past to include a requirement for information to be included in the operations manual or other appropriate manual as this was already required by the general requirement for information to be provided to employees in Part 7;2.

9.2.3 The majority wanted to move ahead with the amendment, but the member nominated by IFALPA could not yet support it. He acknowledged that electronic information could provide safety enhancements, but remained concerned that there would be a reduction in safety unless these enhancements were built into the requirements. He provided the panel with a position paper published by IFALPA that supported the evolution towards provision of electronic information, but only if certain criteria were met. The criteria included a need for improvement in the functionality and usability of the dangerous goods information, a more complete description of the dangerous goods onboard, and dissemination of dangerous goods information to rescue and firefighting services in a manner that met or exceeded the effectiveness of providing written or printed information. Additionally, an external group of relevant stakeholders that included experts from IFALPA, the International Air Transport Association (IATA), an aircraft rescue and firefighting working group, and Global Express Association (GEA) had yet to complete a study on emergency response information needs. The DGP, at its twenty-eighth meeting (DGP/28, Virtual, 15 to 19 November 2021) had decided to wait for the output of this group before making any revisions to the provisions.

9.2.4 The Flight Operations Panel (FLTOSP) secretary noted that the proposed amendment specified that information could be provided electronically *in lieu* of written or printed information. This created a conflict with Annex 6, which required accurate and legible written or printed information concerning dangerous goods carried as cargo to be provided to the pilot-in-command. He reported that the FLTOSP was very supportive of a move to electronic information and had launched a significant project to allow carriage of electronic documents and certificates on aircraft wherever they were referenced. Provisions for electronic notification to the pilot-in-command that were at a minimum as effective and as safe as what was already in place and that were acceptable to all stakeholders could be developed through this work.

9.2.5 The panel concluded that it could not move forward with the proposed amendment because of the conflict with Annex 6 and the fact that pilots, who were the major stakeholders of the provision, could not support it. Several members maintained that the terminology used in the existing provisions allowed for electronic transmission, but this could not be said if the amendment as written was adopted because of the conflict with Annex 6 it would create. The panel would work towards a holistic solution over the next biennium.

9.3 **IMPROPER APPLICATION OF DEFINITION FOR PASSENGER AIRCRAFT (DGP/29-IP/5)**

9.3.1 The meeting was provided feedback from airworthiness and operations experts on amendments to the definition for passenger aircraft in Annex 18 and the Technical Instructions considered at DGP-WG/23. The amendments were made to address inconsistencies with how the definition was applied internationally when determining who could be on board a cargo aircraft carrying “cargo aircraft only” dangerous goods. Amendments to the definition to address inconsistencies were first recommended by the twenty-seventh meeting of the Dangerous Goods Panel (DGP/27, Montréal, 16 to 20 September 2019), but flight operations experts opposed determining who could be on board an aircraft through a definition in Annex 18 because this was an operational issue under Annex 6 (see paragraph 8.1.1 of the DGP/27 Report). The Air Navigation Commission did not support the amendment because it did not consider the rationale for modifying the definition for passenger aircraft to be relevant to the Annex 18 provisions it supported. It concluded that the operational impact from distinguishing between passenger and cargo aircraft should be addressed in the context of Annex 6 — *Operation of Aircraft*. The Air Navigation Commission requested that the Secretariat develop a short-term solution to address the inaccurate interpretation and use of the

definition and tasked the FLTOPSP Safe Carriage of Goods Specific Working Group (FLTOPSP-SCG-SWG) with addressing the broader issue. The Secretariat subsequently developed guidance which was published on the ICAO public site (<https://www.icao.int/safety/OPS/OPS-Normal/Pages/Personsonboard.aspx>). However, panel members did not see the guidance as a solution. The issue was not yet on the work programme of the FLTOPSP-SCG-SWG, so the problem remained.

9.3.2 The amendments proposed at DGP-WG/23 were made in the absence of any progress by FLTOPSP-SCG-SWG. The working group supported the deletion of the definitions for passenger and cargo aircraft in Annex 18, because they were considered unnecessary in that document. However, the terms were referred to extensively in the Technical Instructions to differentiate between what was permitted on each type of aircraft, so panel members considered it important to maintain the definition there. An amendment to the “passenger aircraft” aircraft definition was proposed with the intent of providing operators with more flexibility in determining who was considered a passenger and therefore who could be on board a cargo aircraft transporting dangerous goods forbidden on a passenger aircraft. It included a provision for an operator to allow any person on board provided this was permitted within the conditions approved by the appropriate national authority. There were no strong objections to the intent of the proposal at DGP-WG/23, but it was agreed that the Secretary would obtain feedback from flight operations experts given their objection to the DGP/27 recommendation to amend the definition.

9.3.3 The Secretary reported that flight operations experts within the Secretariat supported deleting the definitions from Annex 18. However, they also proposed deleting the definitions from the Technical Instructions and to instead include provisions explaining whether an operator could transport “cargo aircraft only” dangerous goods on an aircraft. They maintained that dangerous goods provisions should not be prescribing who was permitted on board cargo aircraft as this was an operations/airworthiness issue. Determining who could be on board an aircraft based on definitions in the Technical Instructions could therefore conflict with operations/airworthiness requirements. It was noted that a similar subject was discussed at the eighteenth meeting of the DGP (DGP/18, Montréal, 15 to 25 October 2001) with a similar outcome (see paragraph 2.2.9 of the DGP/18 report). The Secretariat recommended that the panel consider deleting the definitions for passenger and cargo aircraft from both documents and developing criteria for determining when an operator could load cargo not permitted on a passenger aircraft on a cargo aircraft as an alternate approach to addressing the issue.

9.3.4 Various amendments were developed cumulating in one that deleted both definitions and added a provision to the loading of cargo aircraft provisions in Part 7;2.4.1 of the Technical Instructions explaining when packages or overpacks of dangerous goods bearing the cargo aircraft only label could be loaded on a cargo aircraft with persons other than required crew members. The persons would need to be authorized by the operator under conditions specified by the State of the Operator. The conditions would need to include what was required by Annex 6, Part I, Chapter 4 when passengers were onboard the aircraft. The proposed amendment was submitted too late for the panel to give it thorough consideration, but panel members did support the approach taken albeit not the precise wording. A revised amendment would be developed over the next biennium for consideration at the thirtieth meeting of the panel (DGP/30) in the Fall of 2025 for incorporation in the 2027-2028 Edition of the Technical Instructions. The panel had already agreed to deleting the definitions in Annex 18 under Agenda Item 5 (see paragraph 5.1 of this report).

**APPENDIX TO THE REPORT ON AGENDA ITEM 9
(English only)**

**COMMENTS ON PROPOSED AMENDMENTS TO CABIN CREW
PROCEDURES FOR DANGEROUS GOODS INCIDENTS IN THE
*EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS
INVOLVING DANGEROUS GOODS (DOC 9481)***

The following comments were raised during discussions on the proposed amendment to cabin crew procedures for dangerous goods incidents in the passenger cabin during flight (see paragraph 9.1 of the report on this agenda item Appendix C to the report).

1. There were two lists for each procedure in Section 3: a simplified list, which was proposed to be further simplified to contain only the action needed by the cabin crew, and an amplified list. It was suggested that future consideration be given to improving the structure of Section 3 so that it was easier to navigate between the two lists.
2. A new note was added under Section 3.3 referring to single cabin crew member operations, the need for actions listed in the procedures to be carried out with the assistance of other persons, and for the cabin crew to delegate to them the task of communicating with the flight crew while the cabin crew fought the fire. An observer noted that this was not common in her region and questioned whether it was a common practice globally. It was further suggested that guidance be provided for operations with no cabin crew onboard.
3. It was suggested that new procedures for a fire or smoke event from a battery/portable electronic device when fire containment equipment was carried on board the aircraft would apply to any fire onboard the aircraft and would therefore be more appropriately located under “General Considerations” in Section 2 of Doc 9481.
4. A recommendation for fire containment equipment, when carried on board the aircraft, to be placed on the flight deck and in the cabin was considered too prescriptive. The need and location of the equipment should be a decision of the operator based on a safety risk assessment.
5. Concerns were expressed with respect to recommending that detailed procedures for using fire containment devices be developed based on original equipment manufacturer instructions. There were many different types of devices on the market, and there was evidence that some did not perform as advertised. Research was on-going in some States and organizations to ensure they did not create unintended consequences. There was a concern that the new provisions could be interpreted as an implied recommendation for using them. Some State authorities were recommending against using the devices unless the event was over, which would contradict the original equipment manufacturer instructions.
6. References to “toilet” were considered ambiguous because “toilet” could be interpreted to mean either the actual toilet bowl or the room where the toilet bowl was located. It was suggested to replace the word with “lavatory” unless the intent was the toilet bowl.
7. It was suggested to add “fire containment equipment” as an example of a suitable empty container for submerging a portable electronic device to prevent further thermal runaway.

8. The procedures for a portable electronic device fire / smoke in an overhead bin referred to the potential for the device to be in baggage in the initial steps for cooling the device but not in the succeeding steps. It was suggested that removing the PED from the baggage should be added as a step.
9. A recommendation for Halon, Halon replacement or water to be used to extinguish the fire and prevent its spread to additional flammable materials was removed from the procedures for battery/portable electronic device fire /smoke. The reason for removing it was questioned.
10. The new guidance for dangerous goods incidents involving fire or smoke events from a portable electronic device (PED) on the flight deck that required the intervention of cabin crew listed retrieving and using protective equipment as a first step after receiving a call from the flight deck for assistance. The member nominated by the International Federation of Air Line Pilots' Associations (IFALPA) noted that maintaining control of the aircraft was the overriding responsibility of the flight crew, which might necessitate other actions by the cabin crew as a first step. He suggested adding "complying with directions from the cockpit" as a step.
11. The procedures for a PED fallen into /trapped in a passenger seat included applying procedures for battery / PED fire / smoke if smoke or flames appeared. There was concern that not having this as an earlier step might cause a delay in dealing with the smoke or flame, and this was the most critical step. It was suggested to include a cross-reference to this procedure early in the procedures to minimize the length of time the cabin crew might deal with the wrong procedure.
12. Halon was effective at suppressing a fire, but not at eliminating the generation of smoke from thermal runaway. A device needed to be cooled to stop thermal runaway for it to stop smoking. There was a concern that the firefighting procedure for a PED fire / smoke implied that cabin crew should keep applying Halon on a PED until the smoke stopped.
13. It was suggested that text be added to specify that cabin crew procedures for a battery/portable electronic device fire / smoke on the flight deck did not apply to electronic flight bags or electronic devices that were part of the aircraft equipment.

Note.— Development of guidance for flight crew to deal with incidents involving electronic flight bags, PEDs and power banks in the cockpit had been assigned to the FLTOPSP Specific Working Group on the Safe Carriage of Goods. The location of the guidance was to be determined.

14. Notifying the pilot-in-command was included as one of the actions in the procedures for an incident involving a PED fallen into or trapped in a passenger seat, but not for any of the other procedures. Why it was included here but nowhere else was questioned.

Agenda Item 10: 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

10.1 PROPOSED REVISED EDITION OF GUIDANCE MATERIAL FOR THE DANGEROUS GOODS PANEL (DGP/29-WP/28) (ENGLISH ONLY)

10.1.1 The panel adopted a new version of the *Guidance Material for the Dangerous Goods Panel (DGP) to Aid in the Preparation of the Technical Instructions and Supporting Documents* (Version 2). The document contained guidance material to aid panel members in maintaining the Technical Instructions and its supporting documents. It contained general principles used in developing the dangerous goods documents and guidance for deciding how to make changes to them. It also provided a mechanism to record justification behind decisions made by the panel, including those that resulted in deviations from the UN Model Regulations. The guidance material was intended as a useful resource for both long-standing and new panel members. The document needed a substantial review, as it had not been updated since it was first developed in 1999.

10.1.2 DGP-WG/UN Harmonization had been tasked with maintaining the guidance and had been working on it over the past two biennia. It updated the document to address a concern expressed at DGP/28 that guidance on stowage distances of radioactive material from persons might not ensure the necessary level of protection for flight crew (see paragraph 7.1 of the DGP/28 report) and to reflect decisions made at DGP-WG/23 (see paragraph 4.10 of the DGP-WG/23 Report).

10.1.3 The meeting expressed great appreciation for the work done. It was an invaluable resource for all members, especially new ones. The importance of ensuring the document remained up to date in the future was emphasized and ways to do so were proposed. It was agreed that DGP-WG/UN harmonization would be the body responsible for updating it, as described in the working group's terms of reference. Consideration would also be given to having presenters of working papers provide an analysis on how their proposal might impact the guidance document. DGP-WG/UN harmonization could then consider these analyses during its biennial update to the guidance. The Dangerous Goods Working Group on the Supplement had developed a working paper template for proposed amendments, which included a standing paragraph on consequential amendments to other documents that would need to be made should the proposal presented be accepted by the panel. The Secretary would publish this template on the DGP public site along with the guidance document. DGP-WG/UN Harmonization would consider the proposed procedures made by the panel and incorporate them in the guidance document. The meeting supported the need for procedures while also recognizing a need for flexibility to change them if they were shown to be ineffective.

10.1.4 A suggestion for one correction was made in relation to a statement that only dangerous goods listed in the tables in Part 8 were permitted to be carried by passengers and crew. This was not accurate, given that other items would be permitted through the general exceptions or special provisions. However, it was considered a minor issue that should not stop the panel from adopting the document. A correction would be made during the next biennium.

10.1.5 The document would be uploaded to the DGP public site and provided to new panel members as an on-going practice. An agenda item on harmonizing the guidance would remain for all DGP meetings so that a formal mechanism for review was in place.

Agenda Item 11: Other business**11.1 REPORT OF THE DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETINGS (DGP-WG/22 AND
DGP-WG/23) (DGP/29-WP/2 AND DGP/29-WP/3)**

11.1.1 The meeting reviewed the narrative parts of the reports of the 2022 and 2023 DGP Working Group Meetings, DGP-WG/22 (Montréal, 21 to 25 November 2022) and DGP-WG/23 (Rio de Janeiro, Brazil, 15 to 19 May 2023). The narratives were approved without comment. The amendments proposed by the working groups were reviewed under:

- a) DGP/29-WPs/11, 12 (and Addendum), 13 (and Addendum), 14 (and addendum), 15 (and addendum), 16, 19 (and addendum) and 20 (see Report on Agenda Item 1);
- b) DGP/29-WPs/18 and 21 (see Report on Agenda Item 2); and
- c) DGP/29-WP/17 (see Report on Agenda Item 3).

**11.2 REPORT OF THE ICAO/UNIVERSAL POSTAL UNION
CONTACT COMMITTEE (DGP/29-WP/10)**

11.2.1 The Secretariat presented the report of the sixth meeting of the ICAO/Universal Postal Union (UPU) Contact Committee Meeting which had been convened in Montréal on 28 and 29 June 2023. The committee was established to address the need for a collaborative effort by the UPU and ICAO to work jointly in a coordinated fashion on issues of common interest according to their respective missions. Topics most relevant to dangerous goods are outlined below.

11.2.2 Efforts were underway to understand why only thirty-five designated postal operators out of UPU's 192 Member States had been approved by their civil aviation authorities to accept lithium batteries contained in equipment in accordance with Part 1;2.3 of the Technical Instructions. Concern was expressed by the fact that lithium batteries were found in the mail on a regular basis, despite most DPOs not being approved to accept them. What UPU was doing to address this was questioned. The focal point for ICAO on the ICAO-UPU Contact Committee reported that the issue had been raised by ICAO to the UPU as a major concern and that the two organizations were working together to make improvements. Panel members were also interested to know more about how many CAAs had approved the general procedures of DPOs for controlling the introduction of dangerous goods in mail.

11.2.3 Efforts to address challenges related to extraterritorial offices of exchange (ETOEs) were on-going. The panel had expressed repeated concerns over this practice. A particular concern was made with respect to ETOEs combining cargo processes with air waybill documentation and mail processes with letter post documentation during interline transfers to circumvent cargo regulations. The International Air Transport Association (IATA) and the UPU had set up an expert team to address the issue, but progress had been slow.

11.2.4 It was noted that the proposed new chapter in Annex 18 on transport of dangerous goods in the post developed under Agenda Item 5 was coordinated with the UPU Secretariat and that it was supported by them. The existing SARPs were amended to more clearly outline the DPO's responsibilities.

SARPs were also added to address postal authorities operating in a foreign State such as ETOEs. Members were encouraged by the potential for improving the granularity of the ICAO Universal Safety Oversight Audit Programme's (USOAP) protocol questions related to dangerous goods should the Council adopt the new chapter in Annex 18.

11.2.5 The UPU was requested to provide a working paper to the panel, but a large postal congress prevented them from doing so. A representative from the UPU would be expected at the next DGP working group meeting. The need for ICAO and other relevant organizations to continue working with UPU to ensure the highest level of safety was emphasized. A representative of a large airline operator stated that the mail was its highest risk commodity. The focal point for ICAO on the ICAO-UPU Contact Committee requested members, observers and advisers to provide her with any information that would further justify the need for more robust measures by postal authorities so that she could bring it to the attention of the UPU.

11.3 OVERVIEW OF UAE INITIATIVE COMPETENCY VALIDATION (COVAL), FOR DANGEROUS GOODS TRAINING INSTRUCTOR (DGTI) AND DANGEROUS GOODS POST HOLDER (DGPH) (DGP/29-IP/3 AND DGP/29-IP/4)

11.3.1 An overview of the United Arab Emirate (UAE) competency validation programme (COVAL) was presented to the meeting. It had previously been presented to the 41st Session of the ICAO Assembly (Montréal, 27 September to 7 October 2022). The UAE advised the Assembly that it was offering to share the COVAL material with ICAO's Global Aviation Training Section and would be offering free seats in every COVAL course to ICAO Member States. The Assembly's Technical Commission acknowledged, with appreciation, the efforts of the UAE and agreed to refer the information to the DGP. The panel was invited to consider incorporating the COVAL concept into guidance material to help States validate the competency of their dangerous goods training instructors and dangerous goods post holders.

11.3.2 The UAE had established a dangerous goods certification programme over fifteen years prior to ensure all UAE originating dangerous goods shipments were offered for transport by air by dangerous goods certified entities, to improve the quality of dangerous goods training delivery through the certification of dangerous goods training providers and training instructors and to improve operational safety through the certification of dangerous goods post holders. Various methods of validating whether to certify were used. The COVAL method used an integrated approach to certification. All dangerous goods training instructors and dangerous goods post holders were required to undergo the COVAL certification course in the UAE. Monthly COVAL initial certification courses had already been given in 2023 for dangerous goods training instructors and would be given to dangerous goods post holders starting January 2024.

11.3.3 Congratulations were expressed for a remarkable programme and appreciation expressed for the material shared, for offering to incorporate COVAL concepts into dangerous goods guidance material, and for providing complimentary access to Member States to attend COVAL courses. Other panel members reported ways they were implementing competency-based training in their States.

11.3.4 The UAE had invited the DGP to consider incorporating COVAL concepts into the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air*

(Doc 9284SU). It was suggested that other documents could be considered as well, including the new guidance document under development to support implementation of Annex 18 (see the report on Agenda Item 5) and *Guidance on a Competency-based Approach to Dangerous Goods Training and Assessment* (Doc 10147). Other panel members reported on how competency-based training was being implemented in their States. It was suggested to incorporate best practices from various States in the same document.

11.4 TRANSPORT OF ILLICIT SUBSTANCES UNDER CHAIN OF CUSTODY BY LAW ENFORCEMENT AGENCIES (DGP/29-IP/11)

11.4.1 The meeting discussed challenges addressing requests from law enforcement agencies to transport illicit substances that might be classified as dangerous goods for initial laboratory testing or as evidence for prosecution while maintaining a chain of custody. There was support for developing guidance material, while recognizing it was a complicated issue that would need coordination with other sectors. The Chief of the Cargo Safety Section noted that the UN Office of Drugs and Crime had great interest on the subject and that collaboration with the office could be very helpful. Panel members were interested in giving the subject further thought during the next biennium.

11.5 FAREWELL

11.5.1 The meeting bid farewell to three esteemed participants on the panel who would be taking well-deserved retirements from long and successful careers: D. Brennan, panel member nominated by the International Air Transport Association (IATA), S. Schwartz, panel member nominated by the International Federation of Air Line Pilots' Associations (IFALPA) and A. McCulloch, observer from the Global Express Association (GEA), who had previously served as adviser to the panel member nominated by the United Kingdom. They were honoured as exceptional persons who had formed a large part of the backbone of the panel for several decades. Their departure would leave a large gap. The panel was grateful for their generous sharing of knowledge, insight, and expertise for so many years.

11.5.2 The meeting also honoured M. Paquette, former panel member nominated by Canada and chair of the panel between 2014 and the end of 2020. The panel had been unable to honour her at the previous panel meeting, because it was held virtually on account of the COVID-19 pandemic. Ms. Paquette began her tenure as chair during a very challenging time when panel members held strong and conflicting views regarding lithium batteries. She was praised for guiding the panel through difficult discussions with strong leadership, grace, and dedication.

11.5.3 Finally, the meeting honoured Dr. Katherine Rooney, the Chief of the Cargo Section and former secretary of the panel for more than thirty years. Dr. Rooney was honoured as the panel's guiding force who steered it through an ever-changing landscape with a steady hand and unwavering presence. The panel was grateful for the knowledge she shared, the challenges she helped navigate the panel through, and the good team spirit she fostered.

11.5.4 The panel celebrated the wealth of knowledge, dedication, and companionship the four honourees brought to panel and wished them futures full of good health, joy, and new adventures.

APPENDIX A TO THE REPORT

CONSOLIDATED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS RECOMMENDED UNDER AGENDA ITEMS 1, 2, 3 AND 4

Part 1

GENERAL

...

Chapter 1

SCOPE AND APPLICABILITY

...

1.1 GENERAL APPLICABILITY

...

Amendments to battery provisions

Paragraph 4.4.1.5 of DGP/29-WP/3 report and 1.2.1.1.1 of this report:

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:

...

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

- 1) the excess baggage has been consigned as cargo by or on behalf of a passenger;
- 2) the dangerous goods may only be those that are permitted by and in accordance with 8;1.1.2 to be carried in checked baggage;
- 3) the excess baggage is marked with the words "Excess baggage consigned as cargo".

i) data loggers and cargo tracking devices with installed lithium batteries, attached to or placed in packages, overpacks or unit load devices, provided the following conditions are met:

- 1) the data loggers or cargo tracking devices must be in use or intended for use during transport;
- 2) each cell or battery must meet the provisions of Part 2;9.3 a), e), f) (if applicable) and g);
- 3) for a lithium ion cell, the Watt-hour rating not exceeding 20 Wh;
- 4) for a lithium ion battery, the Watt-hour rating not exceeding 20 Wh;
- 5) for a lithium metal cell, the lithium content not exceeding 1 g;
- 6) for a lithium metal battery, the aggregate lithium content not exceeding 1 g;

- 7) the number of data loggers or cargo tracking devices in or on any package or overpack must be no more than the number required to track or to collect data for the specific consignment;
- 8) the data loggers or cargo tracking devices must be capable of withstanding the shocks and loadings normally encountered during transport;
- 9) the devices must not be capable of generating a dangerous evolution of heat; and
- 10) the devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

Note.— This exception does not apply where the data loggers or cargo tracking devices are offered for transport as a consignment in accordance with Packing Instruction 967 or 970.

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1.3 APPLICATION OF STANDARDS

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

UN harmonization amendments

Paragraph 4.1.2.1.2 of DGP/29-WP/3:

UN Model Regulations, Chapter 1.1, 1.1.1.7 (see ST/SG/AC.10/50/Add.1)

Note. — A standard provides details on how to meet the provisions of these Instructions and may include requirements in addition to those set out in these Instructions.

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Chapter 3

GENERAL INFORMATION

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3.1 DEFINITIONS

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UN harmonization amendments

Paragraph 4.1.2.1.2 of DGP/29-WP/3:

UN Model Regulations, Chapter 1.2, 1.2.1 (see ST/SG/AC.10/50/Add.1)

Dangerous goods security. Measures or precautions to be taken by operators, shippers and others involved in the transport of dangerous goods aboard aircraft to minimize theft or misuse of dangerous goods that may endanger persons or property.

Degree of filling. The ratio, expressed in %, of the volume of liquid or solid introduced at 15°C into the means of containment and the volume of the means of containment ready for use.

Design. For the transport of radioactive material, the description of fissile material excepted under 2;7.2.3.5.1 f), special form radioactive material, low dispersible radioactive material, package or packaging which enables such items to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.

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Amendments to facilitate transport or State oversight

Paragraph 3.2 of this report:

Exclusive use. For the transport of radioactive material, the sole use, by a single shipper, of an aircraft or of a large freight container, in respect of which all initial, intermediate and final loading and unloading and shipment are carried out in accordance with the directions of the shipper or consignee, where so required by these Instructions.

Note.— A large freight container need not be approved in accordance with the International Convention for Safe Containers (CSC), 1972.

...

UN harmonization amendments

Paragraph 4.1.2.1.2 of DGP/29-WP/3:

UN Model Regulations, Chapter 1.2, 1.2.1 (see ST/SG/AC.10/50/Add.1)

GHS. The ~~ninth~~ tenth 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.~~9~~10.

...

Manual of Tests and Criteria. The ~~seventh~~ eighth revised edition of the United Nations publication bearing this title (ST/SG/AC.10/11/Rev.~~7~~8 and Amend. 4).

...

Model Regulations. The twenty~~second~~third revised edition of the United Nations publication entitled *Recommendations on the Transport of Dangerous Goods: Model Regulations* (ST/SG/AC.10/1/Rev.~~22~~23).

...

Recycled plastics material. Material recovered from used industrial packagings or from other plastics material that has been cleaned pre-sorted and prepared for processing into new packagings, including IBCs. The specific properties of the recycled material used for production of new packagings, including IBCs, must be assured and documented regularly as part of a quality assurance programme recognized by the appropriate national authority. The quality assurance programme must include a record of proper pre-sorting and verification that each batch of recycled plastics, which is of homogeneous composition, is consistent with the material has the proper specifications (melt flow rate, density, and tensile yield strength, consistent with that properties) of the design type manufactured from such recycled material. This necessarily includes knowledge about the packaging plastics material from which the recycled plastics has have been derived, as well as awareness of the prior use, including prior contents, of those packagings the plastics material if those that prior contents use might reduce the capability of new packagings, including IBCs, produced using that material. In addition, the manufacturer's quality assurance programme for packaging manufacturer's quality assurance programmes under 6.1.1.3 of these Instructions or IBC under 6.5.4.1 of the UN Model Regulations must include performance of the mechanical design type test on packagings in Part 6, Chapter 4 on packagings of these Instructions or IBCs in 6.5.6 of the UN Model Regulations, manufactured from each batch of recycled plastics material. In this testing, stacking performance may be verified by appropriate dynamic compression testing rather than static load testing.

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Note.— ISO 16103:2005 "Packaging — Transport packages for dangerous goods — Recycled plastics material", provides additional guidance on procedures to be which may be followed in approving the use of recycled plastics material. These guidelines have been developed based on the experience of the manufacturing of drums and jerricans from recycled plastics material and as such may need to be adapted for other types of packagings, IBCs and large packagings made of recycled plastics material.

...

Unit load device (ULD). ~~Any type of freight container. A device for grouping and restraining cargo, mail and baggage for air transport. It is either an aircraft container, or a combination of an aircraft pallet with a and an aircraft pallet net or aircraft pallet with a net over an igloo. A ULD is designed to be directly restrained by the aircraft cargo loading system (CLS).~~

Note 1.— An overpack is not included in this definition.

Note 2.— A freight container for radioactive material is not included in this definition (see 2;7.1.3).

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Chapter 4

DANGEROUS GOODS TRAINING

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Amendments to facilitate transport or State oversight

Paragraph 4.3.5 of DGP/29-WP/2:

4.4 TRAINING AND ASSESSMENT RECORDS

4.4.1 The employer must maintain a record of training and assessment for personnel.

4.4.2 The record of training and assessment must include:

- a) the individual's name;
- b) the month of completion of the most recent training and assessment;
- 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~~ other information that identifies the organization providing the training and assessment (e.g. registered address); and
- e) evidence which shows that the personnel have been assessed as competent.

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Part 2

CLASSIFICATION OF DANGEROUS GOODS

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INTRODUCTORY CHAPTER

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1. RESPONSIBILITIES

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

Paragraph 2.2.2 of this report:

1.2 Where classification of the dangerous goods is made by the shipper, information used by the shipper to assign a classification must be made available to the appropriate national authority upon request, if requested within three months of the date on which the dangerous goods were transported.

Note.— Examples of such information include:

a) the known composition of a substance;

b) the known physical characteristics of articles such as vehicles;

c) the results of classification testing and other applicable requirements as identified within Part 2 of these Instructions;
or

d) a safety data sheet issued in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

~~4.2~~1.3 A shipper who has identified, on the basis of test data, that a substance listed by name in column 1 of the Dangerous Goods List in Part 3, Chapter 2, Table 3-1 meets classification criteria for a hazard class or division that is not identified in the list, may, with the approval of the appropriate national authority, consign the substance:

- a) under the most appropriate generic or not otherwise specified (n.o.s.) entry reflecting all hazards; or
- b) under the same UN number and name but with additional hazard communication information as appropriate to reflect the additional subsidiary 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.

~~4.2~~1.3.1 A copy of the document of approval must accompany the consignment.

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

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Paragraph 1.2.1.8 of this report:

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, Dangerous goods in articles 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.

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UN harmonization amendments

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.0, 2.0.5.2 (see ST/SG/AC.10/50/Add.1)

6.2 Such articles may in addition contain cells or batteries. Lithium cells and 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). For articles containing pre-production prototype lithium cells or batteries transported for testing, or for articles containing lithium cells or batteries manufactured in production runs of not more than 100 cells or batteries, the requirements of Special Provision A88 apply.

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Chapter 1

CLASS 1 — EXPLOSIVES

UN harmonization amendments

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.1, 2.1.1.3 (see ST/SG/AC.10/50/Add.1)

1.2 DEFINITIONS

For the purposes of these Instructions, the following definitions apply:

- a) **Explosive substance** is a solid or liquid substance (or a mixture of substances) which is in itself capable, by chemical reaction, of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases.
- b) **Pyrotechnic substance** is ~~a substance or a mixture of substances~~ an explosive substance designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative, self-sustaining, exothermic, chemical reactions.
- c) **Explosive article** is an article containing one or more explosive substances.
- d) **Phlegmatized** means that a substance (or “phlegmatizer”) has been added to an explosive to enhance its safety in handling and transport. The phlegmatizer renders the explosive insensitive, or less sensitive, to the following actions:

heat, shock, impact, percussion or friction. Typical phlegmatizing agents include, but are not limited to: paper, wax, water, polymers (such as chlorofluoropolymers), alcohol and oils (such as petroleum jelly and paraffin).

e) Explosive or pyrotechnic effect means, in the context of 1.1 c), an effect produced by self-sustaining exothermic chemical reactions including shock, blast, fragmentation, projection, heat, light, sound, gas and smoke.

Note.— Explanations for a number of other terms used in connection with explosives can be found in Attachment 2 to these Instructions.

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Chapter 3

CLASS 3 — FLAMMABLE LIQUIDS

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UN harmonization amendments

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.3, 2.3.1.4 (see ST/SG/AC.10/50/Add.1)

3.1.4 Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form homogeneous liquid mixture to suppress their explosive properties (see 1.5.2.3). Entries in the Dangerous Goods List (Table 3-1) for liquid desensitized explosives are: UN 1204, UN 2059, UN 3064, UN 3343, UN 3357 ~~and~~ UN 3379 ~~and UN 3555~~.

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Chapter 4

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

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

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4.2.2 Division 4.1 — Flammable solids

4.2.2.1 Definitions and properties

4.2.2.1.1 Flammable solids are readily combustible solids and solids which may cause fire through friction.

4.2.2.1.2 Readily combustible solids are powdered, granular or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. The danger may not only come from the fire but also from toxic combustion products. Metal powders are especially dangerous because of the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.

UN harmonization amendments

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.4, 2.4.2.2.1 (see ST/SG/AC.10/50/Add.1)

4.2.2.1.3 Metal powders are powders of metals or metal alloys.

4.2.2.2 *Classification of flammable solids*

UN Model Regulations, Chapter 2.4, 2.4.2.2.2.1 (see ST/SG/AC.10/50/Add.1)

4.2.2.2.1 Powdered, granular or pasty substances must be classified as readily combustible solids of Division 4.1 when the time of burning of one or more of the test runs, performed in accordance with the test methods and criteria in the UN *Manual of Tests and Criteria*, Part III, subsection 33.2.1, is less than 45 seconds or the rate of burning is more than 2.2 mm/s. ~~Powders of metals or metal alloys~~ Metal powders must be classified in Division 4.1 when they can be ignited and the reaction spreads over the whole length of the sample in 10 minutes or less.

4.2.2.2.2 Solids which may cause fire through friction must be classified in Division 4.1 by analogy with existing entries (e.g. matches) until definitive criteria are established.

UN Model Regulations, Chapter 2.4, 2.4.2.2.3.1 (see ST/SG/AC.10/50/Add.1)

4.2.2.3 *Assignment of packing groups*

4.2.2.3.1 Packing groups are assigned on the basis of the test methods referred to in 4.2.2.2.1. For readily combustible solids (other than metal powders), Packing Group II must be assigned if the burning time is less than 45 seconds and the flame passes the wetted zone. Packing Group II must be assigned to ~~powders of metal or metal alloys~~ metal powders if the zone of reaction spreads over the whole length of the sample in 5 minutes or less.

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Chapter 5

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

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

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

UN harmonization amendments									
Paragraph 4.1.2.1.3 of DGP/29-WP/3:									
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	Sub- sidiary hazards and notes
tert-Butyl peroxybenzoate	≤52			≥48				3106	
UN Model Regulations, included in IBC520 and, see 2.5.3.2.4 of UN Model Regulations									
<u>tert-Butyl peroxybenzoate</u>	<u>≤32</u>		<u>≥68</u>					<u>3109</u>	
tert-Butyl peroxybutyl fumarate	≤52		≥48					3105	
...									
Dibenzoyl peroxide	≤42 as a stable dispersion in water							3109	
UN Model Regulations, Chapter 2.5, 2.5.3.2.4 (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.1.2.1 c) of this report:									
<u>Dibenzoyl peroxide</u>	<u>≤42</u>		<u>≥38</u>		<u>≥13</u>			<u>3109</u>	
Dibenzoyl peroxide	≤35			≥65				Exempt	29
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	≤100					+30	+35	3114	
...									
Di-2,4-dichlorobenzoyl peroxide	≤77				≥23			FORBIDDEN	3
Di-2,4-dichlorobenzoyl peroxide	≤52 as a paste with silicon oil							3106 <u>3104</u>	
Di-2,4-dichlorobenzoyl peroxide	≤52 as a paste					+20	+25	3118	
...									
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	≤47 as a paste							3108	
<u>2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane</u>	<u>≤22</u>			<u>≥78</u>				<u>Exempt</u>	<u>29</u>
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	>86-100							FORBIDDEN	3

<i>Organic peroxide</i>	<i>Concentration (per cent)</i>	<i>Diluent type A (per cent)</i>	<i>Diluent type B (per cent) (Note 1)</i>	<i>Inert solid (per cent)</i>	<i>Water (per cent)</i>	<i>Control tempera- ture (°C)</i>	<i>Emergency tempera- ture (°C)</i>	<i>UN generic entry</i>	<i>Sub- sidiary hazards and notes</i>
...									
Methylcyclohexanone peroxide(s)	≤67		≥33			+35	+40	3115	
<u>Methyl ethyl ketone peroxide(s)</u>	<u>See remark 33</u>	<u>≥41</u>			<u>≥9</u>			<u>3105</u>	<u>33</u> <u>34</u>
Methyl ethyl ketone peroxide(s)	see remark 8)	≥48						FORBIDDEN	3,8,13
...									

Notes:

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32. Active oxygen ≤4.15 per cent.

33. Available oxygen ≤ 10 per cent.

34. Sum of diluent type A and water ≥ 55 per cent, and in addition methyl ethyl ketone.

Chapter 6

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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6.3 DIVISION 6.2 — INFECTIOUS SUBSTANCES

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6.3.2 Classification of infectious substances

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Table 2-10. Indicative examples of infectious substances included in Category A in any form unless otherwise indicated (6.3.2.2.1 a))

UN harmonization amendments

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.6, 2.6.3.2.2.1 (see ST/SG/AC.10/50/Add.1) and 1.2.1.2.1 d) of this report:

UN Number and Proper Shipping Name	Micro-organism
UN 2814 Infectious substances affecting humans	... Monkeypox virus <u>(cultures only)</u> ¹ ...

¹"Monkeypox" was renamed "mpox" by the World Health Organization (WHO).

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Chapter 7

CLASS 7 — RADIOACTIVE MATERIAL

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7.1.3 Definitions of specific terms

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UN harmonization amendments

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.7, 2.7.1.3 (see ST/SG/AC.10/50/Add.1)

Specific activity of a radionuclide. The activity per unit mass of that nuclide. The specific activity of a material must mean the activity per unit mass of the material in which the radionuclides are essentially uniformly distributed.

Note.— The terms "activity concentration" and "specific activity" are synonymous for the purpose of these Instructions.

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Chapter 9

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

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UN harmonization amendments

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.9, 2.9.2 (see ST/SG/AC.10/50/Add.1)

9.2 ASSIGNMENT TO CLASS 9

The substances and articles of Class 9 are subdivided as shown in Table 2-16.

Table 2-16. Substances and articles of Class 9

<i>UN number</i>	<i>Name</i>	<i>Notes</i>
...		
<i>Lithium batteries</i>		
3090	Lithium metal batteries (including lithium alloy batteries)	See 2:9.3
3091	Lithium metal batteries contained in equipment (including lithium alloy batteries)	
3091	Lithium metal batteries packed with equipment (including lithium alloy batteries)	
3480	Lithium ion batteries (including lithium ion polymer batteries)	
3481	Lithium ion batteries contained in equipment (including lithium ion polymer batteries)	
3481	Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	
3536	Lithium batteries installed in cargo transport unit	

UN harmonization amendments

and

Amendments to battery provisions

Paragraph 4.1.2.1.3 of DGP/29-WP/3:

UN Model Regulations, Chapter 2.9, 2.9.2 (see ST/SG/AC.10/50/Add.1)

Sodium ion batteries

<u>3551</u>	<u>Sodium ion batteries with organic electrolyte</u>	<u>See 9.4</u>
<u>3552</u>	<u>Sodium ion batteries contained in equipment with organic electrolyte</u>	
<u>3552</u>	<u>Sodium ion batteries packed with equipment with organic electrolyte</u>	

...

Life-saving appliances

2990	Life-saving appliances, self-inflating	
3072	Life-saving appliances, not self-inflating containing dangerous goods as equipment	
3268	Safety devices , electrically initiated	

<i>UN number</i>	<i>Name</i>	<i>Notes</i>
UN harmonization amendments		
Paragraph 4.1.2.1.3 of DGP/29-WP/3:		
UN Model Regulations, Chapter 2.9, 2.9.2 (see ST/SG/AC.10/50/Add.1)		
3559	Fire suppressant dispersing devices	
...		
<i>Genetically modified micro-organisms (GMMOs) and genetically modified organisms (GMOs)</i>		
3245	Genetically modified micro-organisms	GMMOs or GMOs which do not meet the definition of toxic substances (see 6.2) or infectious substances (see 6.3) must be assigned to UN 3245. GMMOs or GMOs are not subject to these Instructions when authorized for use by the appropriate national authorities of the States of Origin, Transit and Destination. <u>Pharmaceutical products (such as vaccines) that are packed in a form ready to be administered, including those in clinical trials, and that contain GMMOs or GMOs are not subject to these Instructions.</u> Genetically modified live animals must be transported under terms and conditions of the appropriate national authorities of the States of Origin and Destination. COVID-19 vaccines containing GMOs or GMMOs, including those in clinical trials, are not subject to these Instructions.
3245	Genetically modified organisms	
...		
<i>Other substances or articles presenting a danger during transport, but not meeting the definitions of another class</i>		
...		
3548	Articles containing miscellaneous dangerous goods, n.o.s.	
3556	Vehicle, lithium ion battery powered	
3557	Vehicle, lithium metal battery powered	
3558	Vehicle, sodium ion battery powered	
...		

9.3 LITHIUM BATTERIES**Amendments to battery provisions**

Paragraph 4.1.2.1.3.1 d) of DGP/29-WP/3:

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 provided:~~

- 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;

...

- e) cells and batteries ~~must be~~ are 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;
- 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.

- 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~~ are of a type proved to meet the respective testing requirements of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.; and

UN Model Regulations, Chapter 2.9, 2.9.4 (g) (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.1.2.1 a) of this report:

- g) except for button cells installed in equipment (including circuit boards), 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.

Note.— The term “make available” means that manufacturers and subsequent distributors ensure that the test summary is accessible so that the shipper or other persons in the supply chain can confirm compliance.

UN harmonization amendments

and

Amendments to battery provisions

Paragraph 4.1.2.1.3.1 d) of DGP/29-WP/3:

UN Model Regulations, Chapter 2.9, 2.9.5 (see ST/SG/AC.10/50/Add.1) and paragraphs 1.2.1.2.1 a) and 1.2.1.2.1 b) of this report:

9.4 SODIUM ION BATTERIES

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment containing sodium ion, which are a rechargeable electrochemical system where the positive and negative electrode are both intercalation or insertion compounds, constructed with no metallic sodium (or sodium alloy) in either electrode and with an organic non aqueous compound as electrolyte, must be assigned to UN Nos. 3551 or 3552, as appropriate.

Note.— Intercalated sodium exists in an ionic or quasi-atomic form in the lattice of the electrode material.

They may be transported under these entries provided:

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

*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 encountered during 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 are manufactured under a quality management program as prescribed under 9.3 e) 1 to 9;

- f) manufacturers and subsequent distributors of cells or batteries make available the test summary as specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3, paragraph 38.3.5.

Note.— The term “make available” means that manufacturers and subsequent distributors ensure that the test summary is accessible so that the shipper or other persons in the supply chain can confirm compliance.

...

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

...

Chapter 2

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

...

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

2.1.1 The Dangerous Goods List (Table 3-1) is divided into 13 columns as follows:

UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

UN Model Regulations, Chapter 3, 3.2.1 (see ST/SG/AC.10/50/Add.1)

Column 8 “UN packing group” — this column contains the UN packing group number (i.e. I, II or III) assigned to the [article](#) or substance. If more than one packing group is indicated for the entry, the packing group of the substance or formulation to be transported should be determined, based on its properties, through application of the hazard grouping criteria as provided in Part 2.

...

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		6	7	8	9	10	11	12	13

UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Aircraft hydraulic power unit fuel tank (containing a mixture of anhydrous hydrazine and methyl hydrazine) (M86 fuel)	3165	3	6.1 8	Liquid flammable & Toxic & Corrosive	AU 1 CA 7 IR 3 NL 1 US 3	A1 A48	↓	E0	FORBIDDEN		372	42 L
Aluminium borohydride in devices	2870	4.2	4.3				↓		FORBIDDEN		FORBIDDEN	

UN Model Regulations, Chapter 2.0, 2.0.5.2 (see ST/SG/AC.10/50/Add.1):

Articles containing corrosive substance, n.o.s.*	3547	8	See 2;0.6			A2 <u>A88</u>			FORBIDDEN		FORBIDDEN	
Articles containing flammable gas, n.o.s.*	3537	2.1	See 2;0.6			A2 <u>A88</u>			FORBIDDEN		FORBIDDEN	
Articles containing flammable liquid, n.o.s.*	3540	3	See 2;0.6			A2 <u>A88</u>			FORBIDDEN		FORBIDDEN	
Articles containing flammable solid, n.o.s.*	3541	4.1	See 2;0.6			A2 <u>A88</u>			FORBIDDEN		FORBIDDEN	
Articles containing miscellaneous dangerous goods, n.o.s.*	3548	9	See 2;0.6			A2 <u>A88</u> A224			FORBIDDEN		FORBIDDEN	
Articles containing non-flammable, non-toxic gas, n.o.s.*	3538	2.2	See 2;0.6			A2 <u>A88</u> A225			FORBIDDEN		FORBIDDEN	
Articles containing toxic substance, n.o.s.*	3546	6.1	See 2;0.6			A2 <u>A88</u>			FORBIDDEN		FORBIDDEN	

Appendix A to the Report

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		6	7	8	9	10	11	12	13

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Batteries, containing metallic sodium or sodium alloy †	3292	4.3		Danger if wet		A94 A183 A228		E0	FORBIDDEN	492	No limit
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UN harmonization amendments

and

Amendments to battery provisions

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1) and paragraph 2.2.7 of this report:

Batteries, wet, filled with acid, electric storage †	2794	8		Corrosive		A51 A164 A183		E0	870	30 kg	870	400 kg
Batteries, wet, filled with alkali, electric storage †	2795	8		Corrosive		A51 A164 A183 A228		E0	870	30 kg	870	400 kg
Batteries, wet, non-spillable, electric storage	2800	8		Corrosive		A48 A67 A164 A183		E0	872	No limit	872	No limit
Battery-powered equipment	3171	9		Miscellaneous		A67 A87 A94 A154 A164 A182 A214		E0	952	No limit	952	No limit
Battery-powered vehicle	3171	9		Miscellaneous		A67 A87 A94 A154 A164 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		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

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Bombs, smoke, non-explosive with corrosive liquid, without initiating device	2028	8		Corrosive			II	E0	FORBIDDEN		866	50 kg
Butadienes and hydrocarbon mixture, stabilized , containing more than 40% <u>20%</u> butadienes	1010	2.1		Gas flammable	AU 1 CA 7 IR 3 NL 1 US 3	A1 A209 <u>A229</u>		E0	FORBIDDEN		200	150 kg

Amendments to battery provisions

Paragraph 4.2.2.2 of DGP/29-WP/3:

Cells, containing metallic sodium or sodium alloy †	3292	4.3		Danger if wet		A94 <u>A183</u> <u>A228</u>		E0	492	25 kg	492	400 kg
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UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Detonators, electric for blasting †	0030	1.1B				<u>A226</u>			FORBIDDEN		FORBIDDEN	
Detonators, electric for blasting †	0255	1.4B		Explosive 1.4		<u>A226</u>		E0	FORBIDDEN		131	75 kg
Detonators, electric for blasting †	0456	1.4S		Explosive 1.4		A165 <u>A226</u>		E0	131	25 kg	131	100 kg
Detonators, electronic programmable for blasting †	0511	1.1B				<u>A226</u>		E0	FORBIDDEN		FORBIDDEN	
Detonators, electronic programmable for blasting †	0512	1.4B		Explosive 1.4		<u>A226</u>		E0	FORBIDDEN		131	75 kg

Appendix A to the Report

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		6	7	8	9	10	11	12	13
Detonators, electronic programmable for blasting †	0513	1.4S		Explosive 1.4		A165 A226		E0	131	25 kg	131	100 kg
<u>Disilane</u>	<u>3553</u>	<u>2.1</u>						<u>E0</u>	<u>FORBIDDEN</u>		<u>FORBIDDEN</u>	

Amendments to facilitate transport

Paragraph 4.3.2 of DGP/29-WP/2:

Engine, internal combustion	3530	9		Miscellaneous		A70 A87 A154 A208		E0	972	No limit	972	No limit
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UN harmonization amendments

Paragraph 1.2.1.8 of this report:

Fuel system components (including fuel control units (FCU), carburetors, fuel lines, fuel pumps), see Dangerous goods in apparatus or Dangerous goods in articles or Dangerous Goods in machinery (UN No. 3363)												
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Amendments to facilitate transport

Paragraph 4.3.2 of DGP/29-WP/2:

Machinery, internal combustion	3530	9		Miscellaneous		A70 A87 A154 A208		E0	972	No limit	972	No limit
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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		6	7	8	9	10	11	12	13

UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

Fire suppressant dispersing devices†	<u>0514</u>	<u>1.4S</u>		<u>Explosive 1.4</u>		<u>A232</u>		<u>E0</u>	<u>135</u>	<u>25 kg</u>	<u>135</u>	<u>100 kg</u>
Fire suppressant dispersing devices †	<u>3559</u>	<u>9</u>		<u>Miscellaneous</u>		<u>A232</u>		<u>E0</u>	<u>961</u>	<u>25 kg</u>	<u>961</u>	<u>100 kg</u>
Gallium contained in manufactured articles	<u>3554</u>	<u>8</u>		<u>Corrosive</u>		<u>A48</u> <u>A69</u>		<u>E0</u>	<u>869</u>	<u>No limit</u>	<u>869</u>	<u>No limit</u>
Isoorbide dinitrate mixture with not less than 60% lactose, mannose, starch or calcium hydrogen phosphate	2907	4.1		Solid flammable	BE 3	<u>A40</u> <u>A49</u>	II	E0	445	15 kg	448	50 kg

UN harmonization amendments

and

Amendments to battery provisions

Paragraph 4.1.2.1.4 of DGP/29-WP/3 and paragraph 2.2.7 of this report:

Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous — Lithium or sodium ion batteries	US 3	A88 A99 A154 <u>A164</u> A183 A201 A213		E0	FORBIDDEN		See 965	
Lithium ion batteries contained in equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous — Lithium or sodium ion batteries	US 3	A48 A88 A99 A154 <u>A164</u> A181 A185 A213 A220		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		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
Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous — Lithium or sodium ion batteries	US 3	A88 A99 A154 A164 A181 A185 A213		E0	966	5 kg	966	35 kg
Lithium metal batteries (including lithium alloy batteries) †	3090	9		Miscellaneous — Lithium or sodium ion batteries	US 2 US 3	A88 A99 A154 A164 A183 A201 A213		E0	FORBIDDEN		See 968	
Lithium metal batteries contained in equipment (including lithium alloy batteries) †	3091	9		Miscellaneous — Lithium or sodium ion batteries	US 2 US 3	A48 A88 A99 A154 A164 A181 A185 A213 A220		E0	970	5 kg	970	35 kg
Lithium metal batteries packed with equipment (including lithium alloy batteries) †	3091	9		Miscellaneous — Lithium or sodium ion batteries	US 2 US 3	A88 A99 A154 A164 A181 A185 A213		E0	969	5 kg	969	35 kg

UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

Nitrocellulose membrane filters with not more than 12.6% nitrogen, by dry mass	3270	4.1		Solid flammable		A73 A122 A230	II	E2	458 Y458	1 kg 1 kg	458	15 kg
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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		6	7	8	9	10	11	12	13
Nitrocellulose solution, flammable with not more than 12.6% nitrogen, by dry mass, and not more than 55% nitrocellulose	2059	3		Liquid flammable	BE 3	A3 <u>A40</u> A91	I II III	E0 E0 E0	351 353 Y341 355 Y344	1 L 5 L 1 L 60 L 10 L	361 364 366	30 L 60 L 220 L
Nitrocellulose with alcohol , not less than 25% alcohol, by mass, and not more than 12.6% nitrogen, by dry mass	2556	4.1		Solid flammable	BE 3	<u>A40</u> A217	II	E0	452	1 kg	453	15 kg
Nitrocellulose with water , not less than 25% water by mass	2555	4.1		Solid flammable	BE 3	<u>A40</u> A217	II	E0	452	15 kg	453	50 kg
Nitroglycerin mixture, desensitized, liquid, n.o.s.* with not more than 30% nitroglycerin, by mass	3357	3			BE 3	A17 <u>A40</u>	II		FORBIDDEN		FORBIDDEN	
Nitroglycerin mixture, desensitized, liquid flammable, n.o.s.* with not more than 30% nitroglycerin, by mass	3343	3			BE 3	<u>A40</u>			FORBIDDEN		FORBIDDEN	
Nitroglycerin mixture, desensitized, solid, n.o.s.* with more than 2% but not more than 10% nitroglycerin, by mass	3319	4.1		Solid flammable	AU 1 BE 3 CA 7 IR 3 NL 1 US 3	A1 <u>A40</u> A68	II	E0	FORBIDDEN		499	0.5 kg
Nitroglycerin solution in alcohol with more than 1% but not more than 5% nitroglycerin	3064	3		Liquid flammable	BE 3	<u>A40</u> A188	II	E0	FORBIDDEN		371	5 L
Nitroglycerin solution in alcohol with not more than 1% nitroglycerin	1204	3		Liquid flammable		<u>A40</u>	II	E0	371 Y341	5 L 1 L	371	60 L
Pentaerythrite tetranitrate mixture desensitized, solid, n.o.s.* with more than 10% but not more than 20% PETN, by mass	3344	4.1			BE 3	<u>A40</u>	II		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		6	7	8	9	10	11	12	13
Pentaerythritol tetranitrate mixture desensitized, solid, n.o.s.* with more than 10% but not more than 20% PETN, by mass	3344	4.1			BE 3	A40	II		FORBIDDEN		FORBIDDEN	
PETN mixture desensitized, solid, n.o.s.* with more than 10% but not more than 20% PETN, by mass	3344	4.1			BE 3	A40	II		FORBIDDEN		FORBIDDEN	

UN harmonization amendments

and

Amendments to battery provisions

Paragraph 4.1.2.1.4 of DGP/29-WP/3 and paragraph 2.2.7 of this report:

Sodium ion batteries with organic electrolyte	3551	9		Miscellaneous — Lithium or sodium ion batteries		A88 A99 A154 A183 A227 A228		E0	FORBIDDEN		See 976	
Sodium ion batteries contained in equipment with organic electrolyte	3552	9		Miscellaneous — Lithium or sodium ion batteries		A48 A88 A99 A154 A185 A227 A228		E0	97Y	5 kg	97Y	35 kg
Sodium ion batteries packed with equipment with organic electrolyte	3552	9		Miscellaneous — Lithium or sodium ion batteries		A48 A88 A99 A154 A185 A227 A228		E0	97Y	5 kg	97Y	35 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		6	7	8	9	10	11	12	13

UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

Tetramethylammonium hydroxide, solid	3423	6.1	8	Toxic & Corrosive		A113 A234	II	E2 E5	859 Y844 665	15 kg 5 kg 1 kg	863 672	50 kg 15 kg
Tetramethylammonium hydroxide aqueous solution with not less than 25% tetramethylammonium hydroxide	3560	6.1	8	Toxic & Corrosive		A113 A233 A234	I	E5	651	0.5 L	657	2.5 L
Tetramethylammonium hydroxide aqueous solution with more than 2.5% but less than 25% tetramethylammonium hydroxide	1835	8	6.1	Corrosive & Toxic		A3 A113 A233 A234	II III	E2 E1	851 Y840 852 Y841	1 L 0.5 L 5 L 1 L	855 856	30 L 60 L
Tetramethylammonium hydroxide aqueous solution with not more than 2.5% tetramethylammonium hydroxide	1835	8		Corrosive		A3 A233 A234	III	E1	852 Y841	5 L 1 L	856	60 L
Trifluoromethyltetrazole sodium salt in acetone with not less than 68% acetone, by mass	3555	3		Liquid flammable		A40	II	E0	FORBIDDEN		FORBIDDEN	

UN harmonization amendments

and

Amendments to battery provisions

Paragraph 4.1.2.1.4 of DGP/29-WP/3 and paragraph 2.2.7 of this report:

Vehicle, lithium ion battery powered	3556	9		Miscellaneous — Lithium or sodium ion batteries		A87 A118 A120 A154 A214		E0	952	No limit	952	No limit
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Appendix A to the Report

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		6	7	8	9	10	11	12	13
<u>Vehicle, lithium metal battery powered</u>	<u>3557</u>	<u>9</u>		Miscellaneous — Lithium or sodium ion batteries		<u>A87</u> <u>A118</u> <u>A120</u> <u>A154</u> <u>A214</u>		<u>E0</u>	<u>952</u>	<u>No limit</u>	<u>952</u>	<u>No limit</u>
<u>Vehicle, sodium ion battery powered</u>	<u>3558</u>	<u>9</u>		Miscellaneous — Lithium or sodium ion batteries		<u>A87</u> <u>A118</u> <u>A120</u> <u>A154</u> <u>A214</u> <u>A231</u>		<u>E0</u>	<u>952</u>	<u>No limit</u>	<u>952</u>	<u>No limit</u>

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UN harmonization amendments

Table 3-1. Dangerous Goods List

Amendments to the Chinese version of Table 3-1 only:

Paragraph 4.1.2.2 of DGP/29-WP/2:

Name	UN No.	Class or division	Subsidiary risk	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
Guanyl nitrosaminoguanidene hydrazine, wetted with not less than 30% water, by mass 脒基·亚硝氨基脒基肼, 湿的, 按质量计, 含水不低于30%	0113	1.1A							FORBIDDEN 禁运		FORBIDDEN 禁运	
Ethyl methyl ketone 乙基·甲基甲乙酮	1193	3		Liquid flammable 易燃液体			II	E2	353 Y341	5 L 1 L	364	60 L
Hydrogen cyanide, aqueous solution with not more than 20% hydrogen cyanide or Hydrocyanic acid, aqueous solution with not more than 20% hydrogen cyanide 氰化氢水溶液, 含氰化氢不超过20% 或 氢氰酸水溶液, 含氰化氢不超过20%	1613	6.1							FORBIDDEN 禁运		FORBIDDEN 禁运	
Calcium hydrosulphite 连二亚硫酸氢钙	1923	4.2		Spontaneous combustion 自燃物质			II	E2	467	15 kg	470	50 kg
Dibromodifluoromethane 丙烷二氟二溴甲烷	1941	9		Miscellaneous 杂项危险物品			III	E1	964	100 L	964	220 L

Appendix A to the Report

Name 1	UN No. 2	Class or division 3	Subsidiary risk 4	Labels 5	State variations 6	Special provisions 7	UN packing group 8	Excepted quantity 9	Passenger aircraft		Cargo aircraft	
									Packing instruction 10	Max. net quantity per package 11	Packing instruction 12	Max. net quantity per package 13
Pentane-2, 4-dione 戊-2, 4-戊二酮	2310	3	6.1	Liquid flammable & Toxic 易燃液体和 毒性物质			III	E1	355 Y343	60 L 2 L	366	220 L
Adsorbed gas, toxic, flammable, n.o.s.* 吸附气体, 毒性, 易燃, 未另作规定的*	3514	2.3	2.1		AU 1 CA 7 IR 3 NL 1 US 3	A2		E0	FORBIDDEN 禁运		FORBIDDEN 禁运	
Adsorbed gas, toxic, flammable, corrosive, n.o.s.* 吸附气体, 毒性, 易燃, 腐蚀性, 未另作规定的*	3517	2.3	2.1 8		AU 1 CA 7 IR 3 NL 1 US 3	A2		E0	FORBIDDEN 禁运		FORBIDDEN 禁运	
...												

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Chapter 3

SPECIAL PROVISIONS

...

Table 3-2. Special provisions

TIs UN

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UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.3, SP 28 (see ST/SG/AC.10/50/Add.1):

A40 (28) This substance may be transported under provisions of Class 3 or Division 4.1 only if it is so packed that the percentage of diluent will not fall below that stated at any time during transport (see 2:3.1.4 and 2:4.2.4). In cases where the diluent is not stated, the substance must be packed so that the amount of explosive substance does not exceed the stated value.

...

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.

...

Amendments to manage aviation specific risks

Paragraph 2.2.3 of this report:

Non-spillable batteries 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.

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

TIs UN

Consequential amendment, changes adopted in UN Model Regulations, Chapter 3.3, SP 365 and 366

A69 The following are not subject to these Instructions when carried as cargo:

- a) articles other than lamps, such as thermometers, switches and relays, each containing a total quantity of not more than 15 g of mercury or gallium, if they are installed as an integral part of a machine or apparatus and so fitted that shock or impact damage, leading to leakage of mercury or gallium, is unlikely to occur under normal conditions of transport.
- b) articles other than lamps, each containing not more than 100 mg of mercury, gallium or inert gas and packaged so that the quantity of mercury, gallium or inert gas per package is 1 g or less.

The words “not restricted” and the special provision number A69 must be provided on the air waybill when an air waybill is issued.

Note.— For lamps containing dangerous goods, see Part 1;2.6.

Amendments to facilitate transport or State oversight

Paragraph 4.3.2 of DGP/29-WP/2:

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

- a) for ~~flammable~~-liquid fuel powered engines:
 - 1) the engine is powered by a liquid fuel that does not meet the classification criteria for any class or division; or
 - 2) the fuel tank of the vehicle, machine or other apparatus has never contained any fuel or the fuel tank has been flushed and purged of vapours and adequate measures taken to nullify the hazard; and
 - 3) the entire fuel system of the engine has no free liquid and all fuel lines are sealed or capped or securely connected to the engine and vehicle, machinery or apparatus.
- b) for flammable gas powered internal combustion or fuel cell engines:
 - 1) the entire fuel system must have been flushed, purged and filled with a non-flammable gas or fluid to nullify the hazard;
 - 2) the final pressure of the non-flammable gas used to fill the system does not exceed 200 kPa at 20°C;
 - 3) the shipper has made prior arrangements with the operator; and
 - 4) the shipper has provided the operator with written or electronic documentation stating that the flushing, purging and filling procedure has been followed and that the final contents of the engine(s) have been tested and verified to be non-flammable.

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

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

 TIs UN

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 UN harmonization amendments

and

 Amendments to battery provisions

 Paragraph 4.1.2.1.4 of DGP/29-WP/3 and paragraph 1.2.1.3.1 a) of this report:

 Consequential amendment, changes adopted in UN Model Regulations, Chapter 3.3, SP 310

A88 Pre-production prototypes of lithium ~~batteries or~~ cells or batteries or sodium ion cells or batteries, when these prototypes are transported for testing, or low production runs (i.e. annual production runs consisting of not more than 100 lithium ~~batteries or~~ cells or batteries or sodium ion cells or batteries) of lithium ~~batteries or~~ cells or batteries or sodium ion cells or batteries 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 State of the Operator and the requirements in Packing Instruction 910 of the Supplement are met.

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.

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

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 Consequential amendment, changes adopted in UN Model Regulations, Chapter 3.3, SP 310 and paragraph 1.2.1.3.1 a) of this report:

A99 Irrespective of the quantity limits for cargo aircraft specified in column 13 of Table 3-1, and in Section I of Packing Instructions 965, 966, 967, 968, 969 ~~and~~, 970, 976, 977 and 978, a lithium cell or battery or sodium ion cell or battery (i.e. UN 3090 ~~or~~ UN 3480 or UN 3551), including when packed with equipment or contained in equipment (i.e. UN 3091 ~~or~~ UN 3481 or UN 3552) that meets the other requirements of Section I of the applicable packing instruction, may have a mass exceeding 35 kg, if approved by the appropriate authority of the State of Origin and the State of the Operator and the requirements in Packing Instruction 974 of the Supplement are met.

A copy of the document of approval must accompany the consignment. Transport in accordance with this special provision must be noted on the dangerous goods transport document.

...

 Amendments to facilitate transport or State oversight

 Paragraph 4.3.2 of DGP/29-WP/3:

A107 (≈301) This entry only applies to articles such as machinery, apparatus or devices containing dangerous goods as a residue or as an integral element of the articles. It must not be used for articles for which a proper shipping name already exists in Table 3-1.

TIs UN

Where the quantity of dangerous goods ~~contained as an integral element in articles~~ 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 articles 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.

Notwithstanding the quantities specified in Packing Instruction 962, articles may also contain up to 5 kg of UN 3077 — Environmentally hazardous substance, solid, n.o.s. and/or 5 L of UN 3082 — Environmentally hazardous substance, liquid, n.o.s. The quantity of environmentally hazardous substance must not be indicated on the dangerous goods transport document.

Articles containing only UN 3077 — Environmentally hazardous substance, solid, n.o.s. and/or UN 3082 — Environmentally hazardous substance, liquid, n.o.s. in quantities not exceeding 5 L or 5 kg are not subject to these Instructions.

Note.— ~~This special provision is assigned to UN 3363 — Dangerous goods in articles, Dangerous goods in machinery and Dangerous goods in apparatus. The same requirements of these Instructions apply to each of these items. Where the quantity of dangerous goods in the article exceeds the quantity permitted by Special Provision 301 of the UN Model Regulations, or the dangerous goods are not permitted as limited quantity by the UN Model Regulations, classification of the article must be in accordance with Part 2, Introductory Chapter, 6.1 to 6.6.~~

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UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.3, SP 280 (see ST/SG/AC.10/50/Add.1):

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) or to fire suppressant dispersing devices (UN Nos. 0514 and 3559).

...

Amendments to battery provisions

Paragraph 4.3.4 of DGP/29-WP/2 and paragraph 2.2.3 of this report:

A123 This entry applies to Batteries, electric storage, not otherwise listed in Table 3-1. Examples of such batteries are: alkali-manganese, zinc-carbon and nickel-cadmium batteries. Any electrical battery or battery-powered device, equipment or vehicle ~~having the potential of a dangerous evolution of heat~~ must be prepared for transport so as to prevent:

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

TIs UN

The words "not restricted" and the special provision number A123 must be provided on the air waybill when an air waybill is issued.

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.

UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.3, SP 252 (see ST/SG/AC.10/50/Add.1):

A129 (252) ~~Provided the ammonium nitrate remains in solution under all conditions of transport, aqueous solutions of ammonium nitrate, with not more than 0.2 per cent combustible material, in a concentration not exceeding 80 per cent are not subject to these Instructions when carried as cargo.~~ Ammonium nitrate hot concentrated solutions can be transported under this entry provided:

- a) the solution contains not more than 93 per cent ammonium nitrate;
- b) the solution contains at least 7 per cent water;
- c) the solution contains not more than 0.2 per cent combustible material;
- d) the solution contains no chlorine compounds in quantities such that the chloride ion level exceeds 0.02 per cent;
- e) the pH of an aqueous solution of 10 per cent of the substance is between 5 and 7, measured at 25°C; and
- f) the maximum allowable transport temperature of the solution is 140°C.

Ammonium nitrate hot concentrate solutions are not subject to these Instructions when carried as cargo, provided:

- a) the solution contains not more than 80 per cent ammonium nitrate;
- b) the solution contains not more than 0.2 per cent combustible material;
- c) the ammonium nitrate remains in solution under all conditions of transport; and
- d) the solution does not meet the criteria of any other class or division.

...

UN Model Regulations, Chapter 3.3, SP 328 (see ST/SG/AC.10/50/Add.1):

A146 (328) This entry applies to fuel cell cartridges including when contained in equipment or packed with equipment. Fuel cell cartridges installed in or integral to a fuel cell system are regarded as contained in equipment. Fuel cell cartridge means an article that stores fuel for discharge into the fuel cell through a valve(s) that controls the discharge of fuel into the fuel cell. Fuel cell cartridges, including when contained in equipment, must be designed and constructed to prevent fuel leakage under normal conditions of transport.

Fuel cell cartridge design types using liquids as fuels must pass an internal pressure test at a pressure of 100 kPa (gauge) without leakage.

TIs UN

Except for fuel cell cartridges containing hydrogen in metal hydride which must be in compliance with A162, each fuel cell cartridge design type, including fuel cell cartridges installed in or integral to a fuel cell system, must be shown to pass a 1.2 metre drop test onto an unyielding surface in the orientation most likely to result in failure of the containment system with no loss of contents.

When lithium metal batteries, ~~or~~ lithium ion batteries or sodium ion batteries are contained in the fuel cell system, the consignment must be consigned under this entry and under the appropriate entries for UN 3091 **Lithium metal batteries contained in equipment**, ~~or~~ UN 3481 **Lithium ion batteries contained in equipment** or UN 3552 Sodium ion batteries contained in equipment.

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UN harmonization amendments

and

Amendments to battery provisions

UN Model Regulations, Chapter 3.3, SP 376 (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.1.3.1 a) of this report:

A154 (≈376) Lithium ion cells or batteries ~~and~~ lithium metal cells or batteries and sodium ion cells or batteries, identified as being defective for safety reasons, 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 defective prior to transport).

Lithium ion cells or batteries ~~and~~ lithium metal cells or batteries and sodium ion cells or batteries, identified as being damaged such that they do not conform to the type tested according to the applicable provisions of the UN *Manual of Tests and Criteria* are forbidden for transport. For the purposes of this special provision, these may include, but are not limited to:

- a) cells or batteries that have leaked or vented;
- b) cells or batteries that cannot be diagnosed prior to transport; or
- c) cells or batteries that have sustained physical or mechanical damage.

In assessing a cell or battery as defective or damaged, an assessment or evaluation must be performed based on safety criteria from the cell, battery or product manufacturer or by a technical expert with knowledge of the cell's or battery's safety features. An assessment or evaluation may include, but is not limited to, the following criteria:

- a) acute hazard, such as gas, fire, or electrolyte leaking;
- b) the use or misuse of the cell or battery;
- c) signs of physical damage, such as deformation to cell or battery casing, or colours on the casing;
- d) external and internal short circuit protection, such as voltage or isolation measures;
- e) the condition of the cell or battery safety features; or
- f) damage to any internal safety components, such as the battery management system.

TIs UN

See 2.2.7 of this report:

- A164 ~~Any electrical battery or battery-powered device, equipment or vehicle having the potential of a dangerous evolution of heat must be prepared for transport so as to prevent:~~
- ~~a) a short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or, in the case of equipment, by disconnection of the battery and protection of exposed terminals); and~~
- ~~b) unintentional activation.~~
- Not used.
-

Paragraph 4.2.2.2 of DGP/29-WP/3:

- A183 Waste cells and batteries and cells or 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.
-

UN Model Regulations, Chapter 3.3, SP 360 (see ST/SG/AC.10/50/Add.1):

- A185 (360) Vehicles only powered by lithium metal ~~batteries or~~, lithium ion or sodium ion batteries must be assigned to ~~UN 3171 Battery-powered vehicle~~ UN 3556 Vehicle, lithium ion battery powered or UN 3557 Vehicle, lithium metal battery powered or UN 3558 Vehicle, sodium ion battery powered, as applicable.

Lithium batteries installed in cargo transport units, designed only to provide power external to the transport unit must be assigned to UN 3536 **Lithium batteries installed in cargo transport unit.**

TIs UN

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Amendments to facilitate transport or State oversight

Paragraph 4.3.1 of DGP/29-WP/3:

A190 (373) Neutron radiation detectors containing non-pressurized boron trifluoride gas may be transported under this entry provided that:

a) radiation detectors containing in excess of 1 gram of boron trifluoride and radiation detection systems containing neutron radiation detectors as components may be transported on cargo aircraft in accordance with all applicable requirements of these Instructions irrespective of the indication of "forbidden" in columns 12 and 13 of Table 3-1 ~~and with "Toxic gas" and "Corrosive" labels displayed on each package irrespective of no labels being indicated in column 5~~, provided the following conditions are met:

ai) each radiation detector must meet the following conditions:

- i1) the pressure in each neutron radiation detector must not exceed 105 kPa absolute at 20°C;
- ii2) the amount of gas must not exceed 13 grams per detector;
- iii3) each detector must be manufactured under a registered quality assurance programme;

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

iv4) each neutron radiation detector must be of welded metal construction with brazed metal to ceramic feed through assemblies. These detectors must have a minimum burst pressure of 1 800 kPa as demonstrated by design type qualification testing; and

v5) each detector must be tested to a 1×10^{-10} cm³/s leaktightness standard before filling.

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

- i1) they must be packed in a sealed intermediate plastic liner with sufficient absorbent or adsorbent material to absorb or adsorb the entire gas contents;
- ii2) they must be packed in strong outer packagings and the completed package must be capable of withstanding a 1.8 m drop test without leakage of gas contents from detectors; and
- iii3) the total amount of gas from all detectors per outer packaging must not exceed 52 grams.

ei) completed neutron radiation detector systems containing detectors meeting the conditions of subparagraph ai) must be transported as follows:

- i1) the detectors must be contained in a strong sealed outer casing;
- ii2) the casing must contain sufficient absorbent or adsorbent material to absorb or adsorb the entire gas contents; and
- iii3) the completed system must be packed in strong outer packagings capable of withstanding a 1.8 m drop test without leakage unless a system's outer casing affords equivalent protection.

iv) each package must bear a "Toxic gas" and "Corrosive" hazard label irrespective of no labels being indicated in column 5;

TIs UN

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

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

b) ~~When transported as cargo,~~ neutron radiation detectors containing not more than 1 gram of boron trifluoride, including those with solder glass joints, and radiation detection systems containing such detectors are not subject to these Instructions when carried as cargo, provided ~~they~~ the following conditions are met:

i) each radiation detector must meet the requirements in sub-paragraph a) i) and are be packed in accordance with sub-paragraph ~~b) a) ii)~~ irrespective of the indication of "forbidden" in columns 10 to 13;

ii) ~~R~~adiation detection systems containing such detectors ~~are not subject to these Instructions provided they are~~ must be packed in accordance with sub-paragraph ~~c) a) iii)~~; and

iii) ~~T~~he words "not restricted" and the special provision number A190 must be provided on the air waybill when an air waybill is used.

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

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UN harmonization amendments

Paragraph 4.1.2.1.4 of DGP/29-WP/2:

UN Model Regulations, Chapter 3.3, SP 371 (see ST/SG/AC.10/50/Add.1):

- A195 (371) 1) This entry also applies to articles containing a small pressure receptacle with a release device. Such articles must comply with the following requirements:
- a) the water capacity of the pressure receptacle must not exceed 0.5 litres and the working pressure must not exceed 25 bar at 15°C;
 - b) the minimum burst pressure of the pressure receptacle must be at least four times the pressure of the gas at 15°C;
 - c) each article must be manufactured in such a way that unintentional firing or release is avoided under normal conditions of handling, packing, transport and use. This may be achieved by an additional locking device linked to the activator;
 - d) each article must be manufactured in such a way as to prevent hazardous projections of the pressure receptacle or parts of the pressure receptacle;
 - e) each pressure receptacle must be manufactured from material which will not fragment upon rupture;

TIs UN

- f) the design type of the article must be subjected to a fire test. For this test, the provisions of paragraphs 16.6.1.2, except sub-paragraph g), 16.6.1.3.1 to [16.6.1.3.1.4](#), 16.6.1.3.6, 16.6.1.3.7 b) and 16.6.1.3.8 of the UN *Manual of Tests and Criteria* must be applied. It must be demonstrated that the article relieves its pressure by means of a fire degradable seal or other pressure relief device, in such a way that the pressure receptacle will not fragment and that the article or fragments of the article do not rocket more than 10 metres; and
- g) the design type of the article must be subjected to the following test. A stimulating mechanism must be used to initiate one article in the middle of the packaging. There must be no hazardous effects outside the package such as disruption of the package, metal fragments or a receptacle which passes through the packaging.
- 2) The manufacturer must produce technical documentation of the design type, manufacture as well as the tests and their results. The manufacturer must apply procedures to ensure that articles produced in a series are made of good quality, conform to the design type and are able to meet the requirements in 1). The manufacturer must provide such information to the appropriate national authority on request.

Amendments to battery provisions

Paragraph 4.3.4 of DGP/29-WP/2 and paragraph 2.2.3 of this report:

A199 Nickel-metal hydride batteries or nickel-metal hydride battery-powered devices, equipment or vehicles ~~having the potential of a dangerous evolution of heat~~ are not subject to these Instructions provided they are 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.

The words “not restricted” and the special provision number A199 must be provided on the air waybill when an air waybill is issued.

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.

TIs UN

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UN harmonization amendments

and

Amendments to battery provisions

 Paragraph 4.1.2.1.4 of DGP/29-WP/2:

 UN Model Regulations, Chapter 3.3, SP 388 (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.1.3.1 b)):

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 and equipment powered by wet batteries, metallic sodium batteries or sodium alloy batteries, ~~lithium metal batteries or lithium ion batteries and equipment powered by wet batteries or sodium batteries~~ transported with these batteries installed.

UN 3556 Vehicle, lithium ion battery powered, UN 3557 Vehicle, lithium metal battery powered and UN 3558 Vehicle, sodium ion battery powered, as applicable, apply to vehicles powered by lithium ion, lithium metal or sodium ion batteries transported with the 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. When vehicles are transported in a packaging, some parts of the vehicle, other than the battery, 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. Lithium ion batteries or lithium metal batteries installed in a cargo transport unit and designed only to provide power external to the cargo transport unit must be assigned to UN 3536 **Lithium batteries installed in cargo transport unit**.

TIs UN

UN harmonization amendments

UN Model Regulations, Chapter 3.3, SP 399 (see ST/SG/AC.10/50/Add.1):

A226 (399) For articles that meet the definition for **Detonators, electronic** as described in Attachment 2 and assigned to UN Nos. 0511, 0512 and 0513, the entries for **Detonators, electric** (UN Nos. 0030, 0255 and 0456) may continue to be used until 30 June 2025.

UN harmonization amendments

and

Amendments to battery provisions

Paragraph 4.1.2.1.4 of DGP/29-WP/2:

UN Model Regulations, Chapter 3.3, SP 401 (see ST/SG/AC.10/50/Add.1):

A228 (401) Sodium ion cells and batteries with organic electrolyte must be transported as UN 3551 or UN 3552 as appropriate. Sodium ion batteries with aqueous alkali electrolyte must be transported as UN 2795 **Batteries, wet, filled with alkali, electric storage.**

UN harmonization amendments

UN Model Regulations, Chapter 3.3, SP 402 (see ST/SG/AC.10/50/Add.1):

A229 (402) Substances transported under this entry must have a vapour pressure at 70°C not exceeding 1.1 MPa (11 bar) and a density at 50°C not lower than 0.525 kg/L.

UN Model Regulations, Chapter 3.3, SP 403 (see ST/SG/AC.10/50/Add.1):

A230 (403) Nitrocellulose (NC) membrane filters covered by this entry with NC content not exceeding 53 g/m² and a NC net weight not exceeding 300 grams per inner packaging, are not subject to the requirements of these Instructions if they meet the following conditions:

- a) they are packed with paper separators of minimum 80 g/m² placed between each layer of NC membrane filters;
- b) they are packed to maintain the alignment of the NC membrane filters and the paper separators in any of the following configurations:
 - 1) rolls tightly wound and packed in plastic foil of minimum 80 g/m² or aluminium pouches with an oxygen permeability of equal or less than 0.1 per cent according to standard ISO 15105-1:2007;
 - 2) Sheets packed in cardboard of minimum 250 grams per square metre or aluminium pouches with an oxygen permeability of equal or less than 0.1 per cent according to standard ISO 15105-1:2007;
 - 3) round filters packed in disc holders or cardboard packaging of minimum 250 grams per square metre or single packed in pouches of paper and plastic material of total minimum 100 grams per square metre.

TIs UN

UN harmonization amendments

and

Amendments to battery provisions

UN Model Regulations, Chapter 3.3, SP 404 (see ST/SG/AC.10/50/Add.1):

~~A231 (404) Vehicles powered by sodium ion batteries, containing no other dangerous goods, are not subject to other provisions of these Instructions, if the battery is short-circuited, in a way that the battery does not contain electrical energy. The short-circuiting of the battery must be easily verifiable (e.g. busbar between terminals).~~

UN harmonization amendments

UN Model Regulations, Chapter 3.3, SP 406 (see ST/SG/AC.10/50/Add.1)

and

Paragraph 4.1.2.1.4.1 a) of DGP/29-WP/3:

~~A23X (406) This entry may be transported in accordance with the limited quantity provisions of Chapter 3.4 when transported in pressure receptacles containing not more than 1 000 ml. The pressure receptacles shall meet the requirements of packing instruction P200 of 4.1.4.1 and have a test pressure capacity product not exceeding 15.2 MPa L (152 bar L). The pressure receptacles shall not be packed together with other dangerous goods.~~

TIs UN

Paragraph 4.1.2.1.4 of DGP/29-WP/2:

UN Model Regulations, Chapter 3.3, SP 407 (see ST/SG/AC.10/50/Add.1):

A232 (407) Fire suppressant dispersing devices are articles which contain a pyrotechnic substance, which are intended to disperse a fire extinguishing agent (or aerosol) when activated, and which do not contain any other dangerous goods. These articles, as packaged for transport, must fulfil the criteria for Division 1.4S, when tested in accordance with test series 6(c) of Section 16 of Part 1 of the UN *Manual of Tests and Criteria*. The device must be transported with either the means of activation removed or equipped with at least two independent means to prevent accidental activation.

Fire suppressant dispersing devices must only be assigned to Class 9, UN 3559, if the following additional conditions are met:

- a) the device meets the exclusion criteria in 2;1.5.2.4 b), c) and d);
- b) the suppressant must be deemed safe for normally occupied spaces in compliance with international or regional standards (e.g. NFPA2010);
- c) the article must be packaged in a manner such that when activated, temperatures of the outside of the package must not exceed 200°C;

This entry must be used only with the approval of the appropriate national authority of the State of manufacture.

This entry does not apply to UN 3268 **Safety devices**, electrically initiated described in Special Provision A115.

UN Model Regulations, Chapter 3.3, SP 408 (see ST/SG/AC.10/50/Add.1):

A233 (408) This entry applies only to aqueous solutions comprised of water, tetramethylammonium hydroxide (TMAH), and no more than 1 per cent other constituents. Other formulations containing tetramethylammonium hydroxide must be assigned to an appropriate generic or n.o.s. entry (e.g. UN 2927, **Toxic liquid, corrosive, organic, n.o.s.**, etc.), except as follows:

- a) Other formulations containing a surfactant in a concentration of more than 1 per cent and with not less than 8.75 per cent tetramethylammonium hydroxide must be assigned to UN 2927 **Toxic liquid, corrosive, organic, n.o.s.**, Packing Group I; and
- b) Other formulations containing a surfactant in a concentration of more than 1 per cent and with more than 2.38 per cent but less than 8.75 per cent tetramethylammonium hydroxide must be assigned to UN 2927, **Toxic liquid, corrosive, organic, n.o.s.**, Packing Group II.

UN Model Regulations, Chapter 3.3, SP 409 (see ST/SG/AC.10/50/Add.1) and
Paragraph 4.1.2.1.4.1 f) of DGP/29-WP/3:

A234 (409) The provisions specified in Table 3-1 in the 2023-2024 Edition of these Instructions may continue to be applied until 31 December 2026.

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Part 4

PACKING INSTRUCTIONS

...

Chapter 1

GENERAL PACKING REQUIREMENTS

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1.1.3 Compatibility requirements

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Amendments to facilitate transport or State oversight

Paragraph 4.3.6 of DGP/29-WP/2:

1.1.6 Packagings for which retention of liquid is a basic function must be capable of withstanding without leakage an internal pressure which produces a pressure differential of not less than 95 kPa (not less than 75 kPa for liquids in Packing Group III of Class 3, ~~or~~ Division 6.1 or Class 9), or a pressure related to the vapour pressure of the liquid to be conveyed, whichever is the greater. The pressure related to the vapour pressure must be determined as either:

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Chapter 4

CLASS 2 — GASES

4.1 SPECIAL PACKING PROVISIONS FOR DANGEROUS GOODS OF CLASS 2

4.1.1 General requirements

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

UN harmonization amendments

Paragraph 4.1.2.1.5 of DGP/29-WP/3:

UN Model Regulations, Chapter 4.1, 4.1.6.1.2 (see ST/SG/AC.10/50/Add.1)

4.1.1.2 Parts of cylinders and closed cryogenic receptacles that are in direct contact with dangerous goods must not be affected or weakened by those dangerous goods and must not cause a dangerous effect (e.g. catalysing a reaction or reacting with the dangerous goods). In addition to the requirements specified in the relevant packing instruction, which take precedence, the applicable provisions of ISO ~~11114-1:2012 + A1:2017~~ 11114-1:2020 and ISO ~~11114-2:2013~~ 11114-2:2021 must be met.

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 UN Model Regulations, Chapter 4.1, 4.1.6.1.8 (see ST/SG/AC.10/50/Add.1)

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

- a) Valves are placed inside the neck of the cylinder and closed cryogenic receptacle and protected by a threaded plug or cap;
- b) Valves are protected by caps or guards. Caps must possess vent holes of a sufficient cross-sectional area to evacuate the gas if leakage occurs at the valves;
- c) Valves are protected by shrouds or ~~guards~~ permanent protective attachments;
- d) Not used; or
- e) Cylinders and closed cryogenic receptacles are transported in an outer packaging. The packaging as prepared for transport must be capable of meeting the drop test specified in 6;4.3 at the Packing Group I performance level.

For cylinders and closed cryogenic receptacles with valves as described in b) ~~and e)~~, the requirements of ISO 11117:1998, ISO 11117:2008 + Cor 1:2009 or ISO 11117:2019 must be met. Requirements for shrouds and permanent protective attachments used as valve protection under c) are given in the relevant pressure receptacle shell design standards, see 6;5.2.1 for valves with inherent protection used for refillable cylinders must meet; the requirements of ~~Annex A clause 4.6.2 of ISO 10297:2006, Annex A or clause 5.5.2 of ISO 10297:2014 or Annex A of ISO 1029 or clause 5.5.2 of ISO 10297:2014 + Amd 1:2017 must be met. For cylinders and closed cryogenic receptacles with or, in the case of self-closing valves, of clause 5.4.2 of ISO 17879:2017. For valves with inherent protection used for non-refillable cylinders, the requirements of Annex A clause 9.2.5 of ISO 17879:2017 must be met. For metal hydride storage systems, the valve protection requirements specified in ISO 16111:2008 or ISO 16111:2018 of ISO 11118:2015 or of clause 9.2.5 of ISO 11118:2015 + Amd 1:2019~~ must be met.

 Paragraph 2.2.4 of this report:

4.1.1.9 Non-refillable cylinders and closed cryogenic receptacles must:

- a) be transported in an outer packaging, such as a box, or crate, or in shrink-wrapped trays or stretch-wrapped trays;
- ~~b)~~ be of a water capacity less than or equal to 1.25 litres when filled with flammable gas;
- ~~b)c)~~ not be repaired after being put into service.

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4.2 PACKING INSTRUCTIONS

Packing Instruction 200

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

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

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 UN Model Regulations, Chapter 4.1, 4.1.4.1, P200 (4) (see ST/SG/AC.10/50/Add.1)

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

- ~~a)~~ the conformity of cylinders and accessories with these Instructions;
- ~~b)~~ their compatibility with the product to be transported;
- ~~c)~~ the absence of damage which might affect safety;
- ~~d)~~ compliance with the degree or pressure of filling, as appropriate;
- ~~e)~~ marks and identification.

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

ISO 10691: 2004	Gas cylinders — Refillable welded steel cylinders for liquefied petroleum gas (LPG) — Procedures for checking before, during and after filling.
ISO 11372: 2011	Gas cylinders — Acetylene cylinders — Filling conditions and filling inspection
ISO 11755: 2005	Gas cylinders — Cylinder bundles for compressed and liquefied gases (excluding acetylene) — Inspection at time of filling
ISO 13088: 2011	+AMD. 1:2020 Gas cylinders — Acetylene cylinder bundles — Filling conditions and filling inspection
ISO 24431:2016	Gas cylinders — Seamless, welded and composite cylinders for compressed and liquefied gases (excluding acetylene) — Inspection at time of filling

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- 6) "Special packing provisions":

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Gas specific provisions:

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 UN Model Regulations, Chapter 4.1, 4.1.4.1, P200 (5) (see ST/SG/AC.10/50/Add.1)

- s) Aluminium alloy cylinders must be:

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

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Table 2. LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary hazard	LC ₅₀ ml/m ³	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
1001	Acetylene, dissolved	2.1			X	10	60 52		c, p
1009	Bromotrifluoromethane (refrigerant gas R 13b1)	2.2			X	10	42 120 250	1.13 1.44 1.60	
1010	Butadienes, stabilized (1,2-butadiene)	2.1			X	10	10	0.59	
1010	Butadienes, stabilized (1,3-butadiene)	2.1			X	10	10	0.55	z

UN No.	Name and description	Class or Division	Subsidiary hazard	LC ₅₀ ml/m ³	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
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UN Model Regulations, Chapter 4.1, 4.1.4.1, P200 Table 2 (see ST/SG/AC.10/50/Add.1)

1010	Butadienes and hydrocarbon mixture, stabilized containing more than 40% <u>20%</u> butadienes	2.1			X	10			v z
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Packing Instruction 202

This instruction applies to Class 2 refrigerated liquefied gases in open and closed cryogenic receptacles.

Requirements for closed cryogenic receptacles

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UN Model Regulations, Chapter 4.1, 4.1.4.1, P203 (5) (see ST/SG/AC.10/50/Add.1)

5) ~~Degree of F~~illing

For non-flammable, non-toxic refrigerated liquefied gases, the volume of liquid phase at the filling temperature and at a pressure of 100 kPa (1 bar) must not exceed 98 per cent of the water capacity of the pressure receptacle.

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Requirements for open cryogenic receptacles

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

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UN Model Regulations, Chapter 4.1, 4.1.4.1, P203 (9) (see ST/SG/AC.10/50/Add.1)

9. Open cryogenic receptacles must bear the following marks permanently affixed, e.g. by stamping, engraving or etching:

- ~~a)~~ the manufacturer's name and address;
- ~~b)~~ the model number or name;
- ~~c)~~ the serial or batch number;
- ~~d)~~ the UN number and proper shipping name of gases for which the receptacle is intended;
- ~~e)~~ the capacity of the receptacle in litres.

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

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

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Packing Instruction 218

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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.

UN Model Regulations, Chapter 4.1, 4.1.4.1, P206 (PP89) (4) (see ST/SG/AC.10/50/Add.1)

- 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 [clause 1 of ISO 11118:1999](#) [2015 + Amd 1:2019](#), which limits the maximum capacity to 50 litres.
- e) For liquids charged with a compressed gas, both components — the liquid 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 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 at 65°C;
 - v) Calculation of the total pressure, which is the sum of the vapour pressure of the liquid 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 phase is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph vi)) into account.

- f) For fire extinguishing agents assigned to UN 3500, the maximum test period for periodic inspection must be ten years.

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Packing Instruction 220

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Batteries

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

Amendments to manage aviation specific risks**Paragraph 4.2.2.3 of DGP/29-WP/2:**

- 1) If spillable batteries are installed, and it is possible for the machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492~~ or 870 as applicable.
- 2) If lithium batteries are installed:
 - i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and
 - ii) lithium batteries must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs 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 State of the Operator. A copy of the document of approval must accompany the consignment.
- 3) If metallic sodium or sodium alloy batteries are installed, they must conform to the requirements of Special Provision A94.

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Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

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UN harmonization amendments

Paragraph 4.1.2.1.5 of DGP/29-WP/3:

Packing Instruction 372

Cargo aircraft only for UN 3165 only

UN Model Regulations, Chapter 4.1, 4.1.4.1, P301 (see ST/SG/AC.10/50/Add.1)

General requirements

The requirements of Part 4, ~~Chapter 1 requirements~~, 1.1.1, 4;1.1.5; 4;1.1.8 and 4;1.1.10 must be met, ~~including:~~

1) Compatibility requirements

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

~~2) Closure requirements~~

- ~~— Closures must meet the requirements of 4;1.1.4.~~

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Packing Instruction 378

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Batteries

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

Amendments to manage aviation specific risks

Paragraph 4.2.2.3 of DGP/29-WP/2:

- 1) If spillable batteries are installed, and it is possible for the machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or~~ 870 ~~as applicable.~~
- 2) If lithium batteries are installed:
 - i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and
 - ii) lithium batteries must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs 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 State of the Operator. A copy of the document of approval must accompany the consignment.
- 3) If metallic sodium ~~or sodium alloy~~ batteries are installed, they must conform to the requirements of Special Provision A94.

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Chapter 6

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

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UN harmonization amendments

Paragraph 4.1.2.1 of DGP/29-WP/2:

Packing Instruction 451					
Passenger and cargo aircraft — wetted explosives (Packing Group I)					
...					
COMBINATION PACKAGINGS					SINGLE PACKAGINGS
UN number and proper shipping name	Inner packaging (see 6;3.2)	Inner packaging quantity (per receptacle)	Total quantity per package — passenger	Total quantity per package — cargo	
...					
UN 3474 1-Hydroxybenzotriazole; anhydrous, wetted monohydrate	Glass Plastics	0.5 kg	0.5 kg	0.5 kg	No
...					

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Paragraph 4.1.2.1.5 of DGP/29-WP/3:

Packing Instruction 492	
Passenger and cargo aircraft for UN 3292 only	
General requirements	
Part 4, Chapter 1 requirements must be met, including:	
1) Compatibility requirements	
— Substances must be compatible with their packagings as required by 4;1.1.3.	
— Metal packagings must be corrosion resistant or be protected against corrosion.	
2) Closure requirements	
— Closures must meet the requirements of 4;1.1.4.	

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

<i>UN number and proper shipping name</i>	<i>Packing conditions</i>	<i>Total quantity per package — passenger</i>	<i>Total quantity per package — cargo</i>
UN 3292 Batteries, containing <u>metallic sodium or sodium alloy</u>	Batteries may be offered for transport and transported unpacked or in protective enclosures such as fully enclosed or wooden slatted crates that are not subject to the requirements of Part 6 of these Instructions.	Forbidden	No limit
UN 3292 Cells, containing <u>metallic sodium or sodium alloy</u>	There must be sufficient cushioning material to prevent contact between cells and between cells and the internal surfaces of the outer packaging and to ensure that no dangerous movement of the cells within the outer packaging occurs in transport.	25 kg	400 kg

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Chapter 8

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

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UN harmonization amendments

Paragraph 4.1.2.1.5.1 of DGP/29-WP/3:

Packing Instruction 650

This packing instruction applies to UN 3373.

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UN Model Regulations, Chapter 4.1, 4.1.4.1, P650 (6) (see ST/SG/AC.10/50/Add.1)

- 6) The completed package must be capable of ~~successfully passing the drop test in 6;6.5.3 as specified in 6;6.5.2 of the instructions except that the height of the drop must not be less than 1.2 m. Following the appropriate drop sequence, there must be no~~ withstanding a 1.2 m drop in any orientation without leakage from the primary receptacle(s), which must remain protected by absorbent material, when required, in the secondary packaging.

Note.— Capability may be demonstrated by testing, assessment or experience.

- 7) For liquid substances:
- a) The primary receptacle(s) must be leakproof and must not contain more than 1 litre;
 - b) The secondary packaging must be leakproof;
 - c) If multiple fragile primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated to prevent contact between them;
 - d) Absorbent material must be placed between the primary receptacle(s) and the secondary packaging. The absorbent material must be in quantity sufficient to absorb the entire contents of the primary receptacle(s) so that any release of the liquid substance will not compromise the integrity of the cushioning material or of the outer packaging;
 - e) The primary receptacle or the secondary packaging must be capable of withstanding, without leakage, an internal pressure of 95 kPa (0.95 bar); and

UN Model Regulations, Chapter 4.1, 4.1.4.1, P650 (7) (see ST/SG/AC.10/50/Add.1)
and Paragraph 4.1.2.1.5.1 of DGP/29-WP/3:

Note.— The capability of a packaging to withstand an internal pressure without leakage that produces the specified pressure differential should be determined by testing samples of primary receptacles or secondary packagings. Pressure differential is the difference between the pressure exerted on the inside of the receptacle or packaging and the pressure on the outside. The appropriate test method should be selected based on receptacle or packaging type. Acceptable test methods include any method that produces the required pressure differential between the inside and outside of a primary receptacle or a secondary packaging. The test may be conducted using internal hydraulic or pneumatic pressure (gauge) or external vacuum test methods. Internal hydraulic or pneumatic pressure can be applied in most cases as the required pressure differential can be achieved under most circumstances. An external vacuum test is not acceptable if the specified pressure differential is not achieved and maintained. The external vacuum test is a generally acceptable method for rigid receptacles and packagings but is not normally acceptable for:

- ~~— flexible receptacles and flexible packagings;~~
- ~~— receptacles and packagings filled and closed under an absolute atmospheric pressure lower than 95 kPa.~~

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

~~Note.— The capability of a packaging to withstand an internal pressure without leakage that produces the specified pressure differential should be determined by testing samples of primary receptacles or secondary packagings. Pressure differential is the difference between the pressure exerted on the inside of the receptacle or packaging and the pressure on the outside. The appropriate test method should be selected based on receptacle or packaging type. Acceptable test methods include any method that produces the required pressure differential between the inside and outside of a primary receptacle or a secondary packaging. The test may be conducted using internal hydraulic or pneumatic pressure (gauge) or external vacuum test methods. Internal hydraulic or pneumatic pressure can be applied in most cases as the required pressure differential can be achieved under most circumstances. An external vacuum test is not acceptable if the specified pressure differential is not achieved and maintained. The external vacuum test is a generally acceptable method for rigid receptacles and packagings but is not normally acceptable for:~~

~~flexible receptacles and flexible packagings;~~

~~receptacles and packagings filled and closed under an absolute atmospheric pressure lower than 95 kPa.~~

- 8) For solid substances:

- a) The primary receptacle(s) must be siftproof and must not exceed the outer packaging mass limit;
- b) The secondary packaging must be siftproof;
- c) If multiple fragile primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated to prevent contact between them;
- d) Except for packages containing body parts, organs or whole bodies, the outer packaging must not contain more than 4 kg. This quantity excludes ice, dry ice or liquid nitrogen when used to keep specimens cold; and
- 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.

- 9) Refrigerated or frozen specimens: ice, dry ice and liquid nitrogen:

- a) When dry ice or liquid nitrogen is used to keep specimens cold, all applicable requirements of these Instructions must be met. When used, ice or dry ice must be placed outside the secondary packagings or in the outer packaging or an overpack. Interior supports must be provided to secure the secondary packagings in the original position after the ice or dry ice has dissipated. If ice is used, the outside packaging or overpack must be leakproof. If carbon dioxide, solid (dry ice) is used, the packaging must be designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packagings; and
- b) The primary receptacle and the secondary packaging must maintain their integrity at the temperature of the refrigerant used as well as the temperatures and the pressures which could result if refrigeration were lost.

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- 10) When packages are placed in an overpack, the package marks required by this packing instruction must either be clearly visible or the marks must be 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.

Amendments to facilitate transport or State oversight

Paragraph 3.4 of this report:

- 11) Infectious substances assigned to UN 3373 which are packed and marked in accordance with this packing instruction are not subject to any other requirement in these Instructions except for the following:
- a) the name and address of the shipper and of the consignee must be provided on each package. The information may be applied through the use of a barcode, QR code or other equivalent means;
 - b) the name and telephone number of a person responsible must be provided on a written document (such as an air waybill) or on the package;

- c) classification must be in accordance with 2;6.3.2;
- d) the incident reporting requirements in 7;4.4 and 7;4.5 must be met;

Note.— When the shipper or consignee is also the “person responsible” as referred to in b), the name and address need be marked only once in order to satisfy the name and marking provisions in both a) and b).

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Chapter 10

CLASS 8 — CORROSIVE SUBSTANCES

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Packing Instruction 866

Cargo aircraft only for UN 2028 only

General requirements

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

1) Compatibility requirements

- Substances must be compatible with their packagings as required by 4;1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion.

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 2028 Bombs, smoke, non-explosive with corrosive liquid, without initiating device	Bombs, smoke may be carried provided they are without ignition elements, bursting charges, detonating fuses or other explosive components.	Forbidden	50 kg	No

UN harmonization amendments

UN Model Regulations, Chapter 4.1, 4.1.4.1, P803 (7) (see ST/SG/AC.10/50/Add.1)

ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

- Packagings must meet the Packing Group II performance requirements.
- The articles must be individually packaged and separated from each other using partitions, dividers, inner packagings or cushioning material.

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

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

Drums

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

UN harmonization amendments

UN Model Regulations, Chapter 4.1, 4.1.4.1, P003 (see ST/SG/AC.10/50/Add.1)

Packing Instruction 869Passenger and cargo aircraft for UN Nos. 3506 and 3554 only**General requirements**

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

1) Compatibility requirements

- Substances must be compatible with their packagings as required by 4;1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion.

2) Closure requirements

- Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS			SINGLE PACKAGINGS
<i>UN number and proper shipping name</i>	<i>Net quantity* per package — passenger</i>	<i>Net quantity* per package — cargo</i>	
UN 3506 Mercury contained in manufactured articles <u>UN 3554 Gallium contained in manufactured articles</u>	No limit	No limit	No

*For the purposes of Part 5;4.1.5.1 the “net quantity” shown on the dangerous goods transport document is the net mass of the manufactured articles in each package.

ADDITIONAL PACKING REQUIREMENTS

- Manufactured articles or apparatuses of which metallic mercury or gallium is a component part, such as manometers, pumps, thermometers, and switches must be packed in sealed inner liners or bags of strong leakproof and puncture-resistant material impervious to mercury or gallium, as appropriate, which will prevent the escape of mercury or gallium from the package irrespective of its position before being packed in outer packagings.

Note.— Mercury switches and relays are excepted from the requirement for a sealed inner liner or bag providing they are of the totally enclosed leakproof type in sealed metal or plastic units.

- Electron tubes, mercury vapour tubes (tubes with less than a total net quantity of 450 g of mercury) must be packed in strong outer packagings with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the package.

Note.— Tubes with 450 g of mercury or more must be packaged according to the requirements for manufactured articles or apparatuses (above).

- Electron tubes which are packed in sealed leakproof metal cases may be shipped in the manufacturer's original packagings.

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

Strong outer packagings

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Packing Instruction 950

Batteries

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

Amendments to manage aviation specific risks

Paragraph 4.2.2.3 of DGP/29-WP/2:

- 1) If spillable batteries are installed, and it is possible for the vehicle 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:
 - i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and
 - ii) lithium batteries must meet the provisions of Part 2.9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs 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 State of the Operator. A copy of the document of approval must accompany the consignment.

See paragraph 1.2.1.4.1 a) of this report:

- 3) If metallic sodium or sodium alloy batteries are installed, they must conform to the requirements of Special Provision A94.

...

...

Packing Instruction 951

...

Batteries

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

Amendments to manage aviation specific risks

Paragraph 4.2.2.3 of DGP/29-WP/2:

- 1) If spillable batteries are installed, and it is possible for the vehicle 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:
 - i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and
 - ii) lithium batteries must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs 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 State of the Operator. A copy of the document of approval must accompany the consignment.
- 3) If metallic sodium or sodium alloy batteries are installed, they must conform to the requirements of Special Provision A94.

...

...

Amendments to manage aviation specific risks

and

Amendments to battery provisions

and

UN harmonization amendments

Paragraph 4.2.2.3 of DGP/29-WP/2 and paragraph 4.1.2.1.5 of DGP/29-WP/3:

Packing Instruction 952

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Passenger and cargo aircraft for UN Nos. 3171, 3556, 3557 and 3558 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)

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.

<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>
UN 3171- Battery-powered equipment or Battery-powered vehicle	No limit	No limit
<u>UN 3556 Vehicle, lithium ion battery powered</u>		
<u>UN 3557 Vehicle, lithium metal battery powered</u>		
<u>UN 3558 Vehicle, sodium ion battery powered</u>		

DGP/29-WP/2 (see paragraph 4.2.2.3), UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1) and paragraphs 1.2.1.4 c) and 2.2.7 of this report:

ADDITIONAL PACKING REQUIREMENTS

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

Where vehicles or equipment could possibly be handled in other than an upright position, the vehicle or equipment must be secured in a strong, rigid outer packaging of the type below. The vehicle or equipment must be secured and restrained in the outer packaging to prevent any movement during transport which could change the orientation or cause the vehicle or equipment to be damaged. ~~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.~~

Vehicles and equipment must be equipped with an effective means of preventing accidental activation.

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.~~
- 2) If lithium batteries or sodium ion batteries are installed:
 - i) ~~lithium~~ batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; ~~and~~

Deletion of “Unless otherwise approved by the appropriate authority of the State of Origin” in ii) is not applicable to Spanish or French editions of the Instructions, since it does not appear in these languages (see paragraph 4.3 of this report)

- ii) lithium batteries must meet the provisions of Part 2;9.3 and sodium ion batteries must meet the provisions of Part 2;9.4, unless otherwise approved by the appropriate authority of the State of Origin, except that pre-production prototypes of lithium batteries or sodium ion batteries or cells, when these prototypes are transported for testing, or low production runs of lithium batteries or sodium ion 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 State of the Operator. A copy of the document of approval must accompany the consignment.
- iii) ~~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 signed as UN 3481— **Lithium ion batteries packed with equipment, UN 3552 — Sodium ion batteries packed with equipment** or UN 3091 — **Lithium metal batteries packed with equipment** and packed according to Packing Instruction 966 ~~or~~, 969 ~~or~~ 977, as applicable; ~~and~~

See paragraph 4.2 of this report:

iv) for UN 3556 — Vehicle, lithium ion battery powered, UN 3557— Vehicle, lithium metal battery powered when the battery is rechargeable, and UN 3558 — Vehicle, sodium ion battery powered:

1) Until 31 December 2025

Vehicles should be offered for transport with:

- the battery(ies) at a state of charge not exceeding 30 per cent of their rated capacity; or
- an indicated battery capacity not exceeding 25 per cent.

2) From 1 January 2026

a) Vehicles powered by batteries with a Watt-hour rating exceeding 100 Wh must be offered for transport with:

- the battery(ies) at a state of charge not exceeding 30 per cent of their rated capacity; or
- an indicated battery capacity not exceeding 25 per cent.

b) Vehicles powered by batteries with a Watt-hour rating not exceeding 100 Wh should be offered for transport with:

- the battery(ies) at a state of charge not exceeding 30 per cent of their rated capacity; or
- an indicated battery capacity not exceeding 25 per cent.

c) Vehicles powered by batteries with a Watt-hour rating exceeding 100 Wh and at a state of charge greater than 30 per cent of their rated capacity or with an indicated battery capacity exceeding 25 per cent 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.

See paragraph 4.1.3.5 of this report:

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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.

DGP/29-WP/2 (see paragraph 4.2.2.3), UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1) and paragraphs 1.2.1.4 c) and 2.2.7 of this report:

- 3) If metallic sodium or sodium alloy batteries are installed, they must conform to the requirements of Special Provision A94.

Other operational equipment

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

Strong outer packagings – vehicles and equipment

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

UN harmonization amendments

and

Amendments to battery provisions

Paragraph 4.1.2.1.5 of DGP/29-WP/3:

Packing Instruction 955

Passenger and cargo aircraft for UN 2990 and UN 3072 only

...

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;

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

- e) lithium batteries and sodium ion batteries:
 - 1) identified as damaged or defective in accordance with Special Provision A154 are forbidden for transport;
 - 2) must meet the applicable requirements of 2;9.3 or 2;9.4, as applicable;
 - 3) must be disconnected or electrically isolated and protected against short circuits; and
 - 4) 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.

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

UN harmonization amendments

Paragraph 4.1.2.1.5 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Packing Instruction 961Passenger and cargo aircraft for UN Nos. 3268 and 3559 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.

<i>UN number and proper shipping name</i>	<i>Quantity — passenger</i>	<i>Quantity — cargo</i>	SINGLE PACKAGINGS
UN 3268 Safety devices , electrically initiated			
<u>UN 3559</u> Fire suppressant dispersing devices	25 kg	100 kg	No

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Packing Instruction 964

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

Amendments to manage aviation specific risks

Paragraph 4.2.2.2 of DGP/29-WP/2:

General requirementsPart 4, Chapter 1 requirements must be met (with the exception that for UN 3082 packed in combination packagings, the requirements of 4;1.1.6 do not apply).

These requirements include:

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UN harmonization amendments

and

Amendments to battery provisions

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; and
- 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.

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.

Paragraph 4.1.2.1.5.2.5 of DGP/29-WP/3 and 1.2.1.4 b) of this report:

2. ~~Lithium-ion~~ Batteries forbidden from transport

The following applies to all ~~lithium-ion~~ cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

Waste ~~lithium cells or~~ batteries and ~~lithium cells or~~ 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 the provisions of 2;9.3.

IA.1 General requirements

- Part 4;1 requirements must be met.
- ~~Lithium-ion-c~~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.

Paragraph 4.1.3.5 of this report:

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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.

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

Paragraph 4.1.2.1.5.2.5 of DGP/29-WP/3 report:

IA.2 Additional requirements

- ~~Lithium-ion e~~Cells and batteries must be protected against short circuits.
- ~~Lithium-ion e~~Cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- ~~Lithium-ion e~~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).
- A ~~lithium-ion e~~Cell or battery with a mass of 12 kg or greater and having a strong, impact-resistant outer casing may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

IA.3 Outer packagings

Boxes

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

Drums

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

Jerricans

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

IB. SECTION IB

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

~~Lithium-ion e~~Cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3 a), 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 ~~these~~ 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.

Paragraph 4.1.3.5 of this report:

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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.

Table 965-IB

Contents	Net quantity per package	
	Passenger	Cargo
Lithium ion cells and batteries	Forbidden	10 kg

Paragraph 1.2.1.4.1 b) of this report:

IB.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.
- Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than ~~Division~~ Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material 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 capable of withstanding, without damage to the cells or batteries contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours.

Paragraphs 1.2.1.4.1 e) and 4.1.3.8 of this report:

Note.— Capability may be demonstrated by testing, assessment or experience.

- 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).

Packing Instruction 965**IB.3 Outer packagings***Boxes*

Aluminium
Fibreboard
Natural wood
Other metal
Plastics
Plywood
Reconstituted wood
Steel

Drums

Aluminium
Fibre
Other metal
Plastics
Plywood
Steel

Jerricans

Aluminium
Plastics
Steel

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.

Paragraph 1.2.1.4.1 b) of this report:

2. ~~Lithium-ion~~ Batteries forbidden from transport

The following applies to all ~~lithium-ion~~ cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

I. SECTION I

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

I.1 General requirements

 Part 4;1 requirements must be met.

Paragraph 4.1 of this report:

Until 31 December 2025

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

From 1 January 2026

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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.

Packing Instruction 966

Paragraph 1.2.1.4.1 b) of this report:

Table 966-1

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

1.2 Additional requirements

- ~~Lithium ion e~~Cells and batteries must be protected against short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- ~~Lithium ion e~~Cells and batteries must:
 - be placed in inner packagings that completely enclose the cell or battery, then placed in a packaging of a type shown below that meets the Packing Group II performance requirements, then placed with the equipment 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 packaging of a type shown below that meets the Packing Group II performance requirements.
- The equipment must be secured against movement within the outer packaging.
- The number of cells or batteries in each package must not exceed the number required for the equipment's operation, plus two 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.

1.3 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 966

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);
- Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium ~~batteries or sodium ion~~ batteries);
- Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);
- Part 7;4.5 (Operator's responsibilities — Reporting of undeclared and misdeclared dangerous goods);
- Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and
- Paragraphs 1 and 2 of this packing instruction.

~~Lithium ion~~ Cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3 a), 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 case except for ~~those~~ batteries manufactured before 1 January 2009.

Paragraph 4.1 of this report:

II.1 General requirements

— Until 31 December 2025

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

— From 1 January 2026

Lithium ion cells and batteries with a Watt-hour rating in excess of 2.7 Wh 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 exceeding 30 per cent of their rated capacity must be offered for transport in accordance with the provisions of Section I of this packing instruction with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

Lithium ion cells and batteries with a Watt-hour rating not exceeding 2.7 Wh should 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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.

Paragraph 1.2.1.4.1 b) of this report:

Table 966-II

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

Packing Instruction 966

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 that conforms to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1); or
 - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong rigid outer packaging that conforms to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).
- Cells and batteries must be protected against short circuits. This includes protection against contact with electrically conductive material within the same packaging that could lead to a short circuit.
- The equipment must be secured against movement within the outer packaging.
- The number of cells or batteries in each package must not exceed the number required for the equipment's operation, plus two 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.

Paragraph 4.1.3.8 of this report:

- Each package of cells or batteries or the completed package must be capable of withstanding, without damage to the cells or batteries contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours.

Note.— Capability may be demonstrated by testing, assessment or experience.

Paragraphs 1.2.1.4.1 b) and e) of this report:

- 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.
- 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 packages of Section II **lithium** batteries from multiple packing instructions are included on one air waybill, the compliance statement for the different **lithium** battery types and/or packing instructions may be combined into a single statement provided that the statement identifies the applicable **lithium** battery type(s) and packing instruction numbers.
- 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 the functions for which they are responsible.

II.3 Outer packagings

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

Packing Instruction 966**II.4 Overpacks**

When packages are placed in an overpack:

- a) the packages must be secured within the overpack;
- b) the intended function of each package must not be impaired by the overpack; and

Paragraph 1.2.1.4.1 e) of this report:

- c) the ~~lithium~~ battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be 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.

Paragraph 1.2.1.4.1 b) of this report:

2. ~~Lithium-ion~~ Batteries forbidden from transport

The following applies to all ~~lithium-ion~~ cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

I. SECTION I

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

Paragraph 4.1 of this report:

I.1 General requirements

- Equipment should be offered for transport with:
 - the cells and batteries at a state of charge not exceeding 30 per cent of their rated capacity; or
 - an indicated battery capacity not exceeding 25 per cent.

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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.

- 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). Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

Paragraph 1.2.1.4.1 b) of this report:

Table 967-I

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

Packing Instruction 967

Paragraph 4.1.3.8 of this report:

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.
- Where multiple pieces of equipment are packed in the same outer packaging, each piece of equipment must be packed to prevent contact with other equipment.
- Each package must be capable of withstanding, without damage to the equipment contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours. Large equipment that is offered for transport unpackaged or on pallets is not subject to the requirements for the 3 m stack test capability.

Note.— Capability may be demonstrated by testing, assessment or experience.

- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

I.3 Outer packagings

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

Packing Instruction 967

Paragraph 1.2.1.4.1 b) of this report:

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);
- Part 5;2.4.16 (Shipper’s responsibilities — Special marking requirements for lithium ~~batteries or sodium ion~~ batteries);
- Part 7;4.4 (Operator’s responsibilities — Reporting of dangerous goods accidents and incidents);
- Part 7;4.5 (Operator’s responsibilities — Reporting of undeclared and misdeclared dangerous goods);
- Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and
- Paragraphs 1 and 2 of this packing instruction.

~~Lithium-ion~~ Cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3 a), 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 ~~these~~ batteries manufactured before 1 January 2009.

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport.

Paragraph 4.1 of this report:

II.1 General requirements

- ~~Equipment should be offered for transport with:~~
 - ~~the cells and batteries at a state of charge not exceeding 30 per cent of their rated capacity; or~~
 - ~~an indicated battery capacity not exceeding 25 per cent.~~

~~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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.~~

- 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). Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

Paragraph 1.2.1.4.1 b) of this report:

Table 967-II

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

Packing Instruction 967

Paragraph 4.1.3.8 of this report:

II.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- Where multiple pieces of equipment are packed in the same outer packaging, each piece of equipment must be packed to prevent contact with other equipment.
- Each package must be capable of withstanding, without damage to the equipment contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours. Large equipment that is offered for transport unpackaged or on pallets is not subject to the requirements for the 3 m stack test capability.

Note.— Capability may be demonstrated by testing, assessment or experience.

Paragraphs 1.2.1.4.1 b) and e) of this report:

- 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.
- Where a consignment includes packages bearing the lithium battery mark (Figure 5-3), 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. Where packages of Section II lithium batteries from multiple packing instructions are included on one air waybill, the compliance statement for the different lithium battery types and/or packing instructions may be combined into a single statement provided that the statement identifies the applicable lithium battery type(s) and packing instruction numbers.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with the functions for which they are responsible.

II.3 Outer packagings

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

II.4 Overpacks

When packages are placed in an overpack:

- a) the packages must be secured within the overpack;
- b) the intended function of each package must not be impaired by the overpack; and

Paragraph 1.2.1.4.1 e) of this report:

- c) the lithium battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be 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.

Paragraph 1.2.1.4.1 b) of this report:

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; and
- 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.

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 metal~~ Batteries forbidden from transport

The following applies to all ~~lithium metal~~ cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

Waste ~~lithium cells or~~ batteries and ~~lithium cells or~~ 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 the provisions of 2;9.3.

IA.1 General requirements

Part 4;1 requirements must be met.

Table 968-IA

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

IA.2 Additional requirements

- ~~Lithium metal~~ Cells and batteries must be protected against short circuits.
- ~~Lithium metal~~ Cells and batteries must be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- ~~Lithium metal~~ 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).
- A ~~lithium metal~~ cell or battery with a mass of 12 kg or greater and having a strong, impact-resistant outer casing may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.

Packing Instruction 968

IA.3 Outer packagings

Boxes

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

Drums

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

Jerricans

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

IB. SECTION IB

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

~~Lithium metal or lithium alloy e~~Cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3 a), 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	<i>Net quantity per package</i>	
	<i>Passenger</i>	<i>Cargo</i>
Lithium metal cells and batteries	Forbidden	2.5 kg

IB.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.
- Cells and batteries must not be packed in the same outer packaging with substances and articles of Class 1 (explosives) other than ~~Division~~ ~~Division~~ 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers).
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with electrically conductive material 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 capable of withstanding, without damage to the cells or batteries contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours.

Packing Instruction 968

Paragraph 4.1.3.8 of this report:

Note.— Capability may be demonstrated by testing, assessment or experience.

Paragraph 1.2.1.4.1 b) of this report:

- 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).

IB.3 Outer packagings

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

Paragraph 1.2.1.4.1 b) of this report:

Packing Instruction 969

Passenger and cargo aircraft for UN 3091 (packed with equipment) only

Paragraph 1.2.1.4.1 b) of this report:

1. Introduction

This entry applies to lithium metal or lithium alloy batteries packed with equipment.

Section I of this packing instruction applies to lithium metal and lithium alloy cells and batteries that are assigned to Class 9. Certain lithium metal and lithium alloy cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

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

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 or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

I. SECTION I

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

I.1 General requirements

Part 4;1 requirements must be met.

Table 969-I

<i>UN number and proper shipping name</i>	<i>Package quantity (Section I)</i>	
	<i>Passenger</i>	<i>Cargo</i>
UN 3091 Lithium metal batteries packed with equipment	5 kg of lithium metal cells or batteries	35 kg of lithium metal cells or batteries

Packing Instruction 969

I.2 Additional requirements

- ~~Lithium metal~~eCells and batteries must be protected against short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- ~~Lithium metal~~eCells and batteries must:
 - be placed in inner packagings that completely enclose the cell or battery, then placed in a packaging of a type shown below that meets the Packing Group II performance requirements, then placed with the equipment 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 packaging of a type shown below that meets the Packing Group II performance requirements.
- The equipment must be secured against movement within the outer packaging.
- The number of cells or batteries in each package must not exceed the number required for the equipment's operation, plus two 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.

I.3 Outer packagings

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

II. SECTION II

~~Lithium metal or lithium alloy~~eCells and batteries packed with equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:

- Part 1;2.3 (General — Transport of dangerous goods by post);
- Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries or sodium ion batteries);
- Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);
- Part 7;4.5 (Operator's responsibilities — Reporting of undeclared and misdeclared dangerous goods);
- Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and
- Paragraphs 1 and 2 of this packing instruction.

Lithium metal cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3 a),e), f) (if applicable) and g) and the following:

- 1) for ~~a lithium metal~~ cells, the lithium content is not more than 1 g;
- 2) for ~~a lithium metal or lithium alloy~~ batteries, the aggregate lithium content is not more than 2 g.

II.1 General requirements

Table 969-II

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

II.2 Additional requirements

- ~~Lithium metal~~ Cells and batteries must:
 - be placed in inner packagings that completely enclose the cell or battery, then placed in a strong rigid outer packaging that conforms to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1); or
 - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong rigid outer packaging that conforms to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).
- Cells and batteries must be protected against short circuits. This includes protection against contact with electrically conductive material within the same packaging that could lead to a short circuit.
- The equipment must be secured against movement within the outer packaging.
- The number of cells or batteries in each package must not exceed the number required for the equipment's operation, plus two 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.

Paragraph 4.1.3.8 of this report:

- Each package of cells or batteries or the completed package must be capable of withstanding, without damage to the cells or batteries contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours.

Note.— Capability may be demonstrated by testing, assessment or experience.

Paragraph 1.2.1.4.1 b) of this report:

- 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.
- 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 packages of Section II ~~lithium~~ batteries from multiple packing instructions are included on one air waybill, the compliance statement for the different ~~lithium~~ battery types and/or packing instructions may be combined into a single statement provided that the statement identifies the applicable ~~lithium~~ battery type(s) and packing instruction numbers.
- 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 the functions for which they are responsible.

II.3 Outer packagings

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

II.4 Overpacks

When packages are placed in an overpack:

- a) the packages must be secured within the overpack;
- b) the intended function of each package must not be impaired by the overpack; and
- c) the ~~lithium~~ battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be 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.

Paragraph 1.2.1.4.1 b) of this report:

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.

Paragraph 1.2.1.4.1 b) of this report:

2. ~~Lithium-b~~Batteries forbidden from transport

The following applies to all ~~lithium metal~~ cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

I. SECTION I

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

I.1 General requirements

Equipment must be packed in strong rigid outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1). Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

Table 970-I

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.
- Where multiple pieces of equipment are packed in the same outer packaging, each piece of equipment must be packed to prevent contact with other equipment.

Paragraph 4.1.3.8 of this report:

— Each package must be capable of withstanding, without damage to the equipment contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of

identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours. Large equipment that is offered for transport unpackaged or on pallets is not subject to the requirements for the 3 m stack test capability.

Note.— Capability may be demonstrated by testing, assessment or experience.

- The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.

I.3 Outer packagings

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

Paragraph 1.2.1.4.1 b) of this report:

II. SECTION II

Lithium metal or lithium alloy cCells and batteries contained in equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:

- Part 1;2.3 (General — Transport of dangerous goods by post);
- Part 5;2.4.16 (Shipper’s responsibilities — Special marking requirements for lithium batteries or sodium ion batteries);
- Part 7;4.4 (Operator’s responsibilities — Reporting of dangerous goods accidents and incidents);
- Part 7;4.5 (Operator’s responsibilities — Reporting of undeclared and misdeclared dangerous goods);
- Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and
- Paragraphs 1 and 2 of this packing instruction.

Lithium metal cCells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3 a), e), f) (if applicable) and g) and the following:

- 1) for a lithium metal cells, the lithium content is not more than 1 g;
- 2) for a lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g.

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems. The devices must not be capable of emitting disturbing signals (such as buzzing alarms, strobe lights, etc.) during transport.

II.1 General requirements

Equipment 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). Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

Table 970-II

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

Packing Instruction 970

Paragraph 4.1.3.8 of this report:

II.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- Where multiple pieces of equipment are packed in the same outer packaging, each piece of equipment must be packed to prevent contact with other equipment.
- Each package must be capable of withstanding, without damage to the equipment contained therein and without any reduction of effectiveness, a force applied to the top surface equivalent to the total weight of identical packages stacked to a height of 3 m (including the test sample) for a duration of 24 hours. Large equipment that is offered for transport unpackaged or on pallets is not subject to the requirements for the 3 m stack test capability.

Note.— Capability may be demonstrated by testing, assessment or experience.

Paragraph 1.2.1.4.1 b) of this report:

- 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.
 - Where a consignment includes packages bearing the ~~lithium~~ battery mark (Figure 5-3), 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. Where packages of Section II ~~lithium~~ batteries from multiple packing instructions are included on one air waybill, the compliance statement for the different ~~lithium~~ battery types and/or packing instructions may be combined into a single statement provided that the statement identifies the applicable ~~lithium~~ battery type(s) and packing instruction numbers.
 - Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with the functions for which they are responsible.

II.3 Outer packagings

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

II.4 Overpacks

When packages are placed in an overpack:

- a) the packages must be secured within the overpack;
- b) the intended function of each package must not be impaired by the overpack; and
- c) the ~~lithium~~ battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be 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 972

Batteries

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

Paragraph 4.2.2.3 of DGP/29-WP/2:

- 1) If spillable batteries are installed, and it is possible for the machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction ~~492 or 870~~ as applicable.
- 2) If lithium batteries are installed:
 - i) lithium batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and
 - ii) they must meet the provisions of Part 2;9.3, except that pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low production runs 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 State of the Operator. A copy of the document of approval must accompany the consignment.
- 3) If metallic sodium or sodium alloy batteries are installed, they must conform to the requirements of Special Provision A94.

...

...

Paragraph 4.1.2.1.5.2 of DGP/29-WP/3 and 1.2.1.4 d) of this report:

Packing Instruction 976

Cargo aircraft only for UN 3551

1. Introduction

This entry applies to sodium ion batteries.

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. Batteries forbidden from transport

The following applies to all cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

Waste cells or batteries and cells or 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.

I.1 General requirements

- Each cell or battery must meet the provisions of 2;9.4.
- Part 4;1 requirements must be met.
- 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. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.

- Batteries manufactured after 31 December 2025 must be marked with the Watt-hour rating on the outside case.

I.2 Additional requirements

- Cells and batteries must be protected against short circuits.
- 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.
- 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).
- A cell or battery with a mass of 12 kg or greater and having a strong, impact-resistant outer casing may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.

Packing Instruction 976**Table 976**

<i>UN number and proper shipping name</i>	<i>Net quantity per package</i>	
	<i>Passenger</i>	<i>Cargo</i>
<u>UN 3551 Sodium ion batteries</u>	<u>Forbidden</u>	<u>35 kg</u>

I.3 Outer packagingsBoxes

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 977

Passenger and cargo aircraft only for UN 3552 (packed with equipment) only

1. Introduction

This entry applies to sodium ion batteries packed with equipment.

Section I of this packing instruction applies to sodium ion cells and batteries that are assigned to Class 9. Certain sodium ion 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 cells or batteries will provide electrical power for its operation.

2. Batteries forbidden from transport

The following applies to all cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

I. SECTION I

Each cell or battery must meet the provisions of 2;9.4.

I.1 General requirements

— Part 4;1 requirements must be met.

Table 977-I

<i>UN number and proper shipping name</i>	<i>Net quantity per package</i>	
	<i>Passenger</i>	<i>Cargo</i>
UN 3552 Sodium ion batteries packed with equipment	5 kg of sodium ion cells or batteries	35 kg of sodium ion cells or batteries

I.2 Additional requirements

- Cells and batteries must be protected against short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Cells or batteries must:
 - be placed in inner packagings that completely enclose the cell or battery, then placed in a packaging of a type shown below that meets the Packing Group II performance requirements, then placed with the equipment 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 packaging of a type shown below that meets the Packing Group II performance requirements.
- The equipment must be secured against movement within the outer packaging.
- The number of cells or batteries in each package must not exceed the number required for the equipment's operation, plus two 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 2025 must be marked with the Watt-hour rating on the outside case.

Packing Instruction 977

I.3 Outer packagings

Boxes

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

Drums

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

Jerricans

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

II. SECTION II

Cells and batteries packed with equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:

- Part 1;2.3 (General — Transport of dangerous goods by post);
- Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries or sodium ion batteries);
- Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);
- Part 7;4.5 (Operator's responsibilities — Reporting of undeclared and misdeclared dangerous goods); and
- Paragraphs 1 and 2 of this packing instruction.

Cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.4 a), e) and f) and the following:

- 1) for cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
- 2) for 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 2026.

II.1 General requirements

Table 977-II

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

Packing Instruction 977

II.2 Additional requirements

- Cells and batteries must:
 - be placed in inner packagings that completely enclose the cell or battery, then placed in a strong rigid outer packaging that conforms to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1); or
 - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong rigid outer packaging that conforms to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).
- Cells and batteries must be protected against short circuits. This includes protection against contact with electrically conductive material within the same packaging that could lead to a short circuit.
- The equipment must be secured against movement within the outer packaging.
- The number of cells or batteries in each package must not exceed the number required for the equipment's operation, plus two 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 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.
- The words "sodium ion batteries, in compliance with Section II of PI977" must be placed on the air waybill, when an air waybill is used. Where packages of Section II batteries from multiple packing instructions are included on one air waybill, the compliance statement for the different battery types and/or packing instructions may be combined into a single statement provided that the statement identifies the applicable battery type(s) and packing instruction numbers.
- Where a package contains a combination of batteries contained in equipment and batteries packed with equipment that meet the limits for 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 batteries contained in any package must not exceed 5 kg;
 - the words "sodium ion batteries, in compliance with Section II of PI977" 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

Aluminium
Fibreboard
Natural wood
Other metal
Plastics
Plywood
Reconstituted wood
Steel

Drums

Aluminium
Fibre
Other metal
Plastics
Plywood
Steel

Jerricans

Aluminium
Plastics
Steel

II.4 Overpacks

When packages are placed in an overpack:

- a) the packages must be secured within the overpack;
- b) the intended function of each package must not be impaired by the overpack; and
- c) the battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be 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 978

Passenger and cargo aircraft only for UN 3552 (contained in equipment) only

1. Introduction

This entry applies to sodium ion batteries contained in equipment.

Section I of this packing instruction applies to sodium ion cells and batteries that are assigned to Class 9. Certain sodium ion 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 cells or batteries will provide electrical power for its operation.

2. Batteries forbidden from transport

The following applies to all cells and batteries in this packing instruction:

Cells or batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport.

I. SECTION I

Each cell or battery must meet the provisions of 2;9.4.

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). Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

Table 978-I

<i>UN number and proper shipping name</i>	<i>Net quantity per package</i>	
	<i>Passenger</i>	<i>Cargo</i>
<u>UN 3552 Sodium ion batteries contained in equipment</u>	<u>5 kg of sodium ion cells or batteries</u>	<u>35 kg of sodium ion cells or batteries</u>

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.
- Where multiple pieces of equipment are packed in the same outer packaging, each piece of equipment must be packed to prevent contact with other equipment.
- Batteries manufactured after 31 December 2025 must be marked with the Watt-hour rating on the outside case.

Packing Instruction 978

I.3 Outer packagings

Boxes

Aluminium
Fibreboard
Natural wood
Other metal
Plastics
Plywood
Reconstituted wood
Steel

Drums

Aluminium
Fibre
Other metal
Plastics
Plywood
Steel

Jerricans

Aluminium
Plastics
Steel

II. SECTION II

Cells and batteries contained in equipment, when complying with Section II of this packing instruction, are only subject to the following additional provisions of these Instructions:

- Part 1;2.3 (General — Transport of dangerous goods by post);
- Part 5;2.4.16 (Shipper's responsibilities — Special marking requirements for lithium batteries or sodium ion batteries);
- Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);
- Part 7;4.5 (Operator's responsibilities — Reporting of undeclared and misdeclared dangerous goods); and
- Paragraphs 1 and 2 of this packing instruction.

Cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.4 a), e) and f) and the following:

- 1) for cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
- 2) for 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 2026.

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 rigid outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1). Large equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.

Table 978-II

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

Packing Instruction 978

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.
- Where multiple pieces of equipment are packed in the same outer packaging, each piece of equipment must be packed to prevent contact with other equipment.
- Each package must be marked with the 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.
- Where a consignment includes packages bearing the battery mark (Figure 5-3), the words "sodium ion batteries, in compliance with Section II of PI968" must be placed on the air waybill, when an air waybill is used. Where packages of Section II sodium ion batteries from multiple packing instructions are included on one air waybill, the compliance statement for the different lithium battery types and/or packing instructions may be combined into a single statement provided that the statement identifies the applicable sodium ion battery type(s) and packing instruction numbers.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with the functions for which they are responsible.

II.3 Outer packagings

Boxes

Aluminium
Fibreboard
Natural wood
Other metal
Plastics
Plywood
Reconstituted wood
Steel

Drums

Aluminium
Fibre
Other metal
Plastics
Plywood
Steel

Jerricans

Aluminium
Plastics
Steel

II.4 Overpacks

When packages are placed in an overpack:

- a) the packages must be secured within the overpack;
- b) the intended function of each package must not be impaired by the overpack; and
- c) the battery mark (Figure 5-3) required by this packing instruction must either be clearly visible or the mark must be 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.

UN harmonization amendments

And

Amendments to battery provisions

 Paragraph 4.1.2.1.6 of DGP/29-WP/3:

Part 5

SHIPPER'S RESPONSIBILITIES

...

Chapter 2

MARKING

...

2.4 MARKING SPECIFICATIONS AND REQUIREMENTS

...

 UN Model Regulations, Chapter 5.2, 5.2.1.9 (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.15.1 a):

2.4.16 Special marking requirements for lithium batteries or sodium ion batteries

2.4.16.1 Packages containing lithium cells or batteries or sodium ion cells or batteries prepared in accordance with Section II of Packing Instructions 966, 967, 969-~~or~~, 970, 977 or 978 and Section IB of Packing Instructions 965 and 968 must be marked as shown in Figure 5-3.

2.4.16.2 The mark must indicate the appropriate UN number preceded by the letters "UN" as follows:

- a) "UN 3090" for lithium metal cells or batteries;
- b) "UN 3480" for lithium ion cells or batteries;
- c) "UN 3091" for lithium metal cells or batteries contained in, or packed with, equipment;~~or~~
- d) "UN 3481" for lithium ion cells or batteries contained in, or packed with, equipment;~~;~~ or
- e) "UN 3552" for sodium ion cells or batteries contained in, or packed with, equipment.

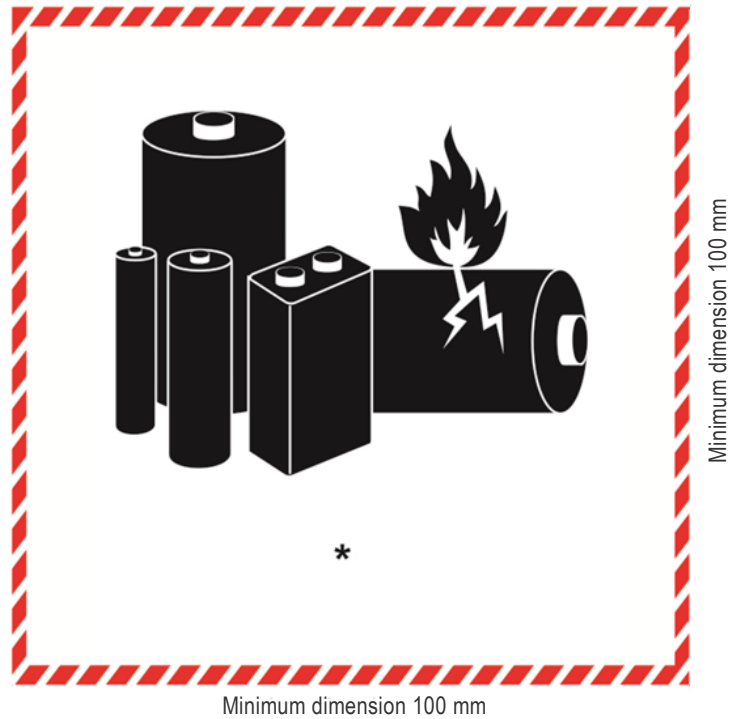
Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers must be indicated on one or more marks.

2.4.16.3 The mark must be in the form of a rectangle or a square with hatched edging. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion ~~or~~, lithium metal or sodium ion~~batteries or~~ cells or batteries) must be black on white or suitable contrasting background. The hatching must be red. The mark must be a minimum dimension of 100 mm wide × 100 mm high and the minimum width of the hatching must be 5 mm. If the size of the package so requires, the dimensions may be reduced to not less than 100 mm wide × 70 mm high. Where dimensions are not specified, all features must be in approximate proportion to those shown on the full-size mark (Figure 5-3).

2.4.16.4 Packages containing lithium batteries that meet the requirements of Section IB of Packing Instructions 965 or 968 must bear both the ~~lithium~~ battery mark (Figure 5-3) and the lithium battery or sodium ion battery Class 9 hazard label (Figure 5-26).

...

UN Model Regulations, Chapter 5.2, Figure 5.2.5 (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.15.1 b)



* Place for UN number(s)

Figure 5-3. Lithium battery mark

Chapter 3

LABELLING

3.5 LABEL SPECIFICATIONS

3.5.1 Class hazard label specifications

3.5.1.1 Labels must satisfy the provisions of this section and conform, in terms of colour, symbols and general format, to the specimen labels shown in Figures 5-4 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:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1) and 1.2.15.1 a) of this report:

- 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. However for the Class 9 label for lithium batteries or sodium ion 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 or sodium ion batteries (Figure 5-26), the label may include such text as the UN number, or words describing the hazard class (e.g. "flammable") in accordance with 3.5.1.1 e) provided that the text does not obscure or detract from the other required label elements.
- d) In addition, except for Divisions 1.4, 1.5 and 1.6, labels for Class 1 must show in the lower half, above the class number, the division number and compatibility group letter for the substance or article. Labels for Divisions 1.4, 1.5 and 1.6 must show in the upper half the division number and in the lower half the class number and the compatibility group letter.
- 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 hazard and precautions to be taken in handling. In the case of the Class 9 label for lithium batteries or sodium ion batteries (Figure 5-26), no text other than the class number must be included in the bottom part of the label.

...

(Miscellaneous — Lithium cells and batteries or sodium ion cells and batteries)



Symbol (seven vertical stripes in upper half); battery group, one broken and emitting flame in lower half: black
Background: white
Figure "9" underlined in bottom corner

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

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;
- d) subsidiary hazard class or division number(s) corresponding to the subsidiary 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").

...

Amendments to facilitate transport or State oversight

And

Amendments to battery provisions

Paragraph 4.1.2.1.6.1 of DGP/29-WP/3:

*Note.— Until 31 March 2025, shippers may identify vehicles powered by lithium batteries, UN 3171 — **Battery powered vehicle** as shown in the 2023-2024 Edition of these Instructions. The marks and labels applied, when required, must be consistent with the information shown on the dangerous goods transport document.*

...

Amendments to manage aviation specific risks

Paragraph 2.2.5 of this report:

4.1.5.7 Radioactive material

4.1.5.7.1 The following information must be included for each consignment of Class 7 material, as applicable, in the order given:

- a) The name or symbol of each radionuclide or, for mixtures of radionuclides, an appropriate general description or a list of the most restrictive nuclides;

+ *Note.— When Table 2-13 is used, refer to 5;4.1.5.8.1 g) for additional information required on the dangerous goods transport document.*

- b) A description of the physical and chemical form of the material, or a notation that the material is special form radioactive material or low dispersible radioactive material. A generic chemical description is acceptable for chemical form;

Note.— For empty Type B(U) or Type B(M) packages as specified in the Note to 2;7.2.4.1.1.7, the name or symbol of the radionuclide of the shielding material followed by the physical and chemical form must be included (e.g. U-dep.,

solid, metal oxide) in which case the indicated radionuclide may differ from the radionuclide(s) authorized in the package design certificate.

- c) The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix symbol (see 1;3.2). For fissile material, the mass of fissile material (or mass of each fissile nuclide for mixtures when appropriate) in units of grams (g), or appropriate multiples thereof, may be used in place of activity;
- d) The category of the package and if applicable for the overpack and freight container, as assigned per 1.2.3.1.4, i.e. I-WHITE, II-YELLOW, III-YELLOW;
- e) The transport index as determined per 1.2.3.1.1 and 1.2.3.1.2 (except for category I-WHITE);
- f) for Category II-Yellow and III-Yellow only: the dimensions including dimensional units of each package, or when placed in an overpack or freight container, the dimensions of the overpack, or the freight container as applicable. The dimensions should be shown in the following order: length x width (or diameter, if applicable) x height. "L", "W" (or "D"), "H" may be shown immediately preceding their respective dimension. When a different order is used, the letters "L", "W" (or "D") and "H" must be shown accordingly;
- fg) For fissile material:
 - 1) shipped under one exception of 2;7.2.3.5.1 a) to f), reference to that paragraph;
 - 2) shipped under 2;7.2.3.5.1 c) to e), the total mass of fissile nuclides;
 - 3) contained in a package for which one of 6;7.10.2 a) to c) or 6;7.10.3 is applied, reference to that paragraph; and
 - 4) the criticality safety index, where applicable.
- gh) The identification mark for each competent authority certificate of approval (special form radioactive material, low dispersible radioactive material, fissile material excepted under 2;7.2.3.5.1 ~~f, g~~, special arrangement, package design, or shipment) applicable to the consignment;
- hi) For consignments of more than one package, the information contained in 4.1.4.1 a) to c) and 4.1.5.7.1 a) to ~~g~~ h) must be given for each package. For packages in an overpack or freight container, a detailed statement of the contents of each package within the overpack or freight container and, where appropriate, of each overpack or freight container must be included. If packages are to be removed from the overpack or freight container at a point of intermediate unloading, appropriate transport documents must be made available;
- ij) Where a consignment is required to be shipped under exclusive use, the statement "EXCLUSIVE USE SHIPMENT"; and
- ik) For LSA-II, LSA-III, SCO-I and SCO-II, the total activity of the consignment as a multiple of A_2 . For radioactive material for which the A_2 value is unlimited, the multiple of A_2 must be zero.

...

Amendments to manage aviation specific risks

Paragraph 4.2.2.3 of DGP/29-WP/3:

4.4 RETENTION OF DANGEROUS GOODS TRANSPORT INFORMATION

4.4.1 The shipper must retain a copy of the dangerous goods transport document and additional information and documentation as specified in these Instructions, for a minimum period of three months and be made available to the appropriate national authority upon request.

4.4.2 When the documents are kept electronically or in a computer system, the shipper must be able to reproduce them in a printed form.

...

UN harmonization amendments

Paragraph 4.1.2.1.7 of DGP/29-WP/3:

Part 6

**PACKAGING NOMENCLATURE, MARKING,
REQUIREMENTS AND TESTS**

...

Chapter 2

**MARKING OF PACKAGINGS OTHER THAN
INNER PACKAGINGS**

...

UN Model Regulations, Chapter 6.1, 6.1.3.1 (see ST/SG/AC.10/50/Add.1)

**2.1 MARKING REQUIREMENTS FOR PACKAGINGS
OTHER THAN INNER PACKAGINGS**

2.1.1 Each packaging intended for use according to these Instructions must bear marks on a non-removable component which are durable, legible and placed in a location and of such a size relative to the packaging as to be readily visible. For packages with a gross mass of more than 30 kg the marks, or a duplicate thereof, must appear on the top or on a side of the packaging. Letters, numerals and symbols must be at least 12 mm high, except for packagings of 30 L capacity or less or of 30 kg maximum net mass, when they must be at least 6 mm in height and except for packagings of 5 L capacity or less or of 5 kg maximum net mass when they must be of an appropriate size.

Note.— The provisions of 2.1.1 of the 2023-2024 Edition of these Instructions may continue to be applied until 31 December 2026. Packagings manufactured before 1 January 2027 according to the provisions applicable at the date of manufacture may continue to be used.

The marks must show:

...

Chapter 3

REQUIREMENTS FOR PACKAGINGS

3.1 REQUIREMENTS FOR PACKAGINGS OTHER THAN INNER PACKAGINGS

GENERAL REQUIREMENTS

...

3.1.1 Steel drums

1A1 non-removable head

1A2 removable head

...

UN Model Regulations, Chapter 6.1, 6.1.4.1.4 (see ST/SG/AC.10/50/Add.1)

3.1.1.4 ~~The body of a drum of a capacity greater than 60 L must, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops.~~ ~~Drums may have rolling hoops, either expanded or separate.~~ If there are separate rolling hoops they must be fitted tightly on the body and so secured that they cannot shift. Rolling hoops must not be spot welded.

...

3.1.2 Aluminium drums

1B1 non-removable head

1B2 removable head

...

UN Model Regulations, Chapter 6.1, 6.1.4.2.3 (see ST/SG/AC.10/50/Add.1)

3.1.2.3 ~~The body of a drum of a capacity greater than 60 L must, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops.~~ ~~Drums may have rolling hoops, either expanded or separate.~~ If there are separate rolling hoops they must be fitted tightly on the body and so secured that they cannot shift. Rolling hoops must not be spot welded.

...

UN Model Regulations, Chapter 6.1, 6.1.4.3.3 (see ST/SG/AC.10/50/Add.1)

...

3.1.3 Drums of metal other than aluminium or steel

1N1 non-removable head

1N2 removable head

...

3.1.3.3 ~~The body of a drum of a capacity greater than 60 L must, in general, have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops.~~ ~~Drums may have rolling hoops, either expanded or separate.~~ If there are separate rolling hoops, they must be fitted tightly on the body and so secured that they cannot shift. Rolling hoops must not be spot welded.

...

 UN Model Regulations, Chapter 6.1, 6.1.4.12 (see ST/SG/AC.10/50/Add.1)

3.1.11 Fibreboard boxes (including corrugated fibreboard boxes)

4G

3.1.11.1 Strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) must be used, appropriate to the capacity of the box and to its intended use. The water resistance of the outer surface must be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m² — see ISO 535:~~1991~~2014. It must have proper bending qualities. Fibreboard must be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting of corrugated fibreboard must be firmly glued to the facings.

...

Chapter 4

PACKAGING PERFORMANCE TESTS

...

4.5 INTERNAL PRESSURE (HYDRAULIC) TEST

...

4.5.3 Test method and pressure to be applied: metal packagings including their closures must be subjected to the test pressure for 5 minutes. Plastic packagings and composite packagings (plastic material) including their closures must be subjected to the test pressure for 30 minutes. This pressure is the one to be included in the mark required by 2.1.1 d). The manner in which the packagings are supported must not invalidate the test. The test pressure must be applied continuously and evenly: it must be kept constant throughout the test period. The hydraulic pressure (gauge) applied, as determined by any one of the following methods, must be:

Amendments to facilitate transport or State oversight

 Paragraph 4.3.6 of DGP/29-WP/2:

- a) not less than the total gauge pressure measured in the packaging (i.e. the vapour pressure of the filling liquid and the partial pressure of the air or other inert gases minus 100 kPa) at 55°C, multiplied by a safety factor of 1.5. This total gauge pressure must be determined on the basis of a maximum degree of filling in accordance with Part 4;1.1.5 and a filling temperature of 15°C. The test pressure must be not less than 95 kPa (not less than 75 kPa for liquids in Packing Group III of Class 3, ~~or~~ Division 6.1 or Class 9); or

...

UN harmonization amendments

Chapter 5

**REQUIREMENTS FOR THE CONSTRUCTION AND
TESTING OF CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES,
AEROSOL DISPENSERS AND SMALL RECEPTACLES
CONTAINING GAS (GAS CARTRIDGES)
AND FUEL CELL CARTRIDGES
CONTAINING LIQUEFIED FLAMMABLE GAS**

...

5.1 GENERAL REQUIREMENTS

...

5.1.5 Initial inspection and testing

...

5.1.5.2 Closed cryogenic receptacles must be subjected to testing and inspection during and after manufacture in accordance with the applicable design standards or recognized technical codes, including the following:

...

Paragraph 4.1.2.1.7 of DGP/29-WP/3:

UN Model Regulations, Chapter 6.2, 6.2.1.5.2 (see ST/SG/AC.10/50/Add.1)

For all completed closed cryogenic ~~pressure~~ receptacles:

- q) testing for leakproofness.

Note.— Closed cryogenic receptacles which were constructed in accordance with the initial inspection and test requirements of 5.1.5.2 applicable in the 2021-2022 Edition of these Instructions but which do not however conform to the requirements of 5.1.5.2 relating to the initial inspection and test applicable in the 2023-2024 Edition of these Instructions may continue to be used.

...

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 either:
 - i) if there is evidence of corrosion; or
 - ii) if the closures or other service equipment are removed;
- d) a hydraulic pressure test of the cylinder shell and, if necessary, verification of the characteristics of the material by suitable tests;

Note 1.— With the agreement of the appropriate national authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

UN Model Regulations, Chapter 6.2, 6.2.1.6.1 (d) (see ST/SG/AC.10/50/Add.1)

Note 2.— For seamless steel cylinder shells 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 + Amd 1:2020 “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 internal conditions of 5.1.6.1 b) and the hydraulic pressure test of 5.1.6.1.d) may be replaced by ultrasonic examination carried out in accordance with ISO 18119:2018 + Amd 1:2021 for seamless steel and seamless aluminium alloy cylinder shells. For a transitional period until 31 December 2026, the standard ISO 18119:2018 may be used for this same purpose. For a transitional period until 31 December 2024, the standard ISO 10461:2005 +Amd 1:2006 may be used for seamless aluminium alloy cylinders and ISO 6406:2005 may be used for seamless steel cylinder shells for this same purpose.

- e) check of service equipment if to be reintroduced into service. This check may be carried out separately from the inspection of the cylinder shell.

Note.— For the periodic inspection and test frequencies, see Packing Instruction 200 or, for a chemical under pressure, Packing Instruction 218.

...

5.2 REQUIREMENTS FOR UN CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES

...

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 refillable UN cylinder shells, except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5:

UN Model Regulations, Chapter 6.2, 6.2.2.1.1 and 6.2.2.1.2 (see ST/SG/AC.10/50/Add.1)

Reference	Title	Applicable for manufacture
ISO 9809-1:1999	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa. <i>Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.</i>	Until 31 December 2018
ISO 9809-1:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.	Until 31 December 2026
ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa.	Until further notice
ISO 9809-2:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.	Until 31 December 2018
ISO 9809-2:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.	Until 31 December 2026

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 9809-2:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1 100 MPa.	Until further notice
ISO 9809-3:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until 31 December 2018
ISO 9809-3:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until 31 December 2026
ISO 9809-3:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 3: Normalized steel cylinders and tubes.	Until further notice
ISO 9809-4:2014	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa	Until further notice Until 31 December 2028
ISO 9809-4:2021	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa <i>Note.— Small quantities are a batch of cylinders not exceeding 200.</i>	Until further notice
ISO 7866:1999	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing. <i>Note.— The note concerning the F factor in section 7.2 of this standard must not be applied for UN cylinders. Aluminium alloy 6351A — T6 or equivalent must not be authorized.</i>	Until 31 December 2020
ISO 7866: 2012+ Cor 1:2014	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing <i>Note.— Aluminium alloy 6351A or equivalent must not be used.</i>	Until further notice
ISO 4706:2008	Gas cylinders — Refillable welded steel cylinders — Test pressure 60 bar and below.	Until further notice
ISO 18172-1:2007	Gas cylinders — Refillable welded stainless steel cylinders — Part 1: Test pressure 6 MPa and below.	Until further notice
ISO 20703:2006	Gas cylinders — Refillable welded aluminium-alloy cylinders — Design, construction and testing.	Until further notice
ISO 11119-1:2002	Gas cylinders of composite construction — Specification and test methods — Part 1: Hoop wrapped composite gas cylinders.	Until 31 December 2020
ISO 11119-1:2012	Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 L	Until further notice Until 31 December 2028
ISO 11119-1:2020	Gas cylinders — Design, construction and testing of refillable composite gas cylinders and tubes — Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 L	Until further notice
ISO 11119-2:2002	Gas cylinders of composite construction — Specification and test methods — Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners.	Until 31 December 2020
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners.	Until further notice Until 31 December 2028
ISO 11119-2:2020	Gas cylinders — Design, construction and testing of refillable composite gas cylinders and tubes — Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners.	Until further notice
ISO 11119-3:2002	Gas cylinders of composite construction — Specification and test methods — Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners.	Until 31 December 2020

Reference	Title	Applicable for manufacture
	<i>Note.— This standard must not be used for linerless cylinders manufactured from two parts joined together.</i>	
ISO 11119-3:2013	Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with non-load-sharing metallic or non-metallic liners. <i>Note.— This standard must not be used for linerless cylinders manufactured from two parts joined together.</i>	Until further notice <u>Until 31 December 2028</u>
UN Model Regulations, Chapter 6.2, 6.2.2.1.1 and 6.2.2.1.2 (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.1.6 of this report:		
<u>ISO 11119-3:2020</u>	<u>Gas cylinders — Design, construction and testing of refillable composite gas cylinders and tubes — Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with non-load-sharing metallic or non-metallic liners or without liners.</u>	<u>Until further notice</u>
ISO 11119-4: 2016	Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 L with load-sharing welded metallic liners.	Until further notice

Note 1.— In the above-referenced standards, composite cylinder shells must be designed for a design life of not less than fifteen years.

Note 2.— Composite cylinder shells with a design life longer than fifteen years must not be filled after fifteen years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme must be part of the initial design type approval and must specify inspections and tests to demonstrate that composite cylinder shells manufactured accordingly remain safe to the end of their design life. The service life test programme and the results must be approved by the appropriate national authority of the country of approval that is responsible for the initial approval of the cylinder design. The service life of a composite cylinder shell must not be extended beyond its initial approved design life.

...

UN Model Regulations, Chapter 6.2, 6.2.2.1.4 (see ST/SG/AC.10/50/Add.1) and paragraph 1.2.1.6 of this report:

5.2.1.4 The following standard applies for the design, construction and initial inspection and test of UN closed cryogenic receptacles, except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5:

Reference	Title	Applicable for manufacture
ISO 21029-1:2004	Cryogenic vessels — Transportable vacuum insulated vessels of not more than 1 000 L volume — Part 1: Design, fabrication, inspection and tests.	Until 31 December 2026
ISO 21029-1:2018 + <u>Amd.1</u> <u>Amd 1:2019</u>	Cryogenic vessels — Transportable vacuum insulated vessels of not more than 1 000 L volume — Part 1: Design, fabrication, inspection and tests.	Until further notice

...

UN Model Regulations, Chapter 6.2, 6.2.2.1.9 (see ST/SG/AC.10/50/Add.1)

5.2.1.9 The following standards apply for the design, construction and initial inspection and test of non-refillable UN cylinders except that the inspection requirements related to the conformity assessment system and approval must be in accordance with 6;5.2.5.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 11118:1999	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	Until 31 December 2020
ISO 13340:2001	Transportable gas cylinders — Cylinder valves for non-refillable cylinders — Specification and prototype testing.	Until 31 December 2020
ISO 11118:2015	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	Until 31 December 2026
ISO 11118:2015 + Amd.1 Amd 1:2019	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	Until further notice

5.2.2 Materials

In addition to the material requirements specified in the design and construction standards, and any restrictions specified in the applicable Packing Instruction for the gas(es) to be transported (e.g. Packing Instruction 200, Packing Instruction 202 or Packing Instruction 214), the following standards apply to material compatibility:

UN Model Regulations, Chapter 6.2, 6.2.2.2 (see ST/SG/AC.10/50/Add.1)

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 11114-1:2012 + A1:2017 11114-1:2020	Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials.	Until further notice
ISO 11114-2:2013 11114-2:2021	Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials.	Until further notice

5.2.3 Closures and their protection

The following standards apply to the design, construction, and initial inspection and test of closures and their protection:

UN Model Regulations, Chapter 6.2, 6.2.2.3 (see ST/SG/AC.10/50/Add.1)

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
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 31 December 2026
ISO 11117:2019	Gas cylinders — Valve protection caps and 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 31 December 2022
ISO 10297:2014 + Amd 1:2017	Gas cylinders — Cylinder valves — Specification and type testing	Until further notice
ISO 14246:2014	Gas cylinders — Cylinder valves — Manufacturing tests and examination	Until 31 December 2024
ISO 14246:2014 + Amd 1:2017	Gas cylinders — Cylinder valves — Manufacturing tests and examination	Until further notice
ISO 17871:2015	Gas cylinders — Quick-release cylinders valves — Specification and type testing <i>Note.— This standard must not be used for flammable gases.</i>	Until 31 December 2026
ISO 17871:2020	Gas cylinders — Quick-release cylinder valves — Specification and type testing.	Until further notice
ISO 17879:2017	Gas cylinders — Self-closing cylinder valves — Specification and type testing <i>Note.— This standard must not be applied to self-closing valves in acetylene cylinders.</i>	Until further notice
<u>ISO 23826:2021</u>	<u>Gas cylinders — Ball valves — Specification and testing</u>	<u>Until further notice</u>

For UN metal hydride storage systems, the requirements specified in the following standard apply to closures and their protection:

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride	Until 31 December 2026
ISO 16111:2018	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	Until further notice

5.2.4 Periodic inspection and test

5.2.4.1 The following standards apply to the periodic inspection and testing of UN cylinders:

UN Model Regulations, Chapter 6.2, 6.2.2.4 (see ST/SG/AC.10/50/Add.1)

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 6406:2005	Seamless steel gas cylinders — Periodic inspection and testing.	Until 31 December 2024
ISO 18119:2018	Gas cylinders — Seamless steel and seamless aluminium-alloy gas cylinders and tubes — Periodic inspection and testing.	<u>Until further notice</u> <u>Until 31 December 2026</u>
<u>ISO 18119:2018 + Amd 1:2021</u>	<u>Gas cylinders — Seamless steel and seamless aluminium-alloy gas cylinders and tubes — Periodic inspection and testing.</u>	<u>Until further notice</u>
ISO 10460:2005	Gas cylinders – Welded carbon-steel gas cylinders – Periodic inspection and testing. <i>Note.— The repair of welds described in clause 12.1 of this standard must not be permitted. Repairs described in clause 12.2 require the approval of the appropriate national authority which approved the periodic inspection and test body in accordance with 5.2.6.</i>	Until 31 December 2024
ISO 10460:2018	Gas cylinders — Welded aluminium-alloy, carbon and stainless steel gas cylinders — Periodic inspection and testing.	Until further notice

ISO 10461:2005/ + Amd 1:2006	Seamless aluminium-alloy gas cylinders — Periodic inspection and testing.	Until 31 December 2024
ISO 10462:2013	Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance.	Until 31 December 2024

...

5.2.7 Marking of UN refillable cylinders and closed cryogenic receptacles

5.2.7.2 The following certification marks must be applied:

...

UN Model Regulations, Chapter 6.2, 6.2.2.7.3 (see ST/SG/AC.10/50/Add.1)

l) In the case of cylinders for UN 3374 **Acetylene, solvent free**:

- i) the tare in kilograms consisting of the total of the mass of the empty cylinder shell, the service equipment (including porous material) not removed during filling and any coating expressed to three significant figures rounded down to the last digit followed by the letters "KG". At least one decimal must be shown after the decimal point. For cylinders of less than 1 kg, the mass must be expressed to two significant figures rounded down to the last digit;
- ii) the identity of the porous material (e.g. name or trademark); and
- iii) the total mass of the filled acetylene cylinder in kilograms followed by the letters "KG".

Note.— Acetylene cylinders constructed in accordance with the 2021-2022 Edition of these Instructions which are not marked in accordance with 6.5.2.7.2 k) or l) applicable in the 2023-2024 Edition of these Instructions may continue to be used until the next periodic inspection and test two years after the coming into force of this edition of these Instructions where they must be marked according to the provisions above or be taken out of operation.

...

5.2.7.4 The following manufacturing marks must be applied:

...

UN Model Regulations, Chapter 6.2, 6.2.2.7.4 (p) (see ST/SG/AC.10/50/Add.1)

- p) In the case of steel cylinders and closed cryogenic receptacles and composite cylinders and closed cryogenic receptacles with steel liner intended for the transport of gases with a risk of hydrogen embrittlement, the letter "H" showing compatibility of the steel (see ISO 11114-1:~~2012~~2020);

...

5.2.9 Marking of UN metal hydride storage systems

...

5.2.9.2 The following marks must be applied:

...

UN Model Regulations, Chapter 6.2, 6.2.2.9.2 (j) (see ST/SG/AC.10/50/Add.1)

- j) In the case of steel cylinders and composite cylinders with steel liner, the letter "H" showing compatibility of the steel (see ISO 11114-1:~~2012~~2020); and

...

5.2.11 Marking of closures for refillable UN cylinders and closed cryogenic receptacles

...

UN Model Regulations, Chapter 6.2, 6.2.2.11 (see ST/SG/AC.10/50/Add.1)

5.2.11.2 The valve test pressure must be marked when it is less than the test pressure which is indicated by the rating of the valve filling connection.

Note.— Closures of refillable cylinders manufactured before 1 January 2027 in accordance with the requirements applicable in the 2021-2022 Edition of these Instructions which are not marked in accordance with the requirements of 5.2.11 applicable in the 2023-2024 Edition of these Instructions may continue to be used.

...

Part 7

OPERATOR'S RESPONSIBILITIES

Amendments to battery provisions

Paragraphs 4.4.1.9 of DGP/29-WP/3 and 3.1 of this report:

Chapter 2

STORAGE AND LOADING

...

2.13 LOADING OF BATTERY-POWERED MOBILITY AIDS CARRIED UNDER THE PROVISIONS OF PART 8

...

2.13.3 Loading of mobility aids powered by lithium ion batteries

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 battery(ies). The mobility aid, the battery(ies), 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(ies) is either:
 - 1) adequately protected against damage by the design of the mobility aid and securely attached to the mobility aid. The electrical circuits must be isolated following the manufacturer's instructions; or
 - 2) removed from the mobility aid, following the manufacturer's instructions; and
- c) each removed battery does not exceed 300 Wh. A maximum of one spare battery not exceeding 300 Wh or two spare batteries each not exceeding 160 Wh may be carried.

Note.— When the lithium battery(ies) remain installed in the mobility aid, there is no Watt-hour limit.

2.13.3.3 An operator must ensure that any battery(ies) removed from the mobility aid and any spare battery(ies) is (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 battery(ies), removed battery(ies) and spare battery(ies).

...

Chapter 4

PROVISION OF INFORMATION

...

Paragraph 2.2.6 of this report:

4.5 REPORTING OF UNDECLARED OR MISDECLARED DANGEROUS GOODS

4.5.1 An operator must report any occasion when undeclared or misdeclared dangerous goods are discovered in cargo or mail. Such a report must be made to the appropriate authorities of the State of the Operator and the State in which this occurred.

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

...

Part 8

PROVISIONS CONCERNING PASSENGERS AND CREW

...

Chapter 1

Paragraph 2.2.1.2 of this report:

PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS ~~OR~~ AND CREW

...

1.1 DANGEROUS GOODS CARRIED BY PASSENGERS ~~OR~~ AND CREW

...

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 in accordance with Table 8-1; and
- b) for personal use only.

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, checked baggage or on the person:

- 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.

1.1.2 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;

Amendments to manage aviation specific risks

Paragraph 4.2.2.4 of DGP/29-WP/2 and paragraph 2.2.1 of this report:

- b) contained in baggage that has been separated from its owner during transit (e.g. [mishandled baggage such as](#) lost baggage or improperly routed baggage); or

...

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 in accordance with Table 8-2 when those dangerous goods are:

- a) carried by staff members of the OPCW on official travel or government agencies listed in Table 8 2 on official travel;

Amendments to manage aviation specific risks

Paragraph 4.2.2.4 of DGP/29-WP/2 and paragraph 2.2.1 of this report:

- b) contained in baggage that has been separated from its owner during transit (e.g. [mishandled baggage such as](#) lost baggage or improperly routed baggage); or

...

Paragraph 2.2.1.2 of this report:

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

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) and h))	Yes	(see c) and d))	<p>...</p> <hr/> <p>Paragraph 2.2.1.1 and 4.4 of this report:</p> <p>e) for portable electronic devices containing batteries should be carried as carry-on baggage; however, if carried as checked baggage:</p> <ul style="list-style-type: none"> — measures must be taken to prevent unintentional activation and to protect the devices from damage; and — the devices should be carried as carry-on baggage; however, <p>if carried as checked baggage, the devices must be completely switched off (not in sleep or hibernation mode) if the batteries exceed:</p> <ul style="list-style-type: none"> — for lithium metal batteries, a lithium content of 0.3 grams per device; or — for lithium ion batteries, a Watt-hour rating of 2.7 Wh per device; <p>...</p>

<i>Dangerous Goods</i>	<i>Location</i>		<i>Approval of the operator(s) is required</i>	<i>Restrictions</i>
	<i>Checked baggage</i>	<i>Carry-on baggage</i>		
4) Mobility aids (e.g. wheelchairs) powered by: <ul style="list-style-type: none"> – spillable batteries; – non-spillable wet batteries; – dry batteries; – nickel-metal hydride batteries; or – lithium ion batteries 	Yes	(see e)	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 dry battery or nickel-metal hydride battery, each battery must comply with Special Provision A123 or A199, respectively; d) in the case of a non-spillable wet battery: <ul style="list-style-type: none"> i) each battery must comply with Special Provision A67; and ii) a maximum of one spare battery may be carried per passenger; e) in the case of a lithium ion battery: <ul style="list-style-type: none"> i) each battery must be of a type which meets the requirements of each test in the <i>UN Manual of Tests and Criteria</i>, Part III, subsection 38.3; ii) when the mobility aid does not provide adequate protection to the battery: <ul style="list-style-type: none"> – 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 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. Spare batteries must be carried in the cabin.
				Paragraph 4.4.1.9 of DGP/29-WP/3 and paragraph 2.2.1.1 of this report:
				<p style="text-align: center;"><i>Note.— When the lithium battery(ies) remain installed in the mobility aid, there is no Watt-hour limit.</i></p>

...

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.

~~— 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.~~

UN harmonization amendments

Paragraph 4.1.2.1.8 of DGP/29-WP/3:

Attachment 2

GLOSSARY OF TERMS

...

Glossary of terms

Term and explanation	UN Number(s), when relevant
...	
UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):	
BATTERIES, CONTAINING METALLIC SODIUM OR SODIUM ALLOY. Articles consisting of a series of CELLS, CONTAINING METALLIC SODIUM OR SODIUM ALLOY that are secured within, and fully enclosed by a metal casing so constructed and closed as to prevent the release of dangerous goods under normal conditions of transport. Although designed and intended to provide a source of electrical energy, these batteries are electrically inert at any temperature at which the metallic sodium or sodium alloy contained in the battery is in a solid state.	3292
...	
CELLS, CONTAINING METALLIC SODIUM OR SODIUM ALLOY. Articles consisting of hermetically sealed, metal casings which fully enclose the dangerous goods and which are so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport. In addition to metallic sodium or sodium alloy, cells covered by this entry may also contain sulphur, but no other dangerous goods. Although designed and intended to provide a source of electrical energy, these cells are electrically inert at any temperature at which the metallic sodium or sodium alloy contained in the cell is in a solid state.	3292
...	
UN Model Regulations, Appendix B (see ST/SG/AC.10/50/Add.1):	
FIRE SUPPRESSANT DISPERSING DEVICES. Articles which contain a pyrotechnic substance, which are intended to disperse a fire extinguishing agent (or aerosol) when activated, and which do not contain any other dangerous goods.	0514, 3559
...	

APPENDIX B TO THE REPORT**CONSOLIDATED AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL
INSTRUCTIONS RECOMMENDED UNDER AGENDA ITEM 1****Part S-3****DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND QUANTITY LIMITATIONS**

...

Note.— Revisions to Table 3-1 of the Technical Instructions will automatically be reflected in related records included in the Supplement through the publishing process. The dangerous goods list entries shown here are records which contain values different to the values in Table 3-1.

Chapter 3**SUPPLEMENTARY DANGEROUS GOODS LIST****Class 2****Table S-3-1. Supplementary Dangerous Goods List (Class 2)**

Name	UN No.	Class or division	Sub-sidiary 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		6	7	8	9	10	11	12	13
UN harmonization amendments												
Paragraph 4.1.3.1 of DGP/29-WP/3:												
UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1) and paragraph 1.3.1.2 of this report:												
<u>Disilane</u>	<u>3553</u>	<u>2.1</u>						<u>E0</u>	<u>FORBIDDEN</u>		<u>FORBIDDEN</u>	

...

Chapter 4

SUPPLEMENTARY DANGEROUS GOODS LIST

Classes 3 to 9

Table S-3-1. Supplementary Dangerous Goods List (Classes 3 to 9)

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		6	7	8	9	10	11	12	13

...

UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3 and paragraph 1.3.1 of this report:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Sodium ion batteries with organic electrolyte	3551	9		Miscellaneous — Lithium or sodium ion batteries		A88 A99 A154 A164 A183 A227 A228 A331 A334		E0	FORBIDDEN		See 976	
Trifluoromethyltetrazole sodium salt in acetone with not less than 68% acetone, by mass	3555	3		Liquid flammable		A40	II	E0	FORBIDDEN		FORBIDDEN	

...

Chapter 6

SPECIAL PROVISIONS

...

Table S-3-4. Special Provisions

...

Amendments to battery provisions

A331	Lithium ion <u>or sodium ion</u> cells or batteries may be offered for transport, on cargo aircraft only, at a state of charge greater than 30 per cent of their rated capacity with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities. When considering an approval, at a minimum, the following criteria should be considered to mitigate risks posed by a lithium <u>ion or sodium ion</u> cell or battery heat, smoke or fire event inside a package at the cell, battery or package level:
...	
A334	<p>a) In instances where other forms of transport (including cargo aircraft) are impracticable, lithium <u>cells or batteries or sodium ion</u> 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 quantities per package do not exceed:</p> <ol style="list-style-type: none"> 1) for lithium metal cells or batteries: <ol style="list-style-type: none"> i) up to 2 batteries with a lithium content more than 0.3 g but not more than 2 g per battery; or ii) up to 8 cells with a lithium content more than 0.3 g but not more than 1 g per cell; or iii) up to 2.5 kg of cells and/or batteries with a lithium content not more than 0.3 g per cell or battery; or 2) for lithium <u>ion or sodium</u> ion cells or batteries: <ol style="list-style-type: none"> i) up to 2 batteries with a Watt-hour (Wh) rating more than 2.7 Wh but not more than 100 Wh per battery; or ii) up to 8 cells with a Watt-hour rating more than 2.7 Wh but not more than 20 Wh per cell; or iii) up to 2.5 kg of cells and/or batteries with a Watt-hour rating not more than 2.7 Wh per cell or battery. <p>b) When considering an approval, at a minimum, the following criteria should be considered to mitigate risks posed by a lithium cell or battery <u>or sodium ion cell or battery</u> heat, smoke or fire event inside a package at the cell, battery or package level:</p> <ol style="list-style-type: none"> 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 <u>cell or battery or sodium ion</u> cell or battery must be contained within the package. <p>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.</p>

Part S-4

PACKING INSTRUCTIONS

(ADDITIONAL INFORMATION FOR PART 4 OF THE TECHNICAL INSTRUCTIONS)

...

Chapter 4

CLASS 2 — GASES

UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Packing Instruction 200

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

...

Table 2. LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary Hazard	LC ₅₀ ml/m ³	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
1032	Dimethylamine, anhydrous	2.1			X	10	10	0.59	b
1033	Dimethyl ether	2.1			X	10	18	0.58	
<u>3553</u>	<u>Disilane</u>	<u>2.1</u>			<u>X</u>	<u>10</u>	<u>225</u>	<u>0.39</u>	<u>g</u>
1035	Ethane	2.1			X	10	95 120 300	0.25 0.30 0.40	

...

Chapter 6

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

...

UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3:

Paragraph 4.1.2.1.1 b) of DGP/29-WP/2:

Packing Instruction 451					
Passenger and cargo aircraft — wetted explosives (Packing Group I)					
...					
COMBINATION PACKAGINGS					SINGLE PACKAGINGS
<i>UN number and proper shipping name</i>	<i>Inner packaging (see 6;3.2)</i>	<i>Inner packaging quantity (per receptacle)</i>	<i>Total quantity per package — passenger</i>	<i>Total quantity per package — cargo</i>	
...					
UN 3474 1-Hydroxybenzotriazole, anhydrous, wetted <u>monohydrate</u>	Glass Plastics	0.5 kg	0.5 kg	0.5 kg	No
...					

...

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3:

UN Model Regulations, Chapter 4.1, 4.1.4.1, P910 (see ST/SG/AC.10/50/Add.1)

Packing Instruction 910

Cargo aircraft only

Introduction

This packing instruction applies to UN Nos. 3090, 3091, 3480 ~~and~~, 3481, 3551 and 3552 annual production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.

General requirements

Part 4, Chapter 1 requirements of the Technical Instructions must be met.

Lithium ion cells and batteries and sodium ion cells and batteries (UN 3480 and UN 3551), including when packed with or contained in equipment (UN 3481 and UN 3552), must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the States of Origin and the State of the Operator.

ADDITIONAL PACKING REQUIREMENTS

- Packagings, including large 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. Rigid large packagings, as shown below, are permitted for a single battery including when packed with equipment;
- 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) The Non-combustibility of the thermal insulation material and the cushioning material 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 is limited to one cell or battery per outer packaging.

Packing Instruction 910

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. Rigid large packagings, as shown below, are permitted for a single item of equipment containing cells or batteries;
- 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) The Non-combustibility of the thermal insulation material and the cushioning material must be assessed according to a standard recognized in the State where the packaging is designed or manufactured.

Packagings not subject to Part 6 of the Technical Instructions

The equipment or batteries may be packed in outer packagings or protective enclosures not subject to the requirements of Part 6 of the Technical 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 unit load devices and between unit load devices and warehouses as well as any removal from a pallet or unit load device 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.

Note.— The authorized packagings may exceed a net mass of 400 kg (see 4.2.3 of the Technical Instructions).

OUTER PACKAGINGS

Boxes

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

Drums

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

Jerricans

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

RIGID LARGE PACKAGINGS

Boxes

Aluminium (50B)
Fibreboard (50G)
Natural wood (50C)
Other metal (50N)
Plastics (50H)
Plywood (50D)
Reconstituted wood (50F)
Steel (50A)

Amendments to battery provisions

Packing Instruction 974

Cargo aircraft only

Introduction

This packing instruction applies to UN Nos. 3090, 3091, 3480 ~~and~~, 3481, 3551 and 3552 where the ~~lithium~~ cell or battery has a mass exceeding 35 kg.

General requirements

Part 4;1 requirements of the Technical Instructions must be met.

Lithium ion cells and batteries and sodium ion cells and batteries (UN 3480 and UN 3551), including when packed with or contained in equipment (UN Nos. 3481 and 3552), must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the State of Origin and the State of the Operator.

Each cell or battery must meet the provisions of Part 2;9.3 of the Technical Instructions.

...

...

APPENDIX B TO THE REPORT**CONSOLIDATED AMENDMENTS TO THE SUPPLEMENT TO THE TECHNICAL
INSTRUCTIONS RECOMMENDED UNDER AGENDA ITEM 1****Part S-3****DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND QUANTITY LIMITATIONS**

...

Note.— Revisions to Table 3-1 of the Technical Instructions will automatically be reflected in related records included in the Supplement through the publishing process. The dangerous goods list entries shown here are records which contain values different to the values in Table 3-1.

Chapter 3**SUPPLEMENTARY DANGEROUS GOODS LIST****Class 2****Table S-3-1. Supplementary Dangerous Goods List (Class 2)**

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		6	7	8	9	10	11	12	13
UN harmonization amendments												
Paragraph 4.1.3.1 of DGP/29-WP/3:												
UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1) and paragraph 1.3.1.2 of this report:												
<u>Disilane</u>	<u>3553</u>	<u>2.1</u>						<u>E0</u>	<u>FORBIDDEN</u>		<u>FORBIDDEN</u>	

...

Chapter 4

SUPPLEMENTARY DANGEROUS GOODS LIST

Classes 3 to 9

Table S-3-1. Supplementary Dangerous Goods List (Classes 3 to 9)

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		6	7	8	9	10	11	12	13

...

UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3 and paragraph 1.3.1 of this report:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Sodium ion batteries with organic electrolyte	3551	9		Miscellaneous — Lithium or sodium ion batteries		A88 A99 A154 A164 A183 A227 A228 A331 A334		E0	FORBIDDEN		See 976	
Trifluoromethyltetrazole sodium salt in acetone with not less than 68% acetone, by mass	3555	3		Liquid flammable		A40	II	E0	FORBIDDEN		FORBIDDEN	

...

Chapter 6

SPECIAL PROVISIONS

...

Table S-3-4. Special Provisions

...

Amendments to battery provisions

A331	Lithium ion <u>or sodium ion</u> cells or batteries may be offered for transport, on cargo aircraft only, at a state of charge greater than 30 per cent of their rated capacity with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities. When considering an approval, at a minimum, the following criteria should be considered to mitigate risks posed by a lithium <u>ion or sodium ion</u> cell or battery heat, smoke or fire event inside a package at the cell, battery or package level:
...	
A334	<p>a) In instances where other forms of transport (including cargo aircraft) are impracticable, lithium <u>cells or batteries or sodium ion</u> 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 quantities per package do not exceed:</p> <ol style="list-style-type: none"> 1) for lithium metal cells or batteries: <ol style="list-style-type: none"> i) up to 2 batteries with a lithium content more than 0.3 g but not more than 2 g per battery; or ii) up to 8 cells with a lithium content more than 0.3 g but not more than 1 g per cell; or iii) up to 2.5 kg of cells and/or batteries with a lithium content not more than 0.3 g per cell or battery; or 2) for lithium <u>ion or sodium</u> ion cells or batteries: <ol style="list-style-type: none"> i) up to 2 batteries with a Watt-hour (Wh) rating more than 2.7 Wh but not more than 100 Wh per battery; or ii) up to 8 cells with a Watt-hour rating more than 2.7 Wh but not more than 20 Wh per cell; or iii) up to 2.5 kg of cells and/or batteries with a Watt-hour rating not more than 2.7 Wh per cell or battery. <p>b) When considering an approval, at a minimum, the following criteria should be considered to mitigate risks posed by a lithium cell or battery <u>or sodium ion cell or battery</u> heat, smoke or fire event inside a package at the cell, battery or package level:</p> <ol style="list-style-type: none"> 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 <u>cell or battery or sodium ion</u> cell or battery must be contained within the package. <p>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.</p>

Part S-4

PACKING INSTRUCTIONS

(ADDITIONAL INFORMATION FOR PART 4 OF THE TECHNICAL INSTRUCTIONS)

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Chapter 4

CLASS 2 — GASES

UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3:

UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Packing Instruction 200

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

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Table 2. LIQUEFIED GASES AND DISSOLVED GASES

UN No.	Name and description	Class or Division	Subsidiary Hazard	LC ₅₀ ml/m ³	Cylinders	Test period, years	Test pressure, bar	Filling ratio	Special packing provisions
1032	Dimethylamine, anhydrous	2.1			X	10	10	0.59	b
1033	Dimethyl ether	2.1			X	10	18	0.58	
<u>3553</u>	<u>Disilane</u>	<u>2.1</u>			<u>X</u>	<u>10</u>	<u>225</u>	<u>0.39</u>	<u>g</u>
1035	Ethane	2.1			X	10	95 120 300	0.25 0.30 0.40	

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Chapter 6

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

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UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3:

Paragraph 4.1.2.1.1 b) of DGP/29-WP/2:

Packing Instruction 451					
Passenger and cargo aircraft — wetted explosives (Packing Group I)					
...					
COMBINATION PACKAGINGS					SINGLE PACKAGINGS
<i>UN number and proper shipping name</i>	<i>Inner packaging (see 6;3.2)</i>	<i>Inner packaging quantity (per receptacle)</i>	<i>Total quantity per package — passenger</i>	<i>Total quantity per package — cargo</i>	
...					
UN 3474 1-Hydroxybenzotriazole, anhydrous, wetted <u>monohydrate</u>	Glass Plastics	0.5 kg	0.5 kg	0.5 kg	No
...					

...

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

UN harmonization amendments

Paragraph 4.1.3.1 of DGP/29-WP/3:

UN Model Regulations, Chapter 4.1, 4.1.4.1, P910 (see ST/SG/AC.10/50/Add.1)

Packing Instruction 910

Cargo aircraft only

Introduction

This packing instruction applies to UN Nos. 3090, 3091, 3480 ~~and~~, 3481, 3551 and 3552 annual production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.

General requirements

Part 4, Chapter 1 requirements of the Technical Instructions must be met.

Lithium ion cells and batteries and sodium ion cells and batteries (UN 3480 and UN 3551), including when packed with or contained in equipment (UN 3481 and UN 3552), must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the States of Origin and the State of the Operator.

ADDITIONAL PACKING REQUIREMENTS

- Packagings, including large 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. Rigid large packagings, as shown below, are permitted for a single battery including when packed with equipment;
- 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) The Non-combustibility of the thermal insulation material and the cushioning material 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 is limited to one cell or battery per outer packaging.

Packing Instruction 910

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. Rigid large packagings, as shown below, are permitted for a single item of equipment containing cells or batteries;
- 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) The Non-combustibility of the thermal insulation material and the cushioning material must be assessed according to a standard recognized in the State where the packaging is designed or manufactured.

Packagings not subject to Part 6 of the Technical Instructions

The equipment or batteries may be packed in outer packagings or protective enclosures not subject to the requirements of Part 6 of the Technical 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 unit load devices and between unit load devices and warehouses as well as any removal from a pallet or unit load device 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.

Note.— The authorized packagings may exceed a net mass of 400 kg (see 4.2.3 of the Technical Instructions).

OUTER PACKAGINGS

Boxes

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

Drums

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

Jerricans

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

RIGID LARGE PACKAGINGS

Boxes

Aluminium (50B)
Fibreboard (50G)
Natural wood (50C)
Other metal (50N)
Plastics (50H)
Plywood (50D)
Reconstituted wood (50F)
Steel (50A)

Amendments to battery provisions

Packing Instruction 974

Cargo aircraft only

Introduction

This packing instruction applies to UN Nos. 3090, 3091, 3480 ~~and~~, 3481, 3551 and 3552 where the ~~lithium~~ cell or battery has a mass exceeding 35 kg.

General requirements

Part 4;1 requirements of the Technical Instructions must be met.

Lithium ion cells and batteries and sodium ion cells and batteries (UN 3480 and UN 3551), including when packed with or contained in equipment (UN Nos. 3481 and 3552), must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the State of Origin and the State of the Operator.

Each cell or battery must meet the provisions of Part 2;9.3 of the Technical Instructions.

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APPENDIX C
(English only)

**AMENDMENTS TO THE EMERGENCY RESPONSE GUIDANCE FOR
AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS
RECOMMENDED UNDER AGENDAS ITEM 2 AND 9**

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Amendments to manage aviation specific risks

Paragraphs 9.1 and 2.4.1 of this report and paragraph 3.2.4.1 of DGP/28-WP/3:

Section 3

**EXAMPLES OF DANGEROUS GOODS
INCIDENT PROCEDURES**

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**3.3 CABIN CREW PROCEDURES FOR DANGEROUS GOODS INCIDENTS
IN THE PASSENGER CABIN DURING FLIGHT**

This section consists of cabin crew procedures for dangerous goods incidents in the passenger cabin during flight involving:

- a) battery / portable electronic device (PED) fire / smoke (see 3.3.1);
- b) overhead bin battery / portable electronic device (PED) fire / smoke (see 3.3.2);
- c) overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke (see 3.3.3);
- d) PED ~~inadvertently crushed or damaged~~ fallen into / trapped in ~~electrically adjustable~~ a passenger seat (see 3.3.4);
- e) battery / portable electronic device (PED) fire / smoke on the flight deck (see 3.3.5);
- f) battery / portable electronic device (PED) fire / smoke when fire containment equipment is carried on board aircraft (see 3.3.6);
- eg) fire involving dangerous goods (see 3.3.57); and
- fh) spillage or leakage of dangerous goods (see 3.3.68)

Note. 1— Although this guidance material presents sequences of tasks, some of these actions occur simultaneously when carried out by crew members in a multi-cabin crew operation.

Note. 2— The operator should ensure its aircraft are equipped with appropriate firefighting and protective equipment for use by crew members.

Note. 3— In a single cabin crew member operation, some of the actions listed in this section should be carried out with the assistance of other persons (e.g. able-bodied passengers). The operating cabin crew member should assign those persons to communicate with the flight crew and provide back-up while the cabin crew member fights the fire.

Note. 4— Although this guidance refers to passenger PEDs, procedures are also applicable to crew member PEDs.

3.3.1 Battery / portable electronic device (PED) fire / smoke

Procedures for battery / portable electronic device (PED) fire / smoke	
Step	Cabin crew action
1.	<p>IDENTIFY THE ITEM</p> <p><i>Note.— It may not be possible to identify the item (source of fire) immediately. In this case, apply Step 2 first, and then attempt to identify it.</i></p> <p>Caution: In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames.</p>
2.	<p>APPLY FIREFIGHTING PROCEDURE</p> <p>a) Obtain and use the appropriate fire extinguisher. b) Retrieve and use protective equipment, as applicable to the situation. c) Move passengers away from the area, if possible. d) Notify pilot in command / other cabin crew members.</p> <p><i>Note.— Actions should occur simultaneously in a multi-crew operation.</i></p>
3.	<p>REMOVE POWER</p> <p>a) Disconnect the device from the power supply, if safe to do so. b) Turn off in-seat power, if applicable. c) Verify that power to the remaining electrical outlets remains off, if applicable.</p> <p>Caution: Do not attempt to remove the battery from the device.</p>
4.	<p><u>DOUSE</u> LEAVE THE DEVICE <u>WITHIN ITS PLACE AND POUR</u> WATER (OR OTHER NON-FLAMMABLE LIQUID) <u>ON THE DEVICE</u></p> <p><i>Note.— Liquid may turn to steam when applied to the hot battery.</i></p>

Procedures for battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
5.	<p><u>LEAVE THE DEVICE IN ITS PLACE AND MONITOR FOR ANY INDICATION OF REIGNITION AND CONTINUE TO POUR WATER (OR OTHER NON-FLAMMABLE LIQUID) ON THE DEVICE</u></p> <p>a) If smoke or flames reappear, repeat Steps 2 and 4.</p> <p>Caution:</p> <ul style="list-style-type: none"> Do not attempt to pick up or move the device. Do not cover or enclose the device. Do not use ice or dry ice to cool the device.
6.	<p><u>WHEN WAIT UNTIL THE DEVICE HAS COOLED</u> (e.g. approximately 10 to 15 minutes)</p> <p>a) Obtain a suitable empty container.</p> <p>b) Fill the container with enough water (or other non-flammable liquid) to submerge the device.</p> <p>c) Using protective equipment, place the device in the container and completely submerge in water (or other non-flammable liquid).</p> <p>d) Stow and secure (if possible) the container to prevent spillage.</p>
<u>7.</u>	<u>OBTAIN A SUITABLE EMPTY CONTAINER</u>
<u>8.</u>	<u>FILL THE CONTAINER WITH ENOUGH WATER (OR OTHER NON-FLAMMABLE LIQUID) TO SUBMERGE THE DEVICE</u>
<u>9.</u>	<u>PLACE THE DEVICE IN THE CONTAINER AND COMPLETELY SUBMERGE IN WATER (OR OTHER NON-FLAMMABLE LIQUID), USING PROTECTIVE EQUIPMENT</u>
<u>10.</u>	<u>STOW AND SECURE (IF POSSIBLE) THE CONTAINER TO PREVENT SPILLAGE</u>
7 <u>11.</u>	MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT
8 <u>12</u>	<p><u>APPLY POST-INCIDENT PROCEDURES AFTER LANDING AT THE NEXT DESTINATION</u></p> <p>a) Apply operator's post-incident procedures.</p>

3.3.2 Overhead bin battery / portable electronic device (PED) fire / smoke

Procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
Step	Cabin crew action
1.	<p>APPLY FIREFIGHTING PROCEDURE</p> <p>a) — Obtain and use the appropriate fire extinguisher. b) — Retrieve and use protective equipment, as applicable to the situation. c) — Move passengers away from the area, if possible. d) — Notify pilot in command / other cabin crew members.</p> <p><i>Note.</i> — Actions should occur simultaneously in a multi-crew operation.</p>
2.	<p>IDENTIFY THE ITEM</p> <p>If the device is visible and accessible, or, if the device is contained in baggage and flames are visible:</p> <p>a) — Re-apply Step 1 to extinguish the flames, if applicable. b) — Apply Steps 3 to 5.</p> <p>If smoke is coming from the overhead bin, but the device is not visible or accessible:</p> <p>c) — Remove other baggage from the overhead bin to access the affected baggage/item. d) — Identify the item. e) — Apply Steps 3 to 5.</p> <p>Caution: In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames.</p>
3.	<p><u>DOUSE</u> LEAVE THE DEVICE (BAGGAGE) WITHIN ITS PLACE AND POUR WATER (OR OTHER NON-FLAMMABLE LIQUID) <u>ON THE DEVICE (BAGGAGE)</u></p> <p><i>Note.</i> — Liquid may turn to steam when applied to the hot battery.</p>
4.	<p><u>MONITOR FOR ANY INDICATION OF REIGNITION AND CONTINUE TO POUR WATER (OR OTHER NON-FLAMMABLE LIQUID) ON THE DEVICE</u></p>
45.	<p><u>WHEN</u> WAIT UNTIL THE DEVICE HAS COOLED</p> <p>a) — Obtain a suitable empty container. b) — Fill the container with enough water (or other non-flammable liquid) to submerge the device. c) — Using protective equipment, place the device in the container and completely submerge in water (or other non-flammable liquid). d) — Stow and secure (if possible) the container to prevent spillage.</p>

Procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
<u>6.</u>	<u>OBTAIN A SUITABLE EMPTY CONTAINER</u>
<u>7.</u>	<u>FILL THE CONTAINER WITH ENOUGH WATER (OR OTHER NON-FLAMMABLE LIQUID) TO SUBMERGE THE DEVICE</u>
<u>8.</u>	<u>PLACE THE DEVICE IN THE CONTAINER AND COMPLETELY SUBMERGE IN WATER (OR OTHER NON-FLAMMABLE LIQUID), USING PROTECTIVE EQUIPMENT</u>
<u>9.</u>	<u>STOW AND SECURE (IF POSSIBLE) THE CONTAINER TO PREVENT SPILLAGE</u>
<u>10.</u>	MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT
<u>11.</u>	<u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION a) Apply operator's post incident procedures.

3.3.3 Overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke

Procedures for overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke	
<i>Step</i>	<i>Cabin crew action</i>
1.	IDENTIFY THE ITEM
2.	INSTRUCT THE PASSENGER TO TURN OFF THE DEVICE IMMEDIATELY
3.	REMOVE POWER a) Disconnect the device from the power supply, if safe to do so. b) Turn off in-seat power, if applicable. c) Verify that power to the remaining electrical outlets remains off, if applicable. d) Verify that the device remains off for the remainder of the flight. Caution: Do not attempt to remove the battery from the device.

Procedures for overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke	
<i>Step</i>	<i>Cabin crew action</i>
4.	<p>INSTRUCT THE PASSENGER TO KEEP THE DEVICE VISIBLE AND MONITOR CLOSELY</p> <p>Caution: Unstable batteries may ignite even after the device is turned off.</p>
5.	<p>IF SMOKE OR FLAMES APPEAR <u>APPLY PROCEDURES FOR</u></p> <p>a) Apply BATTERY / PED FIRE / SMOKE procedures (see 3.3.1). <u>IF SMOKE OR FLAMES APPEAR</u></p>
6.	<p><u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION</p> <p>a) Apply operator's post incident procedures.</p>

3.3.4 PED ~~inadvertently crushed or damaged in electrically adjustable~~ fallen into / trapped in a passenger seat

Procedures for PED inadvertently crushed or damaged in electrically adjustable <u>fallen into / trapped in a passenger seat</u>	
<i>Step</i>	<i>Cabin crew action</i>
1.	<u>NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS</u>
2. <u>2.1.</u>	OBTAIN INFORMATION FROM THE PASSENGER, BY ASKING THE PASSENGER a) To identify the item. b) Where the passenger suspects that the item may have dropped or slipped into. c) If the seat was moved since misplacing the item.
3. <u>3.2.</u>	RETRIEVE AND USE PROTECTIVE EQUIPMENT, <u>IF AVAILABLE</u>
3. <u>3.</u>	<u>NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS</u>
4.	RETRIEVE THE ITEM <u>IF SAFE TO DO SO</u> Caution: Do not move the seat electrically or mechanically when attempting to retrieve the item.
5.	<u>IF SMOKE OR FLAMES APPEAR</u> <u>APPLY PROCEDURES FOR</u> <u>a) Apply BATTERY / PED FIRE / SMOKE procedures (see 3.3.1). IF SMOKE OR FLAMES APPEAR</u>
6. <u>6.</u>	<u>MONITOR THE SEAT AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT</u>
6.7. <u>6.7.</u>	<u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION a) Apply operator's post incident procedures.

3.3.5 Battery / portable electronic device (PED) fire / smoke on the flight deck

<u>Procedures for battery / portable electronic device (PED) fire / smoke on the flight deck</u>	
<u>Step</u>	<u>Cabin crew action</u>
<u>1.</u>	<u>RECOGNIZE SIGNAL FOR FIRE / SMOKE ON THE FLIGHT DECK</u>
<u>2.</u>	<u>APPLY FIREFIGHTING PROCEDURE</u>
<u>3.</u>	<u>REMOVE THE DEVICE FROM THE FLIGHT DECK</u>
<u>4.</u>	<u>CLOSE THE FLIGHT DECK DOOR</u>
<u>5.</u>	<u>APPLY PROCEDURES FOR BATTERY / PED FIRE / SMOKE IF SMOKE OR FLAMES APPEAR</u>
<u>6.</u>	<u>APPLY POST-INCIDENT PROCEDURES AFTER LANDING AT THE NEXT DESTINATION</u>

3.3.6 Procedures for battery / portable electronic device (PED) fire / smoke when fire containment equipment is carried on board aircraft

Due to the quantity and diversity of existing fire containment products available to operators, it is not possible to design a procedure that encompasses all products. Therefore, this section provides overarching guidance for the use of such equipment. The operator should develop detailed procedures based on the original equipment manufacturer (OEM) instructions. If carried on board the aircraft, one of the fire containment equipment should be located in the flight deck. Additional fire containment should be carried in the cabin. They should be placed in a suitable location(s) that is easily accessible by the cabin crew. When operating multi-deck aircraft, the operator should assess the need for additional fire containment equipment on each deck. Cabin crew members should use the equipment following the OEM's instructions, which should be incorporated in the cabin crew operations manual (CCOM). Cabin crew members should be drilled and capable in the use of the specific fire containment equipment carried on board the operator's aircraft.

Note.— Fire containment equipment may not be suitable for all types of PEDs, due to size and shape.

3.3.57 Fire involving dangerous goods

Procedures for fire involving dangerous goods	
<i>Step</i>	<i>Cabin crew action</i>
1.	<p>IDENTIFY THE ITEM</p> <p><i>Note. — It may not be possible to identify the item (source of fire) immediately. In this case, apply Step 2 first, and then attempt to identify it.</i></p> <p>Caution: In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames.</p>
2.	<p>APPLY FIREFIGHTING PROCEDURE</p> <p>a) — Obtain and use the appropriate fire extinguisher / check use of water. b) — Retrieve and use protective equipment, as applicable to the situation. c) — Move passengers away from the area, if possible. d) — Notify pilot-in-command / other cabin crew members.</p> <p><i>Note. — Actions should occur simultaneously in a multi-crew operation.</i></p>
3.	<p>MONITOR FOR ANY REIGNITION <u>INDICATION OF REIGNITION</u></p> <p>a) — If smoke/flames reappear, repeat Step 2.</p>
4.	<p>ONCE THE FIRE HAS BEEN EXTINGUISHED</p> <p>a) — Apply <u>APPLY PROCEDURES FOR SPILLAGE OR LEAKAGE OF DANGEROUS GOODS</u> procedures, if required (see 3.3.6). <u>, IF REQUIRED, ONCE THE FIRE HAS BEEN EXTINGUISHED</u></p>
5.	<p><u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION</p> <p>a) — Apply operator's post incident procedures.</p>

3.3.68 Spillage or leakage of dangerous goods

Procedures for spillage or leakage of dangerous goods	
Step	Cabin crew action
1.	NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS
2.	IDENTIFY THE ITEM
3.	COLLECT EMERGENCY RESPONSE KIT OR OTHER USEFUL ITEMS
4.	DON RUBBER GLOVES RETRIEVE AND SMOKE HOOD USE PROTECTIVE EQUIPMENT
5.	MOVE PASSENGERS AWAY FROM AREA AND DISTRIBUTE WET TOWELS OR CLOTHS
6.	PLACE DANGEROUS GOODS ITEM IN POLYETHYLENE BAGS
7.	STOW POLYETHYLENE BAGS
8.	TREAT AFFECTED SEAT CUSHIONS / COVERS IN THE SAME MANNER AS DANGEROUS GOODS ITEM
9.	COVER SPILLAGE ON CARPET / FLOOR
10.	REGULARLY INSPECT MONITOR ITEMS STOWED AWAY / CONTAMINATED FURNISHINGS
11.	<u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION a) Apply operator's post incident procedures.

3.4 AMPLIFIED CABIN CREW PROCEDURES FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT

This section consists of amplified cabin crew procedures for dangerous goods incidents in the passenger cabin during flight involving:

- a) battery / portable electronic device (PED) fire / smoke (see 3.4.1);
- b) overhead bin battery / portable electronic device (PED) fire / smoke (see 3.4.2);
- c) overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke (see 3.4.3);
- d) PED ~~inadvertently crushed or damaged~~fallen into / trapped in ~~electrically adjustable~~a passenger seat (see 3.4.4);
- ~~e~~ e) battery / portable electronic device (PED) fire / smoke on the flight deck (see 3.4.5);
- f) fire involving dangerous goods (see 3.4.56); and
- fg) spillage or leakage of dangerous goods (see 3.4.67).

~~Note. — Although this guidance material presents sequences of tasks, some of these actions occur simultaneously when carried out by crew members.~~

3.4.1 Battery / portable electronic device (PED) fire / smoke

Amplified procedures for battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
1.	<p>IDENTIFY THE ITEM</p> <p>It may not be possible <u>for cabin crew</u> to identify the item (source of fire <u>or smoke</u>) right away, especially if the fire has started in a seat pocket or the device is not readily accessible. In this case, <u>cabin crew should apply</u> firefighting procedures <u>should be applied</u>, as a first step, <u>(Step 2) and then attempt to identify the item (Step 1)</u>. If the item is contained in baggage, the crew's actions would be similar to the actions for a device that is visible or readily accessible.</p> <p>Caution: In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames. However, in certain situations cabin crew members may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. This should be done with extreme caution and only after donning appropriate protective equipment available on the aircraft.</p>
2.	<p>APPLY FIREFIGHTING PROCEDURE</p> <p><u>a) Apply communication procedures.</u> <u>b) Use appropriate firefighting equipment and protective equipment, as required.</u> <u>c) Fight fire.</u> <u>d) Manage passengers and cabin, as required.</u></p> <p><u>During any</u> occurrence concerning a fire in the cabin, <u>the cabin crew</u> should be notified immediately <u>notify</u> the pilot-in-command who should be kept <u>immediately and keep the flight crew</u> informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each is kept fully informed of the other's actions and intentions. <u>Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination are of utmost importance. The use of the interphone is the primary means of communication between crew members, unless the interphone system fails.</u></p> <p>Appropriate firefighting and emergency procedures must be used to deal with any fire. In a multi-cabin crew operation, the actions detailed in the firefighting procedure should be conducted simultaneously. On aircraft operated with only one cabin crew member, the aid of a passenger should be sought in dealing with the situation.</p>

Amplified procedures for battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
	<p>It is important to<u>that cabin crew</u> instruct the passenger to disconnect the device from the power supply, if it is deemed safe to do so. A battery has a higher likelihood of catching fire due to overheating during or immediately following a charging cycle, although the effects may be delayed for some period of time. By removing the external power supply from the device, it will be assured that additional energy is not being fed to the battery to promote a fire.</p> <p><u>Cabin crew should</u> Tturn off the in-seat power to the remaining electrical outlets until it can be assured that a malfunctioning aircraft system does not contribute to additional failures of the passengers' portable electronic devices.</p> <p><u>Cabin crew should</u> Vvisually check that power to the remaining electrical outlets remains off until the aircraft's system can be determined to be free of faults, if the device was previously plugged in.</p> <p>The removal of power may occur simultaneously to other cabin crew actions (e.g. obtaining water to douse<u>pour on</u> the device). Depending on the aircraft type, in-seat power may have to be turned off by the flight crew members <u>may turn off in-seat power</u>.</p> <p>Caution: Do not attempt to remove the battery from the device.</p>

Amplified procedures for battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
4.	<p><u>LEAVE THE DEVICE IN ITS PLACE AND DOUSE THE DEVICE WITH POUR WATER (OR OTHER NON-FLAMMABLE LIQUID) ON THE DEVICE</u></p> <p><u>Cabin crew need to use water (or other non-flammable liquid) must be used</u> to cool a battery that has ignited to prevent the spread of heat to other cells in the battery. <u>if water is not available, any non-flammable liquid may be used to cool the device. Cabin crew should pour liquid onto the device until signs of steam and crackling have subsided completely.</u></p> <p><u>Note.—</u>Liquid may turn to steam when applied to the hot battery. <u>The action of pouring water or non-flammable liquid on the device cools the battery cells and prevents thermal runaway.</u></p> <hr/> <p>The following is moved from Step 5:</p> <hr/> <p>A battery involved in a fire can reignite and emit flames multiple times as heat is transferred to other cells in the battery. Therefore, <u>cabin crew should monitor</u> the device <u>must be monitored</u> regularly to identify if there is any indication that a fire hazard may still exist. If there is any smoke or indication of fire, <u>the device must be doused with crew should pour</u> more water (or other non-flammable liquid) <u>on the device.</u></p> <p>Caution:</p> <ol style="list-style-type: none"> Do not attempt to pick up or move the device; batteries may explode or burst into flames without warning. The device <u>must should</u> not be moved if displaying any of the following: flames/flaring, smoke, unusual sounds (such as crackling), debris, or shards of material separating from the device. Do not cover or enclose the device as it could cause it to overheat. Do not use ice or dry ice to cool the device. Ice or other materials insulate the device, increasing the likelihood that additional battery cells will reach thermal runaway.
5.	<p><u>LEAVE THE DEVICE IN ITS PLACE AND MONITOR FOR ANY INDICATION OF REIGNITION AND CONTINUE TO POUR WATER (OR OTHER NON-FLAMMABLE LIQUID) ON THE DEVICE</u></p> <p><u>A battery involved in a fire can reignite and emit flames multiple times as heat is transferred to other cells in the battery. Therefore, the device must be monitored regularly to identify if there is any indication that a fire hazard may still exist. If there is any smoke or indication of fire, the device must be doused with more water (or other non-flammable liquid).</u></p>

Amplified procedures for battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
	<p>Caution:</p> <p>a) Do not attempt to pick up or move the device; batteries may explode or burst into flames without warning. The device must not be moved if displaying any of the following: flames/flaring, smoke, unusual sounds (such as crackling), debris, or shards of material separating from the device.</p> <p>b) Do not cover or enclose the device as it could cause it to overheat.</p> <p>c) Do not use ice or dry ice to cool the device. Ice or other materials insulate the device, increasing the likelihood that additional battery cells will reach thermal runaway.</p> <p><u>If smoke or flames reappear, cabin crew should repeat Steps 2 and 4.</u></p>
6.	<p><u>WHENWAIT UNTIL THE DEVICE HAS COOLED (e.g. APPROXIMATELY 10-15 MINUTES)</u></p> <p><u>TheCabin crew may move the</u> device can be moved with caution following a certain period, once it has cooled down and if there is no evidence of smoke, heat, or if there is a reduction in the crackling or hissing sound usually associated with a lithium battery fire (e.g. after approximately 10 <u>this may take approximately 15</u> minutes). The waiting period may vary based on the device and its size. The different circumstances (e.g. types of devices, phase of flight) should be addressed in the operator's training programme.</p>
7.	<p><u>OBTAIN A SUITABLE EMPTY CONTAINER</u></p> <p>A suitable empty container, such as <u>may include</u> a pot, jug, galley unit or toilet waste bin, must. <u>When selecting a suitable empty container, cabin crew should consider the size of the device to be submerged in it. Cabin crew should select a container which can</u> be filled with enough water or non-flammable liquid to completely submerge the device. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves), when moving any device involved in a fire. Once the device is completely submerged, the container used must be stowed and, if possible, secured to prevent spillage.</p> <p><u>Note.— If the aircraft is equipped with a fire containment equipment and the device fits inside it, cabin crew should use the equipment following the manufacturer's instructions.</u></p>
8.	<p><u>FILL THE CONTAINER WITH ENOUGH WATER (OR OTHER NON-FLAMMABLE LIQUID) TO SUBMERGE THE DEVICE</u></p> <p><u>Cabin crew should fill the suitable empty container with enough water or non-flammable liquid to completely submerge the device.</u></p>

Amplified procedures for battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
<u>9.</u>	<p><u>PLACE THE DEVICE IN THE CONTAINER AND COMPLETELY SUBMERGE IN WATER (OR OTHER NON-FLAMMABLE LIQUID), USING PROTECTIVE EQUIPMENT</u></p> <p><u>It is important that cabin crew wear protective equipment (e.g. protective breathing equipment, protective gloves), when moving any device involved in a fire.</u></p>
<u>10.</u>	<p><u>STOW AND SECURE (IF POSSIBLE) THE CONTAINER TO PREVENT SPILLAGE</u></p> <p><u>Once the device is completely submerged, cabin crew should stow the container and, if possible, secured to prevent spillage.</u></p>
<u>711.</u>	<p>MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT</p> <p><u>Monitor</u>Cabin crew should monitor the device and the surrounding area for the remainder of the flight to verify that the device does not pose further hazard.</p>
<u>812.</u>	<p><u>APPLY POST-INCIDENT PROCEDURES AFTER LANDING AT THE NEXT DESTINATION</u></p> <p>Upon arrival, <u>cabin crew should</u> apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item.</p> <p><u>Complete</u>Crew should complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.</p>

3.4.2 Overhead bin battery / portable electronic device (PED) fire / smoke

Amplified procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
1.	<p>APPLY FIREFIGHTING PROCEDURE</p> <p><u>a) Apply communication procedures.</u> <u>b) Use appropriate firefighting equipment and protective equipment, as required.</u> <u>c) Fight fire.</u> <u>d) Manage passengers and cabin, as required.</u></p> <p><u>During Any occurrence concerning a fire in the cabin, the cabin crew should be notified immediately to notify the pilot-in-command who should be kept immediately and keep the flight crew informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each is kept fully informed of the other's actions and intentions.</u></p> <p style="text-align: center;"><u>The following is moved from the end of Step 1:</u></p> <p>Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination are of utmost importance. The use of the interphone is the primary means of communication <u>between crew members,</u> unless the interphone system fails.</p> <p>Appropriate firefighting and emergency procedures must <u>should</u> be used to deal with any overhead bin fire. In a multi-cabin crew operation, the actions detailed in the firefighting procedure should be conducted simultaneously. On aircraft operated with only one cabin crew member, the aid of a passenger should be sought in dealing with the situation. Cabin crew should use firefighting equipment to extinguish the fire and prevent its spread to additional flammable materials. It is important that cabin crew use protective equipment (e.g. protective breathing equipment, protective gloves) when fighting a fire. Due to the weight and size of some overhead bins, and their opening movement, the cabin crew member who is fighting the fire may require assistance in opening and controlling the overhead bin. When fighting an overhead bin fire, the cabin crew member should position themselves at the opposite end of the overhead bin, where the smoke / flames are visible. This action prevents further spreading embers due to the force of the extinguishing agent as it is discharged and comes into contact with the overhead bin.</p> <p>Halon, Halon replacement or water extinguisher should be used to extinguish the fire and prevent its spread to additional flammable materials. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves) when fighting a fire.</p>

Amplified procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
	<p>If fire develops, cabin crew should take prompt action to move passengers away from the area involved and, if necessary, provide wet towels or cloths and give instructions for passengers to breathe through them.</p> <p><u>Note.— If the origin of the fire / smoke cannot be confirmed visually, cabin crew should use the back of the hand to search for hot overhead bin surfaces.</u></p> <p>Caution: <u>Do not use the palm of the hand but the back of the hand since it is more sensitive to temperature differences.</u></p> <p>Caution: <u>In certain firefighting situations, cabin crew may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. In order to avoid injury from a flash fire, cabin crew should use caution when opening the affected baggage when there is any indication of smoke or flames. This should only be done after donning appropriate protective equipment.</u></p>
2.	<p>IDENTIFY THE ITEM</p> <p>It may not be possible to identify the item right away, especially if the fire has started in the overhead bin and the device is not readily accessible.</p> <p>If the device is visible and accessible, or, if the device is contained in baggage and flames are visible, the firefighting procedures should be applied as a first step:</p> <p>a) <u>Re-apply Step 1 to extinguish the flames, if applicable.</u> b) <u>Apply Steps 3 to 10.</u></p> <p>If smoke is coming from the overhead bin, but the device is not visible or accessible, or there is no indication of fire, the firefighting procedures should be applied as a first step. Afterwards, all baggage should be removed from the overhead bin with caution until the item can be identified. Once the item is identified, apply:</p> <p>a) <u>Remove other baggage from the overhead bin to access the affected baggage/item.</u> b) <u>Identify the item.</u> c) <u>Apply Steps 3 to 5</u>10.</p> <p><u>It may not be possible for cabin crew to identify the item (source of fire or smoke) right away, especially if the fire has started in an overhead bin or the device is not readily accessible.</u></p> <p><u>If the device is visible and accessible or if the device is contained in baggage and flames are visible, cabin crew should apply firefighting procedures, as a first step.</u></p>

Amplified procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
Step	Cabin crew action
	<p><u>If smoke is coming from the overhead bin, but the device is not visible or accessible, or there is no indication of fire, cabin crew should apply firefighting procedures, as a first step. Afterwards, cabin crew should remove all baggage from the overhead bin with caution until the item can be identified. Once the item is identified, apply Steps 3 to 10.</u></p> <p>Caution: In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames. However, in certain situations cabin crew members may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. This should be done with extreme caution and only after donning appropriate protective equipment available on the aircraft.</p>
3.	<p><u>DOUSE LEAVE THE DEVICE (BAGGAGE) WITH IN ITS PLACE AND POUR WATER (OR OTHER NON-FLAMMABLE LIQUID) ON THE DEVICE (BAGGAGE)</u></p> <p>Water (or other non-flammable liquid) must be used to cool a battery that has ignited to prevent the spread of heat to other cells in the battery. If water is not available, any non-flammable liquid may be used to cool the device.<u>Cabin crew need to use water (or other non-flammable liquid) to cool a battery that has ignited to prevent the spread of heat to other cells in the battery. Cabin crew should pour liquid onto the device until signs of steam and crackling have subsided completely.</u></p> <p><u><i>Note.</i>— Liquid may turn to steam when applied to the hot battery. The action of pouring water or non-flammable liquid on the device cools the battery cells and prevents thermal runaway.</u></p> <p><u>A battery involved in a fire can reignite and emit flames multiple times as heat is transferred to other cells in the battery. Therefore, cabin crew should monitor the device regularly to identify if there is any indication that a fire hazard may still exist. If there is any smoke or indication of fire, crew should pour more water (or other non-flammable liquid) on the device.</u></p> <p>Caution:</p> <p><u>a) Do not attempt to pick up or move the device; batteries may explode or burst into flames without warning. The device should not be moved if displaying any of the following: flames/flaring, smoke, unusual sounds (such as crackling), debris, or shards of material separating from the device.</u></p> <p><u>b) Do not cover or enclose the device as it could cause it to overheat.</u></p> <p><u>c) Do not use ice or dry ice to cool the device. Ice or other materials insulate the device, increasing the likelihood that additional battery cells will reach thermal runaway.</u></p>

Amplified procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
<u>4</u>	<p><u>MONITOR FOR ANY INDICATION OF REIGNITION AND CONTINUE TO POUR WATER (OR OTHER NON-FLAMMABLE LIQUID) ON THE DEVICE</u></p> <p>If smoke or flames reappear, cabin crew should repeat Steps 1 and 3.</p>
<u>4.5.</u>	<p><u>WHEN WAIT UNTIL THE DEVICE HAS COOLED</u></p> <p>The device should be moved from the overhead bin to prevent a hidden fire from potentially developing. The device can be moved Cabin crew may move the device with caution following a certain period, once it has cooled down and if there is no evidence of smoke, heat, or if there is a reduction in the crackling or hissing sound usually associated with a lithium battery fire <u>(this may take approximately 15 minutes)</u>. The waiting period may vary based on the device and its size. The different circumstances (e.g. types of devices, phase of flight) should be addressed in the operator's training programme.</p>
<u>6.</u>	<p><u>OBTAIN A SUITABLE EMPTY CONTAINER</u></p> <p>A suitable empty container, such as <u>may include</u> a pot, jug, galley unit or toilet waste bin, must. <u>When selecting a suitable empty container, cabin crew should consider the size of the device to be submerged in it. Cabin crew should select a container which can</u> be filled with enough water or non-flammable liquid to completely submerge the device. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves), when moving any device involved in a fire. Once the device is completely submerged, the container used must be stowed and, if possible, secured to prevent spillage.</p> <p><u>Note.— If the aircraft is equipped with a fire containment equipment and the device fits inside it, cabin crew should use the equipment following the manufacturer's instructions.</u></p>
<u>7.</u>	<p><u>FILL THE CONTAINER WITH ENOUGH WATER (OR OTHER NON-FLAMMABLE LIQUID) TO SUBMERGE THE DEVICE</u></p> <p><u>Cabin crew should fill the suitable empty container with enough water or non-flammable liquid to completely submerge the device.</u></p>
<u>8.</u>	<p><u>PLACE THE DEVICE IN THE CONTAINER AND COMPLETELY SUBMERGE IN WATER (OR OTHER NON-FLAMMABLE LIQUID), USING PROTECTIVE EQUIPMENT</u></p> <p><u>It is important that cabin crew wear protective equipment (e.g. protective breathing equipment, protective gloves), when moving any device involved in a fire.</u></p>

Amplified procedures for overhead bin battery / portable electronic device (PED) fire / smoke	
<i>Step</i>	<i>Cabin crew action</i>
<u>9.</u>	<p><u>STOW AND SECURE (IF POSSIBLE) THE CONTAINER TO PREVENT SPILLAGE</u></p> <p><u>Once the device is completely submerged, cabin crew should stow the container and, if possible, secured to prevent spillage.</u></p>
<u>510.</u>	<p>MONITOR THE DEVICE AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT</p> <p><u>Monitor</u>Cabin crew should monitor the device and the surrounding area for the remainder of the flight to verify that the device does not pose further hazard.</p>
<u>611.</u>	<p><u>APPLY POST-INCIDENT PROCEDURES AFTER LANDING AT THE NEXT DESTINATION</u></p> <p>Upon arrival, <u>cabin crew should</u> apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item.</p> <p><u>Complete</u>Crew should complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.</p>

3.4.3 Overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke

Amplified procedures for overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke	
Step	Cabin crew action
1.	<p>IDENTIFY THE ITEM</p> <p><u>Cabin crew should identify the source of overheat or electrical smell, or Ask the passenger concerned to identify the item.</u></p>
2.	<p>INSTRUCT THE PASSENGER TO TURN OFF THE DEVICE IMMEDIATELY</p> <p>It is important to<u>that cabin crew</u> instruct the passenger to turn off the device immediately, <u>if possible and safe to do so, to remove the power supply and prevent further overheating or a fire.</u></p>
3.	<p>REMOVE POWER</p> <p><u>a) Disconnect the device from the power supply, if safe to do so.</u> <u>b) Turn off in-seat power, if applicable.</u> <u>c) Verify that power to the remaining electrical outlets remains off, if applicable.</u> <u>d) Verify that the device remains off for the remainder of the flight.</u></p> <p style="text-align: center;"><u>The following is moved from the end of Step 3:</u></p> <p>Caution: <u>Do not attempt to remove the battery from the device.</u></p> <p>It is important to<u>that cabin crew</u> instruct the passenger or crew member to disconnect the device from the power supply, if it is deemed safe to do so. A battery has a higher likelihood of catching fire due to overheating during or immediately following a charging cycle, although the effects may be delayed for some period of time. By removing the external power supply from the device, it will be assured that additional energy is not being fed to the battery to promote a fire.</p> <p><u>Cabin crew should turn off the in-seat power to the remaining electrical outlets until it can be assured that a malfunctioning aircraft system does not contribute to additional failures of the passengers' portable electronic devices.</u></p> <p><u>Cabin crew should visually check that power to the remaining electrical outlets remains off until the aircraft's system can be determined to be free of faults, if the device was previously plugged in. Depending on the aircraft type, in-seat power may have to be turned off by the flight crew.</u></p>

Amplified procedures for overheated battery / electrical smell involving a portable electronic device (PED) — no visible fire or smoke	
<i>Step</i>	<i>Cabin crew action</i>
	<p>The removal of power may occur simultaneously to other cabin crew actions (e.g. obtaining water to douse the device). Depending on the aircraft type, in-seat power may have to be turned off by the flight crew members.</p> <p>It is important to <u>that cabin crew</u> verify that the device remains turned off for the duration of the flight.</p> <p>Caution: Do not attempt to remove the battery from the device.</p>
4.	<p>INSTRUCT THE PASSENGER TO KEEP THE DEVICE VISIBLE AND MONITOR CLOSELY</p> <p>The device must<u>should</u> remain visible (not stowed such as in baggage or seat pocket or on a person (pocket)) and should be monitored closely. Unstable batteries may ignite even after the device is turned off. Verify<u>Cabin crew should verify</u> that the device is stowed <u>only</u> for landing.</p>
5.	<p><u>APPLY PROCEDURES FOR BATTERY / PED FIRE / SMOKE</u> IF SMOKE OR FLAMES APPEAR</p> <p>If smoke or flames appear, apply the BATTERY / PORTABLE ELECTRONIC DEVICE (PED) FIRE / SMOKE procedures (see 3.4.1).</p>
6.	<p><u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION</p> <p>Upon arrival, <u>cabin crew should</u> apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item.</p> <p><u>Crew should</u> Ccomplete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.</p>

3.4.4 PED ~~inadvertently crushed or damaged in electrically adjustable~~ fallen into / trapped in a passenger seat

The following paragraph is moved to Step 3:

~~Due to the design of some electrically adjustable passenger seats, a PED can slip under a seat covering and/or cushion, behind an armrest or down the side of a seat. Inadvertent crushing of the device poses a fire hazard.~~

Amplified procedures for PED inadvertently crushed or damaged in electrically adjustable <u>fallen into / trapped in a passenger seat</u>	
Step	Cabin crew action
4.	<p style="text-align: center;"><u>Moved to Step 3:</u></p> <p>NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS</p> <p>Any occurrence concerning a fire hazard in the cabin should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each is kept fully informed of the other's actions and intentions.</p>
2 <u>1.</u>	<p>OBTAIN INFORMATION FROM <u>THE PASSENGER BY ASKING THE PASSENGER</u></p> <p>a) <u>Ask the passenger to identify the item.</u> b) <u>Ask where the passenger suspects that the item may have dropped or slipped into.</u> c) <u>Ask if the seat was moved since misplacing the item.</u></p> <p><u>Cabin crew should Ask the passenger concerned to identify the item, and where the passenger suspects it may have dropped or slipped into, and if the passenger has moved the seat since misplacing the item.</u></p>
3 <u>2.</u>	<p>RETRIEVE AND USE PROTECTIVE EQUIPMENT, IF AVAILABLE</p> <p>If available, <u>Cabin crew members</u> should don fire <u>protective</u> gloves before trying to retrieve the item.</p>
3. <u>3.</u>	<p style="text-align: center;"><u>Moved from Step 1:</u></p> <p>NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS</p> <p style="text-align: center;"><u>The following is moved from before this table:</u></p> <p>Due to the design of some electrically adjustable passenger seats, a PED can slip under a seat covering and/or cushion, behind an armrest or down the side of a seat.</p>

Amplified procedures for PED inadvertently crushed or damaged in electrically adjustable <u>fallen into / trapped in a passenger seat</u>	
Step	<i>Cabin crew action</i>
	<p>Inadvertent crushing of the device poses a fire hazard.</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">Moved from Step 1:</p> <p style="text-align: center;">_____</p> <p>Any occurrence concerning a fire hazard in the cabin should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each is kept fully informed of the other's actions and intentions.</p>
4.	<p><u>RETRIEVE THE ITEM <u>IF SAFE TO DO SO</u></u></p> <p><u>Caution:</u> <u>Do not move the seat electrically or mechanically when attempting to retrieve the item.</u></p> <p>To prevent crushing of the PED and reduce the potential fire hazard to the device and the surrounding area, cabin crew members and/or the passengers must should not use the electrical or mechanical seat functions in an attempt to retrieve the item. <u>Cabin crew should Mmove the passenger and, if applicable, the passenger(s) seated next to the affected seat from the area, to facilitate the search. Do Cabin crew should not move the seat. <u>If the cabin crew is unable to retrieve the item without moving the seat, it may need to be retrieved by personnel on the ground, after landing at the next destination. If the item cannot be retrieved, the cabin crew member is unable to retrieve the item, it may be necessary to <u>should</u> move the passenger to another seat, <u>if available</u>.</u></u></p> <p><u>Cabin crew should turn off the individual in-seat power, if possible, to do so. Depending on the aircraft type, in-seat power may have to be turned off by the flight crew.</u></p>
5.	<p><u>APPLY PROCEDURES FOR BATTERY / PED FIRE / SMOKE IF SMOKE OR FLAMES APPEAR</u></p> <p>If smoke or flames appear, apply the BATTERY / PORTABLE ELECTRONIC DEVICE (PED) FIRE / SMOKE procedures (see 3.4.1).</p>
6.	<p><u>MONITOR THE SEAT AND THE SURROUNDING AREA FOR THE REMAINDER OF THE FLIGHT</u></p> <p><u>Cabin crew should monitor the seat and the surrounding area for the remainder of the flight to verify that the device does not pose further hazard.</u></p>

Amplified procedures for PED inadvertently crushed or damaged in electrically adjustable <u>fallen into / trapped in a passenger seat</u>	
<i>Step</i>	<i>Cabin crew action</i>
<u>6-7.</u>	<p><u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION</p> <p>Upon arrival, <u>cabin crew should</u> apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is located and providing all information about the item.</p> <p><u>Crew should</u> <u>C</u>complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and <u>the emergency response kit or</u> any aircraft equipment used is replenished or replaced, if applicable.</p>

3.4.5 Battery / portable electronic device (PED) fire / smoke on the flight deck

<u>Amplified procedures for battery / portable electronic device (PED) fire / smoke on the flight deck</u>	
<u>Step</u>	<u>Cabin crew action</u>
<u>1.</u>	<p><u>RECOGNIZE SIGNAL FOR FIRE / SMOKE ON THE FLIGHT DECK</u></p> <p><u>a) Receive call out from the flight deck (e.g. “back up assistance P-E-D!”).</u> <u>b) Retrieve and use protective equipment, as applicable to the situation.</u> <u>c) Obtain the appropriate fire extinguisher.</u> <u>d) Enter the flight deck.</u></p> <p><u><i>Note.— The first cabin crew member ready to act should enter the flight deck.</i></u></p> <p><u>The flight crew’s main responsibility during any occurrence is to maintain control of the aircraft. Therefore, they may call upon the cabin crew to assist in the event of fire / smoke on the flight deck. As notifying the cabin crew of the fire / smoke occurrence on the flight deck by interphone may delay the response, the use of the public address (PA) system is considered the preferred method of notification. The flight crew should use phraseology that clearly explains the type of emergency situation to the cabin crew without creating panic amongst the passengers. The flight crew should use specific sentence, such as “back up assistance P-E-D!”, over the PA system to alert the cabin crew. The first cabin crew member who is ready to act should enter the flight deck.</u></p> <p><u>It is important that cabin crew use protective equipment (e.g. protective breathing equipment, protective gloves) when fighting a fire. Cabin crew should use firefighting equipment to extinguish the fire and prevent its spread to additional flammable materials.</u></p>

<u>Amplified procedures for battery / portable electronic device (PED) fire / smoke on the flight deck</u>	
<u>Step</u>	<u>Cabin crew action</u>
<u>2.</u>	<p><u>APPLY FIREFIGHTING PROCEDURE</u></p> <p>a) <u>If the item is on fire, in coordination with the flight crew, extinguish the fire.</u> b) <u>Once the fire has been extinguished or the device is not on fire (it may emit visible smoke or be overheated), remove it from the flight deck, if possible.</u> c) <u>If the device cannot be moved, pour water (or other non-flammable liquid) on it.</u></p> <p><u>The joint action between the flight crew and the cabin crew depends on the location and type of the affected device. The flight crew would normally have started the appropriate emergency procedures to deal with the fire before the arrival of the cabin crew, including removing the device from any power source. In that case, cabin crew should join the firefighting actions according to the situation. When the decision is taken to fight the fire on the flight deck, in coordination with the flight crew, the cabin crew should use firefighting equipment to extinguish the fire and prevent its spread to additional flammable materials. It is important that cabin crew wear protective equipment (e.g. protective breathing equipment, protective gloves) when fighting a fire in a confined space, such as the flight deck.</u></p> <p><u>Caution:</u> <u>In certain firefighting situations (e.g. to prevent flight crew incapacitation or a loss of control in-flight), crew may assess and deem it necessary to remove the device immediately from the flight deck even if it is still emitting smoke or flames are present. In order to avoid injury, cabin crew should use caution and only attempt this action after donning protective equipment. In such case, cabin crew should apply the firefighting procedure in 3.4.1, after the device is removed from the flight deck.</u></p>
<u>3</u>	<p><u>REMOVE THE DEVICE FROM THE FLIGHT DECK</u></p> <p><u>Once the fire has been extinguished or the device is no longer on fire (even if it is still emitting visible smoke or feels overheated), cabin crew should remove it from the flight deck, if possible. Minimizing the spreading of smoke and fumes in the flight deck is critical for the continued safe operation of the aircraft. If it cannot be moved, cabin crew should use water (or other non-flammable liquid) to cool a battery that has ignited to prevent the spread of heat to other cells in the battery.</u></p> <p><u>After the device is removed from the flight deck, the cabin crew should apply the firefighting procedure, as described in 3.4.1, if it is still on fire. Water (or other non-flammable liquid) should be used to cool a battery that has ignited to prevent the spread of heat to other cells in the battery.</u></p>

<u>Amplified procedures for battery / portable electronic device (PED) fire / smoke on the flight deck</u>	
<u>Step</u>	<u>Cabin crew action</u>
<u>4</u>	<p><u>CLOSE THE FLIGHT DECK DOOR</u></p> <p><u>The flight deck door should be maintained closed once the device is removed from the flight deck. Crew communication and coordination are of utmost importance. The use of the interphone is the primary means of communication unless that system fails.</u></p>
<u>5</u>	<p><u>APPLY PROCEDURES FOR BATTERY / PED FIRE / SMOKE IF SMOKE OR FLAMES APPEAR</u></p> <p><u>After the device is removed from the flight deck, apply the BATTERY / PORTABLE ELECTRONIC DEVICE (PED) FIRE / SMOKE procedures (see 3.4.1).</u></p>
<u>6.</u>	<p><u>APPLY POST-INCIDENT PROCEDURES AFTER LANDING AT THE NEXT DESTINATION</u></p> <p><u>Upon arrival, cabin crew should apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item. Crew should complete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.</u></p>

3.4.56 Fire involving dangerous goods

Amplified procedures for fire involving dangerous goods	
Step	Cabin crew action
1.	<p>IDENTIFY THE ITEM</p> <p><u>Cabin crew should Ask</u> the passenger concerned to identify the item. The passenger may be able to give some guidance on the hazard(s) involved and how these could be dealt with. If the passenger can identify the item, refer to Section 4 of this document for the appropriate emergency response drill.</p> <p>It may not be possible <u>for cabin crew</u> to identify the item right away, especially if the source of the fire is unknown or the item is not readily accessible. In this case, <u>cabin crew should apply</u> firefighting procedures should be applied as a first step <u>(Step 2)</u>. Once it is possible to do so, and then attempt to identify the item after the fire is under control (Step 1). If the item is contained in baggage, the crew's actions would be similar to the actions for an item that is visible or readily accessible.</p> <p>Caution: In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames. However, in certain situations cabin crew members may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. This should be done with extreme caution and only after donning appropriate protective equipment available on the aircraft.</p>
2.	<p>APPLY THE FIREFIGHTING PROCEDURE</p> <p><u>a) Apply communication procedures.</u> <u>b) Use appropriate firefighting equipment and protective equipment, as required.</u> <u>c) Fight fire.</u> <u>d) Manage passengers and cabin, as required.</u></p> <p><u>During Any</u> occurrence concerning a fire in the cabin, <u>the cabin crew</u> should be notified immediately to <u>notify</u> the pilot-in-command <u>immediately</u> who should be kept and keep the flight crew informed of all actions taken and of the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each is kept fully informed of the other's actions and intentions.</p> <p style="text-align: center;"><u>The following is moved from the last paragraph of this step</u></p> <p>Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination are of utmost importance. The use of the interphone is the primary means of communication <u>between crew members</u>, unless the interphone system fails.</p>

Amplified procedures for fire involving dangerous goods	
Step	<i>Cabin crew action</i>
	<p>Appropriate firefighting and emergency procedures must <u>should</u> be used to deal with any fire. In a multi-cabin crew operation, the actions detailed in the firefighting procedure should be conducted simultaneously. On aircraft operated with only one cabin crew member, the aid of a passenger should be sought in dealing with the situation. <u>Cabin crew should use firefighting equipment to extinguish the fire and prevent its spread to additional flammable materials.</u></p> <p>In general, <u>cabin crew should not use</u> water should not be used on a spillage or when fumes are present since it may spread the spillage or increase the rate of fuming. Consideration should also be given to the possible presence of electrical components when using water extinguishers. <u>It is important that cabin crew use protective equipment (e.g. protective breathing equipment, protective gloves) when fighting a fire.</u></p> <p>If fire develops, cabin crew should take prompt action to move passengers away from the area involved and, if necessary, provide wet towels or cloths and give instructions for passengers to breathe through them.</p> <p style="text-align: center;">_____</p> <p style="text-align: center;">The following is moved to the end of the first paragraph after the letter list of this step.</p> <p style="text-align: center;">_____</p> <p>Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination are of utmost importance. The use of the interphone is the primary means of communication unless the interphone system fails.</p> <p><u>Caution:</u> <u>In certain firefighting situations, cabin crew may assess and deem it necessary to slightly open baggage to allow entry of the extinguishing agent and non-flammable liquid. In order to avoid injury from a flash fire, cabin crew should use caution when opening the affected baggage when there is any indication of smoke or flames. This should only be done after donning appropriate protective equipment.</u></p>
3.	<p>MONITOR FOR ANY <u>INDICATION OF REIGNITION</u></p> <p>Monitor the area regularly to identify if there is any indication that a fire hazard may still exist. If there is any smoke or indication of fire, continue to apply the firefighting procedure. <u>If smoke or flames reappear, cabin crew should repeat Step 2.</u></p>

Amplified procedures for fire involving dangerous goods	
<i>Step</i>	<i>Cabin crew action</i>
4.	<p><u>APPLY PROCEDURES FOR SPILLAGE OR LEAKAGE OF DANGEROUS GOODS, IF REQUIRED, ONCE THE FIRE HAS BEEN EXTINGUISHED</u></p> <p>In the event of a fire involving dangerous goods, <u>cabin crew may need to apply</u> the SPILLAGE OR LEAKAGE INVOLVING DANGEROUS GOODS procedures (see 3.4.67) may need to be applied once the fire has been extinguished.</p>
5.	<p><u>APPLY POST-INCIDENT PROCEDURES AFTER LANDING AT THE NEXT DESTINATION</u></p> <p>Upon arrival, <u>cabin crew should</u> apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item.</p> <p><u>Crew should</u> Ccomplete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.</p>

3.4.67 Spillage or leakage of dangerous goods

Amplified procedures for spillage or leakage of dangerous goods	
Step	Cabin crew action
1.	<p>NOTIFY THE PILOT-IN-COMMAND / OTHER CABIN CREW MEMBERS</p> <p>During Any incident occurrence concerning dangerous goods, the cabin crew should be notified immediately to notify the pilot-in-command immediately who should be kept and keep the flight crew informed of all actions taken and of their the effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each is kept fully informed of the other's actions and intentions.</p> <p>Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is essential to keep the flight deck door closed at all times. Crew communication and coordination are of utmost importance. The use of the interphone is the primary means of communication between crew members, unless the interphone system fails.</p>
2.	<p>IDENTIFY THE ITEM</p> <p>Cabin crew should Ask the passenger concerned to identify the item and indicate its potential hazards. The passenger may be able to give some guidance on the hazard(s) involved and how these could be dealt with. If the passenger can identify the item, refer to Section 4 of this document for the appropriate emergency response drill.</p> <p>On aircraft with only one cabin crew member, consult with the pilot-in-command as to whether the aid of a passenger should be sought in dealing with the incident.</p>
3.	<p>COLLECT EMERGENCY RESPONSE KIT OR OTHER USEFUL ITEMS</p> <p>Cabin crew should Collect emergency response kit, if provided, or collect for use in dealing with the spillage or leakage:</p> <ul style="list-style-type: none"> — a) aA supply of paper towels or newspapers or other absorbent paper or absorbent fabric (e.g. seat cushion covers, head rest protectors); — b) even Protective gloves or fire resistant gloves, if available; — c) aAt least two large polyethylene waste bin bags; and — d) aAt least three smaller polyethylene bags, such as those used for duty-free or bar sales or, if none available, airsickness bags.

Amplified procedures for spillage or leakage of dangerous goods	
<i>Step</i>	<i>Cabin crew action</i>
4.	<p>DON RUBBER GLOVES AND SMOKE HOOD RETRIEVE AND USE PROTECTIVE EQUIPMENT</p> <p><u>It is important that cabin crew use protective equipment (e.g. protective breathing equipment, protective gloves) when handling a spillage or leakage of dangerous goods.</u></p> <p>The Cabin crew should always protect their hands should always be protected before touching suspicious packages or items. Fire-resistant gloves or oven gloves covered by polyethylene bags are likely to give suitable protection.</p> <p>Gas tight breathing equipment should always be worn when attending to an incident involving smoke, fumes or fire.</p>
5.	<p>MOVE PASSENGERS AWAY FROM AREA AND DISTRIBUTE WET TOWELS OR CLOTHS</p> <p>The use of therapeutic oxygen bottles or the passenger drop-out oxygen system to assist passengers in a smoke- or fume-filled passenger cabin should not be considered since considerable quantities of fumes or smoke would be inhaled through the valves or holes in the masks. A more effective aid to passengers in a smoke- or fume-filled environment would be the use of a wet towel or cloth held over the mouth and nose. A wet towel or cloth aids in filtering and is more effective at doing this than a dry towel or cloth. Cabin crew should take prompt action if smoke or fumes develop and move passengers away from the area involved and, if possible, provide wet towels or cloths and give instructions to breathe through them.</p>
6.	<p>PLACE DANGEROUS GOODS ITEM IN POLYETHYLENE BAGS</p> <p><u>Note.</u>—In the case of a spill of known or suspected dangerous goods in powder form, <u>cabin crew should:</u></p> <ul style="list-style-type: none"> a) <u>L</u>leave everything undisturbed.; b) <u>d</u>o not use fire agent or water.; c) <u>C</u>over area with polyethylene or other plastic bags and blankets.; d) <u>K</u>keep area isolated until after landing.

Amplified procedures for spillage or leakage of dangerous goods	
Step	<i>Cabin crew action</i>
	<p>With emergency response kit</p> <p>If it is absolutely certain that the item will not create a problem, the decision may be made not to move it. In most circumstances, however, it will be better to move the item, and this should be done as suggested below. <u>Cabin crew should</u> Pplace the item in a polyethylene bag as follows:</p> <ul style="list-style-type: none"> —a) p<u>P</u>repare two bags by rolling up the sides and placing them on the floor. —b) p<u>P</u>lace the item inside the first bag with the closure of the item, or the point from which it is leaking from its container, at the top. —c) t<u>T</u>ake off the rubber gloves while avoiding skin contact with any contamination on them. —d) p<u>P</u>lace the rubber gloves in the second bag. —e) e<u>C</u>lose the first bag while squeezing out the excess air. —f) t<u>T</u>wist the open end of the first bag and use a bag tie to tie it sufficiently tight to be secure but not so tight that pressure equalization cannot take place. —g) p<u>P</u>lace the first bag (containing the item) in the second bag, which already contains the rubber gloves and secure the open end in the same manner as that used for the first bag. <p>With no emergency response kit</p> <p><u>Cabin crew should</u> Ppick up the item and place it in a polyethylene bag. <u>They should</u> Eensure the receptacle containing the dangerous goods is kept upright or the area of leakage is at the top. Using paper towels, newspaper, etc., <u>cabin crew should</u> mop up the spillage, after having ascertained there will be no reaction between what is to be used to mop up and the dangerous goods. <u>They should</u> Pplace the soiled towels, etc., in another polyethylene bag. <u>Cabin crew should</u> Pplace the gloves and bags used to protect the hands either in a separate small polyethylene bag or with the soiled towels. If extra bags are not available, <u>cabin crew should</u> place the towels, gloves, etc., in the same bag as the item. <u>They should</u> Eexpel excess air from the bags and close tightly so as to be secure but not so tight that pressure equalization cannot take place.</p>

Amplified procedures for spillage or leakage of dangerous goods	
<i>Step</i>	<i>Cabin crew action</i>
7.	<p>STOW POLYETHYLENE BAGS</p> <p>If there is a catering or bar box on board, <u>cabin crew should</u> empty any contents and place the box on the floor, with the door upward. <u>They should</u> Pplace the bag(s) containing the item and any soiled towels, etc., in the box and close the door. <u>Cabin crew should</u> Ttake the box or, if there is no box, the bag(s) to a position as far away as possible from the flight deck and passengers. If a galley or toilet is fitted, <u>cabin crew should</u> consider taking the box or bag(s) there, unless it is close to the flight deck. <u>Cabin crew should</u> Uuse a rear galley or toilet wherever possible, but do <u>should</u> not place the box or bag(s) against the pressure bulkhead or fuselage wall. If a galley is used, the box or bag(s) can be stowed in an empty waste bin container. If a toilet is used, the box can be placed on the floor or the bag(s) stowed in an empty waste container. The toilet door should be locked from the outside. In a pressurized aircraft, if a toilet is used, any fumes will be vented away from passengers. However, if the aircraft is unpressurized there may not be positive pressure in a toilet to prevent fumes from entering the passenger cabin.</p> <p><u>Cabin crew should</u> Eensure when moving a box that the opening is kept upward or when moving a bag that either the receptacle containing the dangerous goods is kept upright or the area of leakage is kept at the top.</p> <p>Wherever the box or bag(s) have been located, <u>cabin crew should</u> wedge them firmly in place to prevent them from moving and to keep the item upright. <u>They should</u> Eensure that the position of the box or bags will not impede disembarkation from the aircraft.</p>
8.	<p>TREAT AFFECTED SEAT CUSHIONS / COVERS IN THE SAME MANNER AS DANGEROUS GOODS ITEM</p> <p><u>Cabin crew should remove</u> Sseat cushions, seat backs or other furnishings which have been contaminated by a spillage should be removed from their fixtures and placed them in a large bin bag or other polyethylene bag, together with any bags used initially to cover them. They <u>Cabin crew</u> should be stowed them away in the same manner as the dangerous goods item causing the incident.</p>

Amplified procedures for spillage or leakage of dangerous goods	
<i>Step</i>	<i>Cabin crew action</i>
9.	<p>COVER SPILLAGE ON CARPET / FLOOR</p> <p><u>Cabin crew should</u> Ccover any spillage on the carpet or furnishings with a waste bag or other polyethylene bags, if available. If not, <u>cabin crew should</u> use airsickness bags opened out so that the plastic side covers the spillage or use the plastic covered emergency information cards.</p> <p><u>If possible, cabin crew should roll up</u> Ccarpet which has been contaminated by a spillage and which is still causing fumes despite being covered, should be rolled up, if possible, and placed <u>it</u> in a large bin bag or other polyethylene bag. It <u>Cabin crew should</u> be placed <u>it</u> in a waste bin and stowed <u>it</u>, when possible, either in the rear toilet or rear galley. If the carpet cannot be removed it should remain covered by a large bin bag or polyethylene bags, etc., and additional bags should be used to reduce the fumes.</p>
10.	<p>REGULARLY INSPECT <u>MONITOR</u> ITEMS STOWED AWAY / CONTAMINATED FURNISHINGS</p> <p><u>Cabin crew should monitor</u> Aany dangerous goods, contaminated furnishings or equipment which have been removed and stowed away or covered for safety should be subject to regular inspection.</p>
11.	<p><u>APPLY POST-INCIDENT PROCEDURES</u> AFTER LANDING AT THE NEXT DESTINATION</p> <p>Upon arrival, <u>cabin crew should</u> apply the operator's post-incident procedures. These may include identifying to ground personnel where the item is stowed and providing all information about the item.</p> <p><u>Crew should</u> Ccomplete the required documentation, as per operator procedures, so that the operator is notified of the event, proper maintenance action is undertaken and the emergency response kit or any aircraft equipment used is replenished or replaced, if applicable.</p>

Section 4

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

...

Amendment to drill codes to reflect amendments to dangerous goods list in the UN Model Regulations, Chapter 3.2, dangerous goods list (see ST/SG/AC.10/50/Add.1):

Amendments to manage aviation specific risks

Paragraph 4.2.4.1 of DGP/29-WP/3 and 2.4.1 of this report:

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

Note.— Revisions to the proper shipping name in Table 3-1 of the Technical Instructions will automatically be reflected in the associated records included in Tables 4-2 and 4-3 of Doc 9481 through the publishing process. The entries shown here are those for which an amendment to the drill code is necessary.

<i>UN No.</i>	<i>Drill Code</i>	<i>Proper shipping name</i>
<u>0514</u>	<u>3L</u>	<u>Fire suppressant dispersing devices</u>
1835		Tetramethylammonium hydroxide aqueous solution
	8L 8P	<u>With more than 2.5% but less than 25% tetramethylammonium hydroxide</u>
	8L	<u>With not more than 2.5% tetramethylammonium hydroxide</u>
3423	8L 6C	Tetramethylammonium hydroxide, solid
<u>3551</u>	<u>12FZ</u>	<u>Sodium ion batteries</u>
<u>3552</u>	<u>12FZ</u>	<u>Sodium ion batteries contained in equipment</u>
<u>3552</u>	<u>12FZ</u>	<u>Sodium ion batteries packed with equipment</u>
<u>3553</u>	<u>10L</u>	<u>Disilane</u>
<u>3554</u>	<u>8L</u>	<u>Gallium contained in manufactured articles</u>
<u>3555</u>	<u>3L</u>	<u>Trifluoromethyltetrazole sodium salt in acetone</u>
<u>3556</u>	<u>12FZ</u>	<u>Vehicle, lithium ion battery powered</u>
<u>3557</u>	<u>12FZ</u>	<u>Vehicle, lithium metal battery powered</u>
<u>3558</u>	<u>12FZ</u>	<u>Vehicle, sodium ion battery powered</u>
<u>3559</u>	<u>9L</u>	<u>Fire suppressant dispersing devices</u>
<u>3560</u>	<u>6C</u>	<u>Tetramethylammonium hydroxide aqueous solution</u>

— END —